

# REPORT

## Capacity Needs Assessment of AGRHYMET



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## Acronyms

ACMAD	African Centre of Meteorological Applications for Development
ACP	Africa Caribbean and Pacific
ACPC	African Climate Policy Centre
AfDB	African Development Bank
AGRHYMET	AGRiculture, HYdrology and METeorology
AMCOMET	African Ministerial Conference on Meteorology
ARC	AGRHYMET Regional Centre
AU	African Union
CCAFS	Climate Change, Agriculture and Food Security
CEMAC	Economic Community of Central African States
CGIAR	Consultative Group on International Agricultural Research
CILSS	Permanent Inter-States Committee for Drought Control in the Sahel
CNA	Capacity Needs Assessment
CSF	Climate Support Facility
CORAF	Council for Agricultural Research and Development
DG	Director General
DFID	UK Department of International Development
DM	Disaster Management
DRR	Disaster Risk Reduction
ECOWAP	Economic Community of West African States Agricultural Policy
ECOWAS	Economic Community of West African States
ECA	Economic Commission for Africa
ECCAS	Economic Community of Central African States
ECMWF	European Centre for Medium range Weather Forecasting
EU	European Union
EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites
FAO	United Nations Food and Agriculture Organization
FEWS NET	Famine Early Warning Systems Network
FFEM	Fonds Français pour l'Environnement Mondial
FSTP	Food Security Thematic Program
GCCA	Global Climate Change Alliance
GFCS	Global Framework for Climate Services
GPCs	Global Producing Centres
ICPAC	IGAD Climate Prediction and Applications Centre
IDRC	Research Centre for International Development
IFRC	International Federation of Red Cross and Red Crescent Societies
IGAD	Intergovernmental Authority on Development

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IOC	Indian Ocean Commission
ISACIP	Institutional Support to African Climate Institutions Project
LRF	Long-Range Forecast
MESA	Monitoring for Environment and Security in Africa
NFCS	National Framework for Climate Services
NOAA	National Oceanographic and Atmospheric Administration
NMHSs	National Meteorological and Hydrological Services
NRC	Norwegian Refugee Council
RAAF	Regional Agency for Agriculture and Food Development
RCC	Regional Climate Centre
SADC	Southern African Development Community
UKMet	United Kingdom Meteorological Office
UNECA	United Nations Economic Commission for Africa
UNDP	United Nations Development Programme
WAEMU	West African Economic and Monitoring Union
WCC	World Climate Conference
WFP	World Food Program
WMO	World Meteorological Organization
WISER	Weather and climate Information SERvices for Africa



## Executive Summary

Climate variability and associated droughts and floods are major causes of poverty and resource depletion in Africa. They are serious threat to economic growth, and their impact is particularly evident in the West African region. The Sahelian drought and famine of the early 1970s serves as reminder of the cumulative effects and impacts of desertification and drought. As the economies of West African countries in particular, are predominantly rain-fed agricultural, future economic development across the region has a high level of dependency upon climate variability and change.

Climate is a factor, amongst many, that limits the development and that requires full consideration in planning. Climate science-informed policy and practice are critical inputs for effective climate risk management for sustainable development. Yet, the use of climate information in the region's development planning has been very limited and West Africa remains the most vulnerable to climate variability and climate change. The main obstacles include limited financial and human resources, infrastructure, and technical expertise required to provide adequate climate services, lack of appropriate climate information system, lack of understanding and capacity to use climate information.

The economic benefit of climate services to Africa cannot be assessed, that climate knowledge is beneficial to the planning process cannot, nevertheless, be disputed. The World Meteorological Organization (WMO) Regional Climate Centres (RCCs) objective is to assist members of a given region to deliver better climate services and products, and to strengthen their capacity to meet national climate information needs. The capacity needs assessment of AGRHYMET was conducted under the framework of partnership between of the African Ministerial Conference on Meteorology (AMCOMET), the UK Department for International Development (DFID) Weather and Climate Information SERVICES (WISER) and WMO to support identification of the centre's capacity needs in order to perform all RCC mandatory functions to qualify for designation as RCC for West Africa region.

### Key Finding

AGRHYMET - for the AGRiculture, HYdrology and METeorology- is a specialized institution of CILSS mandated to train and inform on Sahelian food security, desertification and water control and management in order to:

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- Contribute in achieving food security and increased agricultural production in the CILSS Member States and ECOWAS;
- Help improve natural resources management in the Sahelian region and West Africa, and
- Provide training and information for development agents and their partners in the fields of agro-ecology including: agro-climatology, hydrology and plant protection.

AGRHYMET has established itself as centre of excellence and provides training and information on climate monitoring, early warning and applications in support of food security, water resource management, desertification control, environmental management, disaster risk reduction and climate change impacts for sustainable development in the CILSS Member States and West Africa.

The AGRHYMET Regional Centre (ARC) is improving its capacity to monitor food security in the region "in near real time", with techniques that range from cutting-edge satellite, gauge data management systems, and statistical models, to monitoring missions with technical partners in each of the member countries during the course of every agricultural season.

On the organization structure, it is found that the centre does not have a climate department and need to create one in order to host the RCC-Network for ECOWAS countries. It is also found that four West African countries (Ghana, Liberia, Nigeria and Sierra Leone) have not yet joined the AGRHYMET program.

### Human capacity need

The human capacity gap at AGRHYMET for effective implementation of the RCC mandatory functions are in the area of Long-Range Forecasting, Climate Prediction and Climate Modelling including downscaling and climate change.

Currently, AGRHYMET has the human resource capability to start to operate an RCC. However, the centre needs an additional staff especially in the areas of long-range forecasting and climate modelling to operate the ECOWAS-RCC without ACMAD's support.

AGRHYMET provides differentiated climate information services in three of the five GFCS priority sectors: agriculture and food security, water, and disaster risk reduction. For all of these sectors, the user interface is institutionalized through the

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countries' Multidisciplinary Working Groups that meet every ten day. However, there still is a need for human resources in the provision of differentiated climate services to health and energy sector.

### **Infrastructural needs**

The ARC has adequate office accommodation infrastructure to adequately host the ECOWAS RCC without causing constraints on the existing programs. There are enough offices, lecture rooms, laboratories, conference room etc. which can be dedicated or jointly used along with other ongoing programs at the centre.

AGRHYMET has adequate equipment and tools (computing facilities, laptops, workstations) to start the demonstration phase of the RCC functions. But, most of these equipment were obtained through specific project fund. Redirecting certain means to support the ECOWAS RCC functions could be possible but having new infrastructures exclusively for the RCC activities is event preferable to avoid conflict between project objectives.

AGRHYMET should upgrade its Internet bandwidth. Access to a reliable broadband high-speed Internet is required to support the ECOWAS RCC activities such as regional climate simulation, downscaling, etc. and reaching out to the regional NMHSs and community-level stakeholders via emails, web browsing, and file transfer.

A verification software is also needed for validation of the regional climate model performances over the West African region.

### **Financial need**

AGRHYMET's primary source of funding is from the assessed contributions of Member States which constitutes their recurrent budget for supporting core staff and essential services. Although most of the Member States pay their contributions, funding provided by them are slow to mobilize and only cover a fraction (~10%) of the centre's needs. The second source of support is extra-budgetary assistance provided by the technical and financial partners. They come in the form of project grants and last for the project life-cycle.

For the initial implementation of the ECOWAS RCC, AGRHYMET will need an additional funding that would be adequate for the level of activity envisaged for the first five-year development phase of the RCC. However, considering the present



economic difficulties encountered by many Member States, it is suggested that the take-off of ECOWAS RCC could be ensured provided sufficient external support from donors were made available to AGRHYMET in the initial five to ten-year period. The member States, however, should provide their full commitment to the ECOWAS RCC from the start and progressively increase their contribution to take over its operating costs.

### **User needs**

There is substantial evidence demonstrating that information related to seasonal time scales forecasting is being disseminated and used increasingly in West Africa. AGRHYMET is part of the initiation of the Regional Climate Outlook Forums (RCOFs) in West Africa which aim at generating consensus forecasts and bringing together climate forecasters and users to discuss the interpretation and use of these forecasts.

There is evidence of the benefits of successful coupling between climate science and users at seasonal time scales in terms of improving the management of the effects of climate variability on West African society, especially with regards to agricultural practices and water management in the Sahel. However, limits remain on both the provider side and the user side to the successful incorporation of climate information products into development planning.

### **On the providers' side:**

- An improvement in forecast skill and reliability is crucial for use and building confidence; the current level is a constraint to use in certain situations.
- Dissemination and communication of information is vital; current practice seems not to be effective.
- An improvement of seasonal forecast lead time; current seasonal forecast products are available with a short lead time of few weeks.
- Low capacity to interpret and translate climate information for decision making

### **On the demand side**

- There is a need for information on intra-seasonal time scales (onset of rainy season, dry spell frequency, rainfall secession, patchiness of rainfall, etc.
- There is a need to work on means by which climate forecast can be incorporated into development planning.

- Integration of climate information within Early Warning Systems.
- Weak relationships between the supplier and users.
- Lack of trust in the available climate products.

**Users/stakeholders need also include:**

Supporting connections with climate services information providers -- there is a need of a strong relationships between implemented projects and climate service providers at the local, national and regional levels to improve the quality of the information provided and help accessing better and more local data.

Improving understanding of climate information -- stakeholders expressed that the forecast information at its current state was too difficult for users to understand, and that there were no processes in place to translate the information into a simple and understandable language.

Tailoring information to support decision making -- current climate services were not often tailored for decision making.

Lack of forecast verification -- the common gap in current climate services information in the region is the lack of forecast verification. Users need to see the verification of past forecasts to build trust between them and the climate information providers.

Understanding uncertainty -- the majority of users are aware of uncertainties in the data. However, while some are unclear how to deal with it, others simply don't know what the uncertainty means. Some want to know what the odds are and thus expressed the need to look to past frequencies.

**Recommendations**

**1. On the technical assistance**

- International partners should help develop and facilitate mobilization of scientific staff between AGRHYMET and climate institutions in developed countries to give AGRHYMET research workers opportunities to become better acquainted and prepared to extend their knowledge and experience far beyond the boundaries of their research station area.

**2. On the Governance,**



- AGRHYMET sponsored institution (CILSS) should make a hard deadline to take the decision about joining ECOWAS to allow the participation of all West African countries in the AGRHYMET program and hence, to the incoming ECOWAS RCC activities.
- In order to formally host the ECOWAS RCC and have legitimacy of all West African countries, a regional collaborative success should be initiated by AGRHYMET to bring on board the governments of non-CILSS countries.
- CILSS Council of Ministers should improve regional coordination and undertake policy evaluation to give AGRHYMET a clear leadership, responsibilities, and coordination at the regional level for climate information systems and services.

### 3. Capacity needs

- For the inception period of the ECOWAS RCC and the mature phase, AGRHYMET should recruit at least two Experts in Long Range Forecast (LRF), two Experts in Climate Modelling Prediction and downscaling and one Expert in Climate Change and Adaptation Strategies.
- The Director General of AGRHYMET should put in place measures for the creation of an additional department, namely, "Climate Prediction and Services", which will serve as the ECOWAS RCC, where all WMO RCC mandatory and highly recommended functions will be implemented during the RCC demonstration phase and beyond.
- There is great need to significantly increase the computing capacity available to the NMHSs who will represent the national component of the ECOWAS RCC, in order to accelerate progress in the area of data exchange, climate predictions and dissemination.

### 4. Financial Needs

- For the take-off of the ECOWAS RCC, sufficient external support from donors should be made available to AGRHYMET for the initial five to ten-year period, providing that the Member States provide their full commitment to the ECOWAS RCC from the start and progressively increase their contribution to take over its operating costs.

- For the sustainability of the RCC, the Director General should put in place a dedicated structure for resource mobilization with a clearly defined hierarchy and delineation of roles and responsibilities, especially for managing and nurturing long-term relationships with the funding partners. Or,
- AGRHYMET should trust WMO Resource Mobilization Office (RMO) to undertake all the financial resource mobilization activities associated with the ECOWAS RCC functions.

## 5. Communication and outreach

- Recommendation is made for the creation of an Outreach and Communication Unit that would provide intensive outreach services to member countries and other stakeholders. This Unit will be based at ARC but would travel frequently to maintain regular contact with current and potential users and stakeholders within the region.

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# 1. Introduction and Background

## 1.1 Introduction

In order to provide entry points for technical support and services intervention, the African Ministerial Conference on Meteorology (AMCOMET), in collaboration with the World Meteorological Organization (WMO) Regional Climate Centres (RCC) and the United Kingdoms (UK) Department of International Development (DFID) Weather and climate Information SERVICES for Africa (WISER) program, sought capacity needs assessment of AGRHYMET.

The overall objectives of this assessment is to provide good understanding of the gaps that exist with the view to eventually having AGRHYMET performing all WMO RCC's mandatory functions to qualify for designation as the Economic Community of West African States (ECOWAS) RCC. WMO is encouraging the establishment of a number of Regional Climate Centres (RCCs)<sup>1</sup> that will generate and deliver more regionally focused, high-resolution data and products, as well as offer training support on the use of the products. The aim is for the RCCs to assist WMO Members States in any given Region or a defined sub-Region to deliver better climate products and services including long-range forecasts, and to strengthen their capacity to meet national climate information needs.

## 1.2 Background

The Western African arid and semi-arid region, also referred to as the Sahel, is largely subject to highly variable rainfall, resulting in droughts and floods. Droughts are indiscriminate in terms of geography, climate and political boundary. It's associated with massive socioeconomic and environmental disruptions. Severe and widespread drought of the early 1970s that occurred in the region resulted in severe food shortages, famine and death of humans and animals. The extent and shock of this disaster prompted the Permanent Inter-State Committee for Drought Control in the Sahel (CILSS), in collaboration with the United Nations Development Program (UNDP), to establish in 1974 the AGRHYMET for -- AGRiculture, HYdrology and METeorology -- Regional Centre (ARC). The objectives of this initiative are to contribute to food security, increase agricultural production and strengthen the

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<sup>1</sup> <http://www.wmo.int/pages/prog/wcp/wcasp/rcc/rcc.php>

National Meteorological and Hydrological Services (NMHSs) in each of the CILSS countries, which at that time included nine (9) countries (Burkina Faso, Cabo Verde, The Gambia, Guinea Bissau, Mali, Mauritania, Niger, Senegal and Chad), helping them improve the management of natural resources, provide information and training of development agents and their partners in the fields of agro-ecology (i.e., agro-climatology, hydrology, plant protection, among others).

In December 2006, an agreement that made CILSS the “technical arm” of the Economic Community of West African States (ECOWAS) was signed between the two institutions. This scenario, largely supported by CILSS partners, was adopted by the 15<sup>th</sup> Conference of Heads of State and Government held in N’Djamena (Chad) in March 2010. It called on CILSS to “undertake the necessary steps under the direction of ECOWAS, with the goal of making CILSS an institution specializing in rural development, fight against desertification, natural resource management and climate change, at the disposal of all inter-African integration organizations, while preserving its identity, autonomy and specificity”<sup>2</sup>. Thus, AGRHYMET’s scope of activities in recent years have expanded beyond the geographical boundaries of CILSS Member States, to include the whole of West Africa<sup>3</sup>. In 2012, coastal countries of Benin, Côte d’Ivoire, Guinea and Togo joined CILSS. Today, CILSS, through AGRHYMET stands as a strong, independent regional institution, recognized for its ability to use climate and environmental information to ensure there are no surprises (*jamaïs surpris!*) that will affect the food security of its members States.

As the economies of Africa are predominantly rain-fed agricultural, future economic development across the continent has a high level of dependency upon climate variability and change. Climate is a factor, amongst many, that limits development and that requires full consideration in planning. Climate science-informed policy and practice are critical inputs for effective climate risk management for sustainable development. Yet, the use of climate information in African development planning has been very limited and Africa remains vulnerable to climate variability. The main obstacles include limited financial and human resources, infrastructure, and technical expertise required to provide adequate climate services, lack of appropriate climate information system, lack of understanding and capacity to use climate information.

<sup>2</sup> CILSS (2014) ‘Le rapprochement institutionnel entre le CILSS et la CEDEAO en marche ! 19 July, <http://www.cilss.bf/spip.php?article444>.

<sup>3</sup> Traoré et al. (2014)

Thus there is a need to improve the provision of climate services and its use in development planning and practice in Africa.

The World Meteorological Organization (WMO), as a specialized agency of the United Nations (UN), has initiated a Global Framework for Climate Services (GFCS; <http://gfcs.wmo.int/>) to guide the development and application of climate services worldwide. The implementation of the regional component of the GFCS required the designation of Regional Climate Centres (RCCs), an institution capable of generating and delivering more regionally-focused high-resolution data and products, as well as training and capacity building.

The Sixteenth session of WMO Regional Association I (Africa) held in Praia, from 3-9 February 2015, through its Resolution 7 (RA I-16), dictated that RCC implementation in Region I will comprise of RCC Africa hosted by the African Centre of Meteorological Applications for Development (ACMAD), RCC Intergovernmental Authority on Development (IGAD) hosted by the IGAD Climate Prediction and Applications Centre (ICPAC), RCC Southern African Development Community (SADC) hosted by the SADC Climate Services Centre, RCC-Network-Northern Africa, RCC-Network Economic Community of West African States (ECOWAS), and RCC Economic Community of the Central African States (ECCAS).

AGRHYMET regional centre is suggested to host the ECOWAS RCC although all the West African countries are not member of its parent organization, CILSS. Nonetheless, the recent agreement that made CILSS the “technical arm” of ECOWAS provide an opportunity for AGRHYMET to become a climate oriented centre for West Africa, and therefore inclined to host the ECOWAS RCC. This scenario will allow ACMAD as an African multi-functional RCC, to concentrate on the provision of continental scale climate information while that of West Africa sub-region is provided by AGRHYMET. However, making ARC an RCC would require approval by both ECOWAS and CILSS policy makers in order to bring on board non-CILSS countries. In addition, the centre need to satisfy a set of mandatory WMO RCC functions in order to obtain WMO’s designation as a RCC.

### 1.3 Objectives of the assessment

The objectives of this assessment are to present the current status (key gaps and needs), propose the future development of AGRHYMET and develop a set of recommendations with potential to have significant impact on the development,



production and delivery of services to key users and stakeholders, and uptake of all WMO RCC mandatory functions to qualify for designation as the ECOWAS RCC, in near-future. To achieve these objectives, this assessment consists of the following activities:

- ✓ Review and consolidate the various assessments performed at AGRHYMET in recent years.
- ✓ Identify AGRHYMET’s key products, services and the needs of their key users.
- ✓ Undertake Capacity Needs Assessment (CNA) through identification of AGRHYMET’s human, infrastructural, institutional, and governance, fiscal and legal, communication and outreach capacity needs to provide good understanding of the gaps that exist, with a view to eventually have AGRHYMET perform all WMO RCC mandatory functions to qualify for designation as ECOWAS RCC.
- ✓ Analyse the findings by outlining key gaps that exist to help AGRHYMET improve its development, production, delivery and uptake of key weather and climate products and services.

## 1.4 Deliverables

Findings of this CNA are highlighted in sections that will contain the following;

- ✓ Present the current status (As-Is) and propose the future development (To-Be) of AGRHYMET while focusing on how the RCC will improve the delivery of services to key users and sectors.
- ✓ Assist with addressing governance issues of the RCC in the shortest time possible, by setting goals and benchmarks, explaining objectives and then presenting a plan to achieve the goals and objectives, including how the RCC will monitor their improvements in institutional performance and service delivery over time.
- ✓ Provide an opportunity to collect pertinent information and data to support decision making process, and identify strengths and weaknesses within the organization and their working environment.
- ✓ Identify the capacity building needs for effective functioning of the RCC, and

- ✓ Provide concrete recommendations and specific actions for the development of the RCC over the next 5-10 years, along with a realistic investment plan for the sustainable delivery of services (linking available funds and resources with the level of service).

## 1.5 Methodology

In this assessment, we used a qualitative method, with strong emphasis on the following participatory and consultative methods:

- ✓ Preparation of Work Plan
- ✓ In-depth Literature Review
- ✓ Key Informant Interviews
- ✓ Focus Groups
- ✓ Surveys (Questionnaires)
- ✓ Peer Review of the Draft Findings

## 2. AGRHYMET Products and Services

### 2.1 Current Status

In response to the severe and widespread Sahelian droughts of the early 1970s, which resulted in severe food shortages, famine, death of animals and exodus of people, the AGRHYMET Regional Centre (ARC, [www.agrhymet.ne](http://www.agrhymet.ne)) was created as a

specialized agency of CILSS. It is mandated to strive to ensure food security and fight against the effects of drought and desertification for a new ecological balance in its Member States now made up of thirteen (13) countries: Benin, Burkina Faso, Cabo Verde, Chad, Côte d'Ivoire, Gambia, Guinea, Guinea Bissau, Mali, Mauritania, Niger, Senegal, and Togo. As such, AGRHYMET initiative was to strengthen the National Meteorological and Hydrological Services (NMHSs) in each of the CILSS member States. As an interstate public institution with legal status and financial autonomy, AGRHYMET has today, an international status as a tool-oriented regional centre specialized in the science and techniques applied to agricultural development, rural development and natural resources management. Over the years, the centre has established itself as a regional centre for excellence in:

- Training of managerial staff of the Sahel and elsewhere
- Agro-meteorological and hydrological monitoring at the regional level
- Agricultural statistics and crop monitoring
- Regional data banks
- Management and dissemination of information on the monitoring of natural resources in the Sahel
- Documentation: agro-meteorology, plant protection, environmental monitoring, desertification, natural resources management, etc.
- Maintenance of meteorological instruments and electronic equipment, and
- Strengthening interstate cooperation through the exchange of technology and methodology

## 2.2 Mission

The ARC **mission** is as follow:

- Collect, process and analyse biophysical and socio-economic data for the provision and dissemination of information related to -- (i) food security, (ii) water resource management, (iii) climate change impacts, and (iv) desertification control and environment -- in order to sensitize and inform the general population, and particularly decision makers/stakeholders, to encourage them to take rational decisions to prevent massive human suffering and displacement due to potential climate hazards.

- To undertake capacity development through training and transfer of technology and methods adapted to the Sahelian countries in the field of climatology, agro-meteorology, hydrology, information technology, crop protection and geomatics.
- Strengthen the cooperation between CILSS member countries through the exchange of technology and methodology.

To achieve its mission, the centre monitors meteorological and hydrological phenomena, crops and pasture conditions during the rainy season to improve agricultural production and natural resources management relevant to improve food security in the CILSS member countries.

## 2.3 Mandate

As a regional training centre in Agro-meteorology and Operational Hydrology, and their Applications, AGRHYMET mandate is to:

- To collect and process data and disseminate information on (i) food security, (ii) water resource management, (iii) desertification control and (iv) climate change impacts
- To build technical capacities through training and transfer of tools, methods adapted to the Sahelian countries in climatology, agro-meteorology, hydrology, information technology, crop protection, and Geomatics.
- To strengthen interstate cooperation by sharing methodologies and technologies between member states

AGRHYMET aspiration is to:

- Contribute to achieve food security and increased agricultural production in the CILSS Member States and ECOWAS
- Help improve natural resources management in the Sahelian region and West Africa, and
- Provide training and information for development agents and their partners in the fields of agro-ecology including: agro-climatology, hydrology and plant protection.

Today, AGRHYMET has established itself as a regional centre of excellence in:

- Training and applications in Agricultural-meteorology, Hydrology, plant protection, and Environmental sciences;
- Agricultural statistics and crop monitoring;
- Regional data banks;
- Monitoring of natural resources and dissemination of information in the Sahel and the rest of West African countries;
- Documentation of Agro-meteorology, plant protection, environmental monitoring, desertification, natural resource management, etc.
- Maintenance of meteorological instruments and electronic equipment;
- Strengthening interstate cooperation through the exchange of technology and methodology.

## 2.4 Governance

The bulk of AGRHYMET Governance Body comprises of a general management, three technical departments and five Units.

### *General management*

The ARC is headed by a Director General (DG). The DG is appointed by the Council of Ministers of CILSS Member States for a period of three (3) years subject to renewal for succeeding periods of three years. Under the authority and supervision of CILSS Executive Secretary based in Ouagadougou (Burkina Faso), the DG has the responsibility for conducting the effective implementation of AGRHYMET strategic plan and ensures proper implementation of policies and procedures assigned to the centre.

**Funding:** It is noted that AGRHYMET DG is supported by a Technical Assistant, appointed by the French Cooperation, a position not defined in the CILSS Convention approved by the Heads of State and Government on 22 April, 1994, in Praia (Cabo Verde).

## *Departments*

There are two science-driven and one technical departments at the ARC. The Information and Research Department, the Training and Research Department and the Technical Support Department. Their respective *foci* are:

### *i) Department of Information and Research*

The Information and Research department's mission is to collect and analyse needed meteorological, hydrological, environmental, socioeconomic and market information systems data for the production and dissemination of information related to food security, markets, water resources, environmental management and transfer of technology to the NMHSs of Member States. The current structure of this department encompasses two divisions; one with overall responsibility for food security and markets, and the other is charged with water control and fighting desertification.

### *ii) Training and Research Department*

The main activities of this department are education, research and capacity building for students of CILSS Member States in the fields of agro-meteorology, hydrology, food security, plant protection, natural resources management and fight against desertification. The centre offers a:

- Diploma and degree level courses in in the sectors of plant protection, agro-meteorology, hydrology, food security and nutrition, climate change and sustainable development, sustainable land management, instrumentation and computer sciences, etc.
- Training in remote sensing, geographic information systems (GIS), sustainable agriculture, gender and development, plant protection, natural resource management, etc.
- Technical consultations in areas of expertise.
- Research and dissemination of information products.

### *iii) Technical Support Departments*

The technical support department provides information technology assistance, database and information management tools, and other support services such as:

- Maintenance of computers and telecommunications;

- Designing plans to upgrade the maintenance chain and telecommunications network system and internet system;
- Training and technical assistance to the user community in software engineering and database by developing standards and procedures manuals;

AGRHYMET has a multi-sectoral regional database for climate, plant health, water and agriculture.

### *Units*

The technical departments of AGRHYMET are supported by five different entities including:

- (i) The Administration, Finance and Accounting Unit for overseeing all the administrative and financial activities of the centre;
- (ii) The Communication, Information and Documentation Unit for managing the centre communication strategies, including the development of messaging and communication plans to engage the stakeholders and users;
- (iii) The Monitoring and Evaluation Unit, for monitoring and assessing the departments and other unit's activities;
- (iv) The Scientific Coordination Unit, for providing scientific assistance to the other entities and contribute to improving the scientific ethic, training, information and research standard;
- (v) Finally, the Human Resource Management Unit, in charge of managing, recruiting and hiring employees, coordinating employee benefits, and suggesting employee training and development strategies.

**Findings:** It is noted that AGRHYMET does not have a **climate department nor a unit exclusively performing climate activities and services for its Member States**. It is worthy of note that in order for a centre to be designated as a RCC, it is required to perform a set of mandatory functions related to climate prediction, as well as some additional highly recommended functions. AGRHYMET therefore, need to create a Department, and or a Division under one of the existing Departments, to address of the ECOWAS RCC activities.

## 2.5 Products and Services

### 2.5.1 Products

AGRHYMET - for the agriculture, hydrology and meteorology- initial mandate was focused on the monitoring of regional food security and fight against desertification. Thus, the centre has not developed climate prediction activities to the level of its competitors (e.g., ACMAD, ICPAC, etc.). Although the ARC does not have a department dedicated to climate monitoring and prediction, it provides training and information on climate monitoring and information, early warning and applications in support of food security, water resource management, desertification control, environmental management, disaster risk reduction and climate change impacts for sustainable development in the CILSS Member States and West Africa.

ARC is improving its capacity to monitor food security in the region 'in near real time', with techniques that range from cutting-edge satellite, gauge data management systems and statistical models, to monitoring missions with technical partners in each of the member countries during the course of every agricultural season.

The information and products are provided through analysis and outlooks for a dekad (10-day), month and season in form of cartographic, georeferenced and bulletins summarizing various climatological and environmental aspects such as; rainfall onset, dry spells, cumulative seasonal rainfall totals, drought severity, plant health, water resources and environmental watershed sustainability. More specifically, AGRHYMET produces the following information products to meet users demand;

- Satellite derived products and video satellite (NOAA, METEOSAT Second Generation, aerial videography, etc.)
- Cartographic products (administrative maps, vegetation indices, etc.)
- Georeferenced products designed in using laboratory Geographic Information System (GIS)
- Research and advice focused on agriculture, hydrology, agricultural meteorology and environment
- Monthly bulletins on the monitoring and assessment of the agricultural season, hydrology and plant health

Consensus pre-season climate outlook fora are also organized in conjunction with ACMAD and other international climate centres. The forums aim at gathering consensus forecast of the June-July-August and July-August-September cumulative rainfall for the Sahelian rainy season and of the long rainy season in the Gulf of Guinea, including the onset and cessation dates of these rainy seasons, the likely duration of the longest dry spell during the season and the average maximum discharges in large river basins. It also aim in bringing together climate forecasters and users to discuss the interpretation and use of these forecasts.

In addition, each information bulletin AGRHYMET produces contain various recommendations and advisories to the users and stakeholders such as when and where to avoid sowing, the use of early maturing and/or a drought resistant crop, etc.

An assessment of cereal balance information for each of the Sahelian countries is also produced at the end of the cropping season. This information helps target early food security assessment in a specific country or help with contingency planning and emergency preparedness for future shocks. The serial balance information is also helpful in guiding planning and investment decisions aimed at enhancing agricultural productivity or market development.

AGRHYMET products are disseminated to all NMHSs of CILSS and ECOWAS countries through its website and serve as inputs to provide early warning information to users, stakeholders and policy makers.

## 2.5.2 Services

AGRHYMET provides a variety of services to the users and stakeholders of the West African region and beyond. Most of the services are primarily in the areas of:

- Food security,
- Water resource management,
- Fight against desertification.

In collaboration with the Executive Secretariat of CILSS, five regional workshops on Prevention and Management of Food Crises (PREGEC) were held each year to present countries' crop assessment outcomes. Based on the cereal balance sheet, services on national production, planned imports and available food aid and food reserves, and their comparison to food consumption, are provided for each of the countries. This information is particularly useful to stakeholders and other partners

working in the humanitarian sector (FAO, FEWS, WFP, etc.) to determine, if any, support a country might need in order to be ready for a rapid intervention.

AGRHYMET has competence and expertise in the following areas where it provides services:

- Training in agronomy, plant protection, water resource management, agro-meteorology, computer
- Management of databases and software engineering
- Agricultural statistics
- Geographic Information System for natural resources mapping including training
- Remote sensing including training
- Hydrological modelling, studies / analysis of watershed and irrigation schemes and irrigation management
- Diagnosis of pest problems
- Design of training materials (brochures, posters, brochures.)

## 2.6 Programs

The ARC currently implements several international donor funded programs that help the centre diversify its products and outreach. These are:

- *MESA Program*

AGRHYMET is the regional implementation centre on Monitoring for Environment and Security in Africa (MESA) for ECOWAS region, Mauritania and Chad. MESA is funded by the European Union (EU) under the Global Monitoring for Environment and Security (GMES) framework to consolidate the African Monitoring of the Environment for Sustainable Development (AMESD). MESA aims to increase the capacity in information management, decision-making and planning of African continental, regional and national institutions mandated for environment, climate, and food security.

The MESA Project currently delivers products and operational services to African users in the following thematic areas:

- agricultural production
- monitoring and assessment of droughts, wildfires, land degradation mitigation

- coastal and marine resources management
- water resources management
- natural habitat conservation
- rangeland management and forest monitoring

A continental wide bulletin is issued twice a year based on the analysis of the seasonal climate forecasts and environmental indicators derived from satellite imagery, including the Normalized Difference Vegetation Index (NDVI), rainfall estimation, active fire products, chlorophyll-a and sea surface temperatures (SSTs). MESA continental bulletin is produced through the cooperation between MESA Regional and Continental Implementation Centres (ACMAD, BDMS/SADC-CSC, CICOS, AGRHYMET, ICPAC, MOI, and the University of Ghana), MESA Headquarters at the African Union Commission and the Joint Research Centre of the European Commission.

- *GCCA Project*

The Global Climate Change Alliance (GCCA) is an initiative between the EU and the Africa Caribbean and Pacific (ACP) countries most vulnerable to climate change. Through its Climate Support Facility (CSF), the GCCA program offers expertise on climate change and adaptation to institutions such as AGRHYMET. The CSF consists of a pool of experts in a range of areas related to climate change who are mobilized on demand to provide the customized technical assistance requested by beneficiaries. The expertise is available to help with:

- trainings, workshops and capacity building
- project identification/formulation and feasibility studies
- assessment of projects and assistance with funding accesses
- policy development, strategies and roadmaps preparation

- *Food Security Thematic Program*

The Food Security Thematic Program (FSTP) currently has two implementation phases at ARC. Phase 2 is funded by the EU and aim to improve food security in the poorest and most vulnerable countries in CILSS and ECOWAS region, and phase 3, on the other hand, is related to sustainable land management and climate change adaptation in the Sahel and West Africa program. It aims to reduce the vulnerability of the countries due to climate change. It is co-financed by the EU, the French Fonds

Français pour l'Environnement Mondial (FFEM) and the Research Centre for International Development (IDRC).

- *Program for adaptation of climate change in agriculture and water resource sectors*

This project aims to strengthen the capacities of West African countries in addressing climate change through pilot projects and training. It is funded by the French Global Environment Facility (GEF).

- *ISACIP / AfriClimServ Project*

The Institutional Support to African Climate Institutions Project (ISACIP) is an African Development Bank (AfDB) funded project designed to strengthen the capacities of African regional climate centres to develop and disseminate climate information in support of economic development in the continent. Although coordinated by ACMAD, the primary beneficiaries are ACMAD, AGRHYMET, ICPAC and DMC. ISACIP main activities include:

- improve access to observation networks
  - operationalization of climate information systems
  - improve expertise for downscaling global climate data and scenarios
  - develop and implement climate information dissemination strategies
  - enhancement of the capacity of scientists
  - climate impacts assessments
  - technical and professional training
  - capacity strengthening
- *Program to support food security and nutrition in West Africa*

Co-funded by ECOWAS and the French Development Agency (AFD) under the framework of the Regional Partnership Compact for the Implementation of the Comprehensive Africa Agriculture Development Program in West Africa (ECOWAP/CAADP), this program is designed to contribute in achieving the ECOWAS Regional food security objectives.

## 2.7 Milestones

Key accomplishments of AGRHYMET over the past years have permitted considerable advances in crop yield forecasting and early warning. These accomplishments include:

- Strengthening its member countries NMHSs observational data network;
- Training of many staff from CILSS member countries and other African countries in agro meteorology, hydrology, instrumentation and equipment maintenance, computer science, GIS, and remote sensing;
- Establishing a standardized system of regional database at ARC;
- Installation of a ground satellite receiving station at ARC;
- Establishing and strengthening the cooperation between NMHSs, agricultural and livestock ministries through the Multidisciplinary Working Group (MWG) “Group de Travail Pluridisciplinaire, GTP” that meet every ten days during the cropping season.

The multidisciplinary working group (MWG), led by the National Meteorological Service are composed of technical experts from NMHSs, the Ministry of Agriculture, hydrology, plant protection, livestock breeding, and early warning agency. This group, which still meets today, during the cropping season processed the seasonal forecasts for use in preparing 10-day bulletins. The bulletins provide the basis for information and advice to farmers, as well as to national policy makers on the food security status of the country.

The 10-day bulletins report on the state of crops, water resources and weather conditions as well as crop health issues, pastoral issues, animal husbandry, and agricultural markets. They also predict future conditions for the next 10-day and are disseminated by radio as well as printed versions.

AGRHYMET achievement has contributed to reduce the challenges of food insecurity associated with the impacts of droughts and floods in CILSS countries. The centre has also contributed in collaboration with ACMAD, in the implementation of the Regional Climate Outlook Forums (RCOFs) respectively for West Africa Sahel and the Gulf of Guinea (PRESAO, and PRESAGG), where consensus-based approach is applied to produce and disseminate assessment of the expected state of the regional climate for the upcoming season.

As part of the GFCS implementation strategy, AGRHYMET has yet to start the processes toward a demonstration phase before it can apply to be designated as WMO RCC. During the demonstration period, AGRHYMET is expected to implement WMO RCC mandatory functions (Annex I) and report the products as per the defined criteria in an RCC web portal. These functions include the operational Long-Range Forecasting (LRF), climate monitoring, climate data services to support operational LRF and climate monitoring, and training in the use of RCC products and services.

### Recommendations

***For the benefit of capacity development of African scientists, it is recommended that the technical assistant to the Director General of AGRHYMET position should be filled by a scientist from CILSS/ECOWAS Member States providing that the costs involved should be charged to the general budget of AGRHYMET.***

***Considering that climate monitoring and prediction play an important role in long-term planning and that nowhere in West Africa is climate systematically integrated into long-term planning and investment decision-making, it is urgent for AGRHYMET to create an additional Department of Climate Monitoring and Prediction which can perform the RCC ECOWAS activities.***

## 3. Assessment Findings

### 3.1 Introduction

Today, climate variability and climate change decisions and actions in Africa are being informed by a loose confederation of networks and non-governmental organizations (NGOs) created to assist in understanding, anticipating and responding to climate phenomena, their impacts, and implications. Users are often confused by this diverse array of institutions and products available. Development partners also, tend to complicate matters further instead of supporting efforts to simplify and streamline assistance. Some rely on one institution or another, depending on their needs and operational strategies, while others promote new intervention frameworks or other programming exercises within existing arrangements.

CILSS and ECOWAS made numerous commitments in support of regional initiatives to tackle challenges, among other things that cannot be solved at the national level. Such challenges affect rural household farmers and pastoralists' lives in areas ranging from food security, desertification, climate variability and climate change adaptation and mitigation. AGRHYMET as a climate oriented institution of these organisations is expected to carry on the regional implementation of climate impacts on natural resource sectors, such as agriculture, water resources, forestry, ecosystem, and on human activities and infrastructure.

This Chapter presents the capacity gaps and needs that are holding back AGRHYMET in becoming the ECOWAS Regional Climate Centre for the provision of effective climate services for planning and decision-making in West Africa. It is found

that insufficient institutional, human, financial and technological capacity continues to hamper adequate work management at AGRHYMET.

### 3.2 AGRHYMET Capacities Gap

The development of ECOWAS RCC, offers great potential to enable farmers and stakeholders in West Africa to make informed-decisions, better manage risk, take advantage of favourable climate conditions and adapt to climate change. However, the indicated institution (AGRHYMET) to host this RCC is not representative of all ECOWAS countries and need to address additional challenges including:

- 1) **Political Authority** that brings legitimacy to regional actions through engagement by elected officials, or provides a recognized political voice when dealing with other levels of government.
- 2) **Professional Authority** demonstrated through internal and external staff capacity, talent and expertise.
- 3) **Planning Authority** to develop short- or long-term plans, visions or policies.
- 4) **Financial Authority** to collect and allocate resources including contribution from Members States, international donors and technical partners.

#### 3.2.1 Ownership status

Reducing losses to climate-related disasters, meeting wider human development objectives, and implementing a successful response to climate change are aims that can only be accomplished if they are undertaken in a regional integrated manner. The CILSS/AGRHYMET to date comprises thirteen (13) states (Benin, Cote d'Ivoire, The Gambia, Guinea, Guinea Bissau, Mauritania, Senegal, Togo, Burkina Faso, Mali, Niger, Chad and Cabo Verde), all except Chad and Mauritania are member of ECOWAS.

ECOWAS countries such as Ghana, Liberia, Nigeria, and Sierra Leone still did not join the CILSS organization despite that it is chosen to be the technical arm of ECOWAS. This suggests that non-CILSS countries in West Africa are not associated with the decision-making process and design of numerous regional programs to be implemented at AGRHYMET. It is, therefore, important for the Executive Secretary (ES) of CILSS, under the proposal of the Director General of AGRHYMET to brief the

Council of Ministers on the designation of AGRHYMET to host the ECOWAS RCC and thereby, inviting these countries to accelerate the process of joining the CILSS organization.

To avoid falling into the category of failed programs where the main constraint in the implementation has been, from the onset, the lack of shared vision of the program itself, AGRHYMET must be sure that all ECOWAS countries participate to the RCC initiative from start. Otherwise, non-CILSS member countries may view the AGRHYMET RCC as a CILSS program and partially from ECOWAS, and may wonder why they should participate and contribute to its success. Consequently, there is an urgent need for ECOWAS to back CILSS which will then make AGRHYMET a climate services centre for all West African States.

CILSS was already home to the Technical Secretariat for the Regional Council of Food and Security in West Africa. Hence, the backing of ECOWAS in the field of climate services for planning and decision-making will give AGRHYMET the political authority that brings legitimacy to regional actions through engagement by elected officials, or provides a recognized political voice when dealing with other levels of government.

### Recommendations:

**AGRHYMET sponsored institution (CILSS) should make a hard deadline to take the decision about joining ECOWAS to allow the participation of all West African countries to AGRHYMET program and therefore, to the ECOWAS RCC activities.**

**A regional collaborative success should be initiated by AGRHYMET to bring on board the governments of non-CILSS countries in order to formally host the ECOWAS RCC and have legitimacy of all ECOWAS countries.**

### 3.2.2 Leadership Status

The most important factor influencing the success of climate services governance in West Africa has been engagement by the top political leadership. In situations where political leaders have taken an active interest, matters have moved forward swiftly and with precision. Meadowcroft (2010) for example, stated that there is nothing that

focuses the minds of officials and external stakeholders more than the knowledge that the Prime Minister or President is actively interested in a file<sup>4</sup>.

Institutional leadership is also important in this process. In today's complex West African institutional context, AGRHYMET can see its credibility diminish because of the rise of other regional agencies working in the same field (e.g., Regional Agency for Agriculture and Food (RAAF), the West and Central African Council for Agricultural Research and Development (CORAF/WECARD), the West African Economic and Monitoring Union (WAEMU) program of Agricultural Transformation for Food Security and Nutrition, etc.

An advocacy and lobbying to the Heads of State and Government of ECOWAS by AGRHYMET authorities are needed in order for the centre to have the legitimacy of a specialized institution of ECOWAS in climate services provision.

#### Recommendation:

**CILSS Council of Ministers should improve regional coordination and policy evaluation to give AGRHYMET a clear leadership, responsibilities, and coordination at the regional level for climate information systems and services.**

### 3.2.3 Human Capacity Gaps

The current staffing of AGRHYMET is just sufficient and well qualified to perform the ongoing activities mandated to the centre (Table 1). A good number of them are professionals, capable of leading scientific research, training and information management, but most are working in the area of climate applications relevant to the functions of a RCC (e.g., agriculture and food security, water resources, and environment). Most recent survey on the ARC human capacity revealed an inadequacy of human resources (too few people, high mobility and lack of training).

In addition to the deficit in human resources, a precarious employment and the lack of motivation of the staff also hamper the efficiency of the centre. Many of its staff are recruited to serve the needs of specific programs or projects. These research programs are funded by the international donors and cannot be sustained beyond

<sup>4</sup> Meadowcroft J.: Climate change governance -- A paper contributing to the 2010 World Bank World Development Report.

their life cycle. The personnel recruited through these projects often lose their positions at the end of the project and information services provided through these, also end abruptly because of lack of funds.

**Table 1:** Status of current staff at AGRHYMET and Needs

	Departments	Staff Number	Needs
1	Administration/management	10	None
2	Information and research Training and research RCC	38	Two (2) Experts (PhD Level) in Long-Range Forecasting Two (2) Experts (PhD Level) on Climate Modelling ( downscaling) One (1) Expert in the Provision of differentiated climate information to health and energy sectors respectively
3	Technical support	11	None

In this current state, AGRHYMET has gaps in the positions of Long Range Forecasting, Climate Prediction and Climate Modelling. The implementation of the RCC demonstration phase will require the recruitment of experts in these areas. Another human capacity challenge AGRHYMET has been in the area of Climate Change, a position currently filled by an officer seconded under a project.

The implementation of the ECOWAS RCC will therefore require a recruitment of skilled climate scientists at AGRHYMET, during the demonstration phase, in the area of long range forecast, climate modelling and climate change.

**Recommendation:**

**For the inception period of the ECOWAS RCC, there is a need to recruit at AGRHYMET**

- **Two (2) Experts in Long Range Forecast (LRF)**
- **Two (2) Experts in Climate Modelling**
- **One (1) Expert in Climate Change and Adaptation Strategies**

**3.2.4 Gaps in AGRHYMET Products**

Among the key GFCS priority areas, AGRHYMET has capacity in three. That is: agriculture and food security, water resources and disaster risk management. All three areas have an emphatic need for the products and services that ARC can offer. AGRHYMET provides critical products and information services for socio-economic development of African people as well as sustainable environmental management. The centre has many success stories. For example:

- AGRHYMET products have contributed to reduce the challenges of food insecurity associated with the impacts of droughts and floods in CILSS countries.
- The centre has greatly contributed in the implementation of the Regional Climate Outlook Forums (RCOFs) in West Africa, which have become the principle vehicle for providing advanced information about the likely character of the rainy season in the Sahel and the Gulf of Guinea regions.
- AGRHYMET accomplishments have permitted considerable advances in crop yield forecasting and early warning
- AGRHYMET uses Earth Observation data to monitor crop pests and diseases over a large area to advise ECOWAS Member States on the current status of crop pests and diseases in the region.

However, there is no available climate services products targeting the other two GFCS priority sectors, namely health and energy. As such, AGRHYMET has a



human capacity gap in these areas that need to be filled in order for the centre to satisfy the needs of the users in these sectors.

## Recommendations

**There's need for AGRHYMET to develop expertise in the production and delivery of differentiated climate information to the health and energy sectors.**

### Training and Capacity Building Needs

There is little capacity at the NMHSs level for providing intra-seasonal to inter-annual climate predictions that can aid decision makers in planning. In addition, gradually increasing global warming and accompanying climate extremes (e.g., droughts, floods, heat waves) forced by greenhouse gas emissions have also introduced a new element into information needs for many stakeholders. Therefore, there's a need for training in the use of operational RCC products and services to:

- Provide information on methodologies and product specifications for mandatory RCC products, and provide guidance on their use;
- Coordinate training (training of trainers) for RCC users in interpretation and use of mandatory RCC products.

Capacity building need to be addressed in order to improve the provision and delivery of climate services and their role in sustainable development in West Africa.

## Recommendations

As a centre of excellence, AGRHYMET RCC should serve as:

**A regional resource centre for the West African region, which will help in capacity building of scientists from NMHSs;**

**Enhance substantive participation of ECOWAS countries' scientists in the process of generating new regional modelling scenarios of climate change;**

**Help contribute to capacity development in West Africa and improve the visibility of the region concerns in the international climate change policy discourse;**

**Conduct research to understand the nature and impacts of climate variability and change at local/community level;**

**Undertake comprehensive assessment of the performance of global climate models and downscaling tools in the West African context.**

### **3.3 Technical Capacity Gaps**

#### **3.3.1 Infrastructural and Organizational Needs**

AGRHYMET - for the AGriculture, HYdrology and METeorology initial mandate was focused more on the monitoring of regional food security and fight against desertification rather than climate prediction. Hence, the centre does not have a climate prediction department. A successful implementation of the ECOWAS RCC activities requires the creation of such department at AGRHYMET which will be exclusively responsible in performing all the recommended RCC mandatory functions and the additional highly recommended functions as needed. The operational functions carried out by this department can be found in **Annex I**.

Because AGRHYMET is called to host a WMO RCC- Networks for ECOWAS countries, it can abstain itself in to implement all the mandatory and highly recommended functions under its roof. RCC-Networks comprising one or more nodes with the mandatory functions distributed among the nodes, and each node delivering its assigned function(s) for the entire domain of responsibility. It is initially proposed that ACMAD should perform on the behalf of AGRHYMET part of the RCC mandatory and highly recommended functions.

However, in view of the current staffing situation at ACMAD, it turns out that AGRHYMET is even better equipped than ACMAD and has the capability to operate an RCC requirement activities without the support of ACMAD. The Centre has the adequate office accommodation infrastructure to adequately host the ECOWAS RCC without causing constraints on the existing programs. There are enough offices, lecture rooms, laboratories, conference room etc. which can be dedicated or jointly

used along with other ongoing programs at the centre. The current staff is also an asset to the RCC providing additional recruitments as proposed earlier.

## Recommendations

**The Inspector encourages the Director General of AGRHYMET to put in place measures for the creation of an additional department, namely, "Climate Prediction and Services", which will serve as the ECOWAS RCC, where all WMO RCC mandatory highly recommended functions will be implemented during the RCC demonstration phase and beyond.**

In default of a full Department, a creation of a climate services division, possibly under the department of information and research could also be acceptable. A climate services division under such department that already have the food security, water control and fight against desertification divisions, will be complementary in providing useful climate information for agriculture and food security, disaster risk reduction, and water resources, three of the five GFCS priority areas. The other priority areas are health and energy.

### 3.3.2 Equipment and tools

ARC has adequate equipment and tools to start the demonstration phase of the RCC functions. The centre has many computing facilities including 110 computers, 29 laptops and workstations including 3 servers. But most of these equipment were obtained through specific project funds. Therefore, while some of the available computers can be allocated to the RCC during the demonstration period, it is recommended to have new equipment and tools exclusively allocated to the RCC functions.

Adequate computational resources are critical for regional climate models, as well as impacts-adaptation-vulnerability assessment, and for projecting future changes. ECOWAS RCC would benefit from improvements in and access to high-performance computing. Efforts are needed to ensure that the output from models, analyses, and assessments are appropriately managed, undergo continuing development, and actually inform decision-making processes at appropriate levels.

Most of the West African countries currently provide basic or essential climate services, but they have inadequate observation network, and inadequately developed climate databases, hampered by limited capacity to generate and develop

information products and engage users. ECOWAS RCC should be adequate to support the NMHSs in tailoring climate information to satisfy their user’s needs.

### Recommendation

**To ensure the success of the ECOWAS RCC strategy, AGRHYMET partners should take steps to increase the computational and human resources available to support a wide range of modeling efforts and ensure that these efforts are linked with both the national observing system strategy and with efforts to support effective decision making.**

**There is great need to significantly increase the computing capacity available to the NMHSs who will represent the national component of the ECOWAS RCC, in order to accelerate progress in the area of data exchange, climate predictions, tailoring and dissemination of climate information to local users.**

### 3.3.3 Financial Need

AGRHYMET’s main source of funding is from the assessed contributions of Member States which constitutes their recurrent budget for supporting core staff and essential services. Although most of the Member States pay their contributions, funding provided by them are slow to mobilize and only cover a fraction (~10%) of the centre’s needs.

The second source of support the centre relies on is the extra-budgetary assistance provided by the technical and financial donors. They have traditionally consisted of USAID, the African Development Bank (AfDB), the European Union, France, Danish Cooperation, World Bank, and UEMOA. This assistance comes in the form of grants for project activities carried out by the institution. They are provided over the life-cycle of the project and does not necessarily carry any expectation of extension once the project comes to an end. Most likely, the ECOWAS RCC functions will be financed through a similar system.

For the initial implementation of the ECOWAS RCC, AGRHYMET will need an additional funding that would be adequate for the level of activity envisaged for the first five-year development phase of the RCC. However, considering the present economic difficulties encountered by many Member States, it is suggested that the take-off of ECOWAS RCC could be ensured provided sufficient external support from



donors were made available to AGRHYMET in the initial five to ten-year period. The member States, however, should provide their full commitment to the ECOWAS RCC from the start and progressively increase their contribution to take over its operating costs.

Since AGRHYMET is funded through assessed contributions from the CILSS Member States and extra-budgetary resources from donors, the key financial management issue for the functioning of the ECOWAS RCC is the mobilization of financial and in-kind resources to undertake the development efforts. A strong connection must exist between the core mandate of the ECOWAS RCC and its ability to attract contributions, and this, can be relatively easy or difficult for AGRHYMET to raise resources. Ideally, the Centre would need a resource mobilization structure to create awareness and understanding of its mandate through activism, engagement of executive head of States, and engagement with partners.

It is also true that resources have to be spent in order to raise resources. AGRHYMET, therefore, needs a strategy for resource mobilization that could avoid personnel cost, and help to prevent in-house competition for resources, avoid piecemeal efforts, and help in allocating resources where they are most needed, and ultimately leads to comprehensive program delivery and broad impact.

Bearing in mind these considerations, in addition to the sustainability concern of this new sub-regional climate centre, we recommend that:

### Recommendations:

***For the take-off of the ECOWAS RCC activities, sufficient external support from donors should be made available to AGRHYMET for the initial five to ten-year period, providing that the Member States provide their full commitment to the ECOWAS RCC from the start and progressively increase their contribution to take over its operating costs.***

***For resource mobilization, two options are recommended to AGRHYMET to guarantee the sustainability of the RCC.***

- i) The Director General should put in place a dedicated structure for resource mobilization with a clearly defined hierarchy and delineation of roles and responsibilities, especially for managing and nurturing long-term***

***relationships with the funding partners. The member of this structure should hold full-time position and its composition should be, for example:***

- ***the Director General of AGRHYMEY***
- ***one (1) representative of CILSS Executive Secretariat***
- ***one (1) representative of ECOWAS Commission***
- ***the head of the Scientific Coordination Unit***
- ***the head of ECOWAS RCC***

***or***

***ii) AGRHYMET can trust WMO Resource Mobilization Office (RMO) to undertake all the financial resource mobilization activities associated with the ECOWAS RCC functions.***

### **3.3.4 Communication Strategy**

It appears that some of the needed climate information for decision making is already being offered by the NMHSs of respective, regional and sub-regional climate and research institutions as well as pilot activities based in universities and NGOs. However, they are not coordinated, have inadequate funding, and often lack high-level vision and leadership. It is necessary to develop a two-way communication strategy and embraced interests from decision makers. It is also necessary to engage the existing institutions that have track record of providing climate information (e.g., ACMAD, NMHSs, Niger Basin Authority, etc.).

#### ***Recommendation:***

**It is recommended the creation of an Outreach and Communication Unit that would provide intensive outreach services to member countries and other stakeholders. This Unit will be based at ARC but would travel frequently to maintain regular contact with current and potential users and stakeholders within the region.**

### 3.3.5 Institutional Coordination

At present, there is a lack of institutional arrangements in West Africa to facilitate the systematic integration of climate information with other relevant information such as environmental, health, socio-economic, etc. in a form that can be used by development planning agencies. This is aggravated by the fact that within different sectors there are a wide range of institutions working at different administrative scales that are generally poorly coordinated.

This lack of coherence in policy or lack of coordinated institutional is a barrier in assisting farmer risk management practices or responding to climate impacts such as droughts or flooding. Fragmented institutions make it difficult to share capacity to analyse climate data or develop crosscutting to support risk management.

#### Recommendation

**To help provide a more cohesive approach to delivering appropriate climate information services in the West African complex environment, AGRHYMET should find the way in engaging boundary institutes such as national research centres, universities and NGOs in the development of demand-led climate information.**

## 4. User Needs

### 4.1 Status and Needs of Climate Services

#### 4.1.1 Current Status

NMHSs in West Africa are the principal providers of climate information services and products at the national levels. The range of information and services they provide include:

- Current and historical weather and climate data
- Daily weather forecast
- Climate forecast at different time scales (ten-day, monthly and season)
- Products targeting specific users (agriculture, plant protection, health, etc.)
- Analysed climate information
- Specialized information and products in response to specific demands (such as drought early warning, flood monitoring, desert locust monitoring, etc.).

In addition, the NMHSs are required to provide, install and maintain the countries' networks of observation stations, disseminate weather and climate information and products to end-users and participate in all regional and international fora on

meteorology. Thus, NMHSs of AGRHYMET member countries play a critical role of providing meteorological data to AGRHYMET.

#### 4.1.2 Major Gaps

Challenges associated with the provision of climate information services in West Africa are essentially a result of limited capacities of the NMHSs and they are common across these agencies.

Regional climate products lack the level of resolution to provide adequate details at national levels. This situation is exacerbated by the lack of skilled staff at NMHSs to interpret these products and poor service delivery to the rural communities who are most in need of such critical information.

Limited funding and lack of adequate infrastructure due to little investment in the NMHSs are another major impediments. For example, survey conducted over West Africa under CGIAR/CCAFS<sup>5</sup> shows that there so much need for climate products and services, but there are severe limitations in terms of technical capacity, availability of professional staff and applications software. There is also the lack of competency in database management with a number of countries lacking database management systems in place, and lack of dissemination and communication strategy. Some of the major gaps include:

- The deterioration of the region climate observation networks. This creates key gaps in our understanding of and ability to predict the regional and global climate system;
- Lack of engagement of NMHSs in West Africa with the national development programs;
- Lack of knowledge and understanding of the user needs;
- Little capacity to tailor climate information appropriately to meet the user's demands.

## 4.2 Climate Services Need in ECOWAS Region

Achieving the goal of climate resilient and less vulnerable societies depend on improved decision-making of governments planners, donors, extension workers,

<sup>5</sup> Kadi, M., Njau, L.N., Mwikya, J., Kamga, A., 2011a: The State of Climate Information Services for Agriculture and Food Security in West African Countries. CCAFS Working Paper No. 4. Copenhagen, Denmark.

NGOs and farmers. Thus, demand of climate information must come from these users of climate products, and this demand must be met by efficiency supply of credibility, timely and appropriate information in a form that support the particular planning needs and the capacity for utilizing the information effectively.

However, in the ECOWAS region, users said that the available climate information was not understood or trusted. This indicates that at its present state, there is a need for a sustainable, in-country mechanism for the translation of climate information into a simple and understandable language.

Also in the ECOWAS region,

- There is evidence of demand for seasonal forecast information related to droughts and floods by users in West Africa.
- There are some important challenges for further consideration on both the provider side and the demand side of seasonal climate information plus a need for effective communication between the communities.

**On the provider's side:**

- An improvement in forecast skill and reliability is crucial for use and building confidence; the current level is a constraint to use in certain situations.
- Dissemination and communication of information is vital; current practice does not seem to be effective.
- An improved seasonal forecast lead time; current seasonal forecast products are available with a short lead time of few weeks.
- Low capacity to interpret and translate climate information for decision making

**On the demand side:**

- There is a need for information on intra-seasonal time scales (onset of rainy season, dry spell frequency, rainfall cessation, etc).
- There is a need to work on means by which climate forecasts can be incorporated into development planning.
- Integration of climate information within Early Warning Systems.
- Weak relationships between the suppliers and users.

- Lack of trust in the available climate products

Access restrictions on countries data is another challenge most users across West Africa face. Over the past decades, most of the NMHSs in Africa have moved from government funded meteorological services to ones that are increasingly being asked to recover a substantial portion of their costs of operation. This has created reluctance on the part of several NMHSs across Africa to provide data without restrictions being on their use or redistribution. **Free and unrestricted exchange of weather and climate data are needed for effective climate services in ECOWAS region and beyond.**

### 4.3 Stakeholder needs

Stakeholders also expressed the need to:

- **Supporting connections with climate services information providers** -- there is a need of a strong relationships between implemented project and climate service providers at the local, national and regional levels to improve the quality of the information provided and help in accessing better and more local data.
- **Improving understanding of climate information** -- stakeholders expressed that the forecast information at its current state was too difficult for users to understand, and that there were no processes in place to translate the information into a simple, understandable language. This indicates that some of the available information is not useful, in its current form.
- **Tailoring information to support decision making** -- stakeholders expressed that the climate information they were providing to help small-stakeholders and farmers was not tailored toward decision making.
- **Lack of forecast verification** -- the common gap in current climate services information in the region is the lack of forecast verification. Users expressed the need to see forecast evaluation become part of a regular forecasting process.
- **Understanding uncertainty** -- the majority of users are aware of uncertainties in the data. However, while some are unclear how to deal with it, other simply

don't know what the uncertainty means. Some want to know what the odds are and thus expressed the need to look to past frequencies.

## 5. Conclusion

Climate-informed policy, planning, investment and interventions results in more resilient, less vulnerable economies and societies, and thus fostering sustainable development. An effective climate information service requires widest possible range of decision makers, stakeholders and users at national and local levels, accesses to reliable information about current and future climate, the impacts and consequences and the options for reducing risks or adapting to them. Both decision makers and users need information tailored to their particular needs, communicated clearly, timely and accompanied by decision support tools that allow to improve planning, risk management and resource allocation.

ECOWAS RCC to be hosted by AGRHYMET will be an important centre in providing such climate service information for West African countries. For the ECOWAS RCC to effectively deliver such information, this assessment recommend that AGRHYMET, the host institution be equipped, financed, and organized in such a way as to properly fulfil these objectives. There is currently a substantial gap between AGRHYMET's potential for environmental monitoring and its ability to meet the demands of users at the national, and regional level.

## ANNEX I: Activities of a WMO RCC mandatory functions

**Operational activities for LRF (both dynamical and statistical, within the range of a 1-month to 2 year timescale, based on regional needs):**

- Interpret and assess relevant LRF products from GPCs (some of which can be obtained through the Lead Centers for Long Range Forecast Multi-Model Ensemble (LRFMME), make use of the Lead Centre for Standard Verification System(SVS) for LRF, distribute relevant information to RCC users, and provide feedback to GPCs
- Generate regional and sub-regional tailored products, relevant to RCC user needs, including seasonal outlooks
- Generate “consensus” statement on regional or sub-regional forecasts
- Perform verification of RCC quantitative LRF products, including the exchange of basic forecasts and hindcast data
- Provide online access to RCC products and services to RCC users
- Assess use of RCC products and services through feedback from users

**Operational activities for climate monitoring;**

- Perform climate diagnostics including analysis of climate variability and extremes, at the regional and sub-regional scales

- Establish an historical reference climatology for the region and/or sub-regions
- Implement a regional climate watch
- Operational data services, to support operational LRF and climate monitoring
- Develop quality controlled regional climate datasets, gridded where applicable
- Provide climate database and archiving services, at the request of NMHSs

**Training in the use of operational RCC products and services**

- Provide information on methodologies and product specifications for mandatory RCC products, and provide guidance on their use

Coordinate training for RCC users in interpretation and use of ma

## ANNEX II: ECOWAS RCC Implementation Plan

Operational Objective	Activities	Expected Result	Time Frame (Years)						Est. Cost to be Det.
			1	2	3	5	8	10	
<b>Objective 1</b>  <b>Increase Political Support and Recognition of AGRHYMET as WMO Regional Climate Centre for ECOWAS countries</b>	Advocacy/lobbying to Heads of State and Government by AGRHYMET Director General, CILSS Executive Secretary and the ECOWAS Commission for CILSS to become a specialized institution of ECOWAS	CILSS join ECOWAS and AGRHYMET officially recognized as WMO RCC for West African countries							
	Work at creating in the region, a general environment conducive English speaking countries to join CILSS	Participation of all the West African countries to the ECOWAS RCC activities							
	Review and improve the legislative and regulatory framework for generation and application of climate services, including integration of climate services in all climate dependent sectors at national and regional								

	levels						
<p><b>Objective 2</b></p> <p><i>Meet the Demand for Tailored Climate Service Provision in the Priority Climate-Sensitive Sectors (Agriculture &amp; Food security, Health, Disaster Risk Management, Energy, water resources, etc.)</i></p>	Define, build and make available a Climate Services Toolkit to all ECOWAS countries	Ensure that climate sensitive sectors have access to up-to-date, reliable and consistent climate information and products that meet at least their basic needs					
	Improve Climate System Monitoring and its products based on standards, data exchange protocols, improved gridded data, improve access to users.	Standard templates of national climate monitoring products and climate reports; improved procedures for gridding data					
	Strengthen collaboration with the Regional Climate Centres (RCCs) for the implementation of the Integrated African Strategy on Meteorology (Weather and Climate Services) and its Implementation Plan for sustainable development	Collaboration with ACMAD strengthen,  Collaboration established with other sub-regional RCCs					
<p><b>Objective 3</b></p> <p><i>Build the capacity of the NMHSs and other technical services to jointly co-produce salient climate products and</i></p>	Provision of training materials, methodologies, tools, procedures, working instructions, guides and manuals	Training on data quality control procedures, Manual on data rescue, climate data management achieved					
	Training on interpretation on use of RCC products	Understanding and use of RCC products improved					

<p><b>services, building on multi-disciplinary knowledge and expertise from each sector</b></p>	<p>Establish the User Interface Platform (UIP) of the GFCS at the National and Regional level to engage with users and enhance the application of climate services for sectors such as agriculture, disaster risk reduction, water, health, transport, environment, among others.</p>	<p>Providers and users of climate information work together for the benefit of integrating climate information into decision making process.</p>											
<p><b>Objective 4</b></p>	<p>Enhance Public Awareness and Education through outreach programs to the users, policy / decision makers, the public and other stakeholders</p>	<p>Public understanding of the importance of climate applications for sustainable development improved</p>											
<p>Improve the Communication / widespread distribution of Climate Services</p>	<p>Develop a Service Delivery / Communications Strategy for the dissemination of weather and climate information to stakeholders, in collaboration with the media, as a component of the NMHS Strategic Plan</p>	<p>ECOWAS RCC Website created.  Cooperation with national public and private medias (radio, TV, newspapers, etc.) strengthened</p>											
<p>Visibility and relevance of the ECOWAS RCC and NMHSs in the region enhanced thereby contributing to sustainable</p>	<p>Organize workshops for the sensitization of relevant stakeholders, including policy makers, to enhance the understanding and use of climate services for safety of life, protection of property, conservation of the environment, and adaptation to build resilient communities to cope with climate extremes occasioned by adverse climate change impacts</p>	<p>Policy makers, stakeholders, users and actors of government agencies sensitized</p>											
	<p>Prepare and provide policy</p>	<p>Pathways and</p>											



<p>development at the national and regional level</p>	<p>makers, including parliamentarians and relevant line ministries in governments, with timely, relevant and well packaged information related to:</p> <ul style="list-style-type: none"> <li>- Impact-based weather and climate forecasts with quantified impacts on the society and climate dependent sectors</li> <li>- Develop Annual Reports on the Status of Climate - Provide annual summary of pertinent activities and events related to weather and climate</li> </ul>	<p>evidence for consideration of climate variability and climate change in policies and planning processes in West Africa set.</p> <p>Contribution of climate services to sustainable development improved</p>							
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