Centre d'Application et de Prévision Climatologique de l'Afrique Centrale
Climate Application and Prediction Center for Central Africa
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Strategic Plan for the Establishment of a WMO Regional Climate Center (WMO-RCC) in Central Africa

Name of the Center	Climate Application and Prediction Center for Central Africa (CAPC-AC)
Geographical localization	Douala, Cameroon Republic
Date of Creation	May, 25 2015
Institutional Status	EECAS Specialized Institution

Table de Matière :

1. Introduction

This document describes the approach for the establishment of Climate Application and Prediction Centre as the World Meteorological Organization (WMO) Regional Climate Center (RCC) for Central Africa. CAPC-AC is a specialized institution of the Economic Community of Central African States (ECCAS). Mindful that weather and climate phenomena and processes recognize no political boundaries, CAPC-AC represents an integrated approach, a regional institutional framework to support the activities of the NMHSs of WMO Member States in Central Africa, with a view to strengthening their capacity to provide national users with high-quality climate services. The establishment of the Regional Climate Center of Central Africa marks the culmination of a series of meetings, including the First Conference of Ministers Responsible for Meteorology in Africa, held in Nairobi (Kenya) in April 2010, the Fifteenth Session of the Regional Association I (Africa) (RA I), held in November 2010 in Marrakesh (Morocco) and the Addis Ababa support meeting for the implementation of the Global Framework for Climate Services (GFCS) in Africa (September 2012). It is designed to meet the need for reliable climate information and services that can help reduce vulnerability to climate change and promote climate resilience in connection with the development-related investments of the countries of the Central African sub-region, such as Angola, Burundi, Cameroon, Central African Republic, Chad, Congo, Democratic Republic of the Congo (DRC), Equatorial Guinea, Gabon and São Tomé and Príncipe (Figure 1).

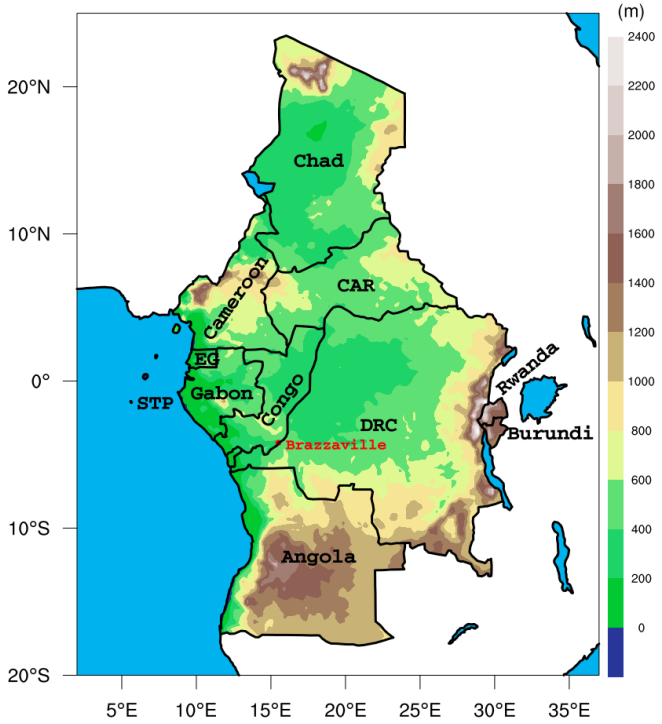


Figure 1: Elevation (m) map with country labels highlighting ECCAS member states. Abbreviated country labels include Central African Republic (CAR), Democratic Republic of Congo (DRC), Equatorial Guinea (EG) and Sao Tome and Principe (STP).

2. Background

A. State of Central Africa Climate and Meteorology

Central African communities have always been exposed to climate variability and climate extremes, but the expected increase in frequency and severity of these events due to a changing climate poses new challenges for societies in this region. According to the IPCC sixth assessment report, it is unequivocal that human influence has warmed the atmosphere, ocean and land. Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred. Human-induced climate change is already affecting many weather and climate extremes in every region across the globe. Evidence of observed changes in extremes such as heatwaves, heavy precipitation, droughts, and tropical cyclones, and, in particular, their attribution to human influence, has strengthened since the Fifth Assessment Report (AR5).

Across equatorial Central Africa, extreme hydro meteorological events are responsible for multiple casualties, significant infrastructure damage, and adverse economic consequences for local communities. Despite advances in forecasting across different timescales, weather forecast uptake across Central Africa, alongside the rest of the continent, remains limited. Not only does Central Africa experience some of the most severe weather observed in the world, but it also contains some of the poorest countries. For example, from October to December 2019, persistent heavy rainfall caused exceptional flooding in the Central African Republic with the Oubangui River overflowing by up to 372 miles, destroying over 10,000 homes and displacing approximately 56,000 people. Reducing risks and maximizing climate-related opportunities requires appropriate science-based information and the necessary institutional framework, infrastructure, and human capacity to transform and communicate this information for decision-making and improved stakeholder outcomes.

In addition, the Central African region is one of the most diversified regions in the world in terms of natural resources. Opportunities for economic development in the region include oil reserves in the Gulf of Guinea, vast metal and mineral deposits, enormous water resources in the Congo-Oubangui-Sangha basin and the Great Lakes, and a large tropical forest in the Congo Basin. These resources, largely untapped and underutilized, can be leveraged to boost growth in the region. On a sectoral basis, industry accounted for the largest share of the regional economy in 2016, contributing about 42% of regional GDP (Gross Domestic Product) followed by services, which contributed 41%. Agriculture contributed 17% (AfDB, 2018). For instance, industry activities are mainly dependent on the availability of water. Therefore, water resource management and agriculture contribute at the rate of about 60% of the regional GDP. Climate services are crucial to increase agricultural productivity, improve food and nutrition security and livelihoods, and ultimately foster economic growth. Climate services strengthen resilience, adaptive capacity to climate risks and variability, and are important to both smallholder farmers and breeders, as well as other key actors along the value chain.

The Economic Community of Central African States (ECCAS) Climate Application and Prediction Center (CAPC-AC) has been created by the Decision No. 72/ECCAS/CCEG/XVI/15 of the 16th Conference of Heads of State and Government of ECCAS on May 25, in N'djamena, Chad. The CAPC-AC strives to address the growing demands to improve the region’s understanding of climate, climate predictions and use of climate information to serve societal needs better. This Action envisages addressing climate challenges by developing climate service capabilities. The vision of the Centre is to enable society to better manage the risks and opportunities arising from climate variability and change. This would be attained through

development and incorporation of science-based climate information and prediction into planning, policy and practice. Furthermore, effective climate services will facilitate climate-smart decisions that will reduce the impact of climate-related disasters, improve food security and health outcomes.

B. Key frames of expression of needs

At the Eighth Ordinary Session of the Assembly of the African Union in 2007, strong concerns were expressed as to the vulnerability of Africa's socio-economic sectors and production systems in the face of climate variability and change. Many stressed the need to improve tools for analyzing climate change data in order to provide credible information and incorporate climate adaptation measures into decision making processes. The Ministers and Heads of delegation, in the Declaration issued at the close of the First Conference of Ministers Responsible for Meteorology in Africa, held in Nairobi (Kenya) in April 2010, agreed to "establish the African Ministerial Conference on Meteorology (AMCOMET) as a high-level mechanism for the development of meteorology and its applications" and to "establish with the support of WMO and partners a sub-regional structure for climate monitoring and adaptation to climate change for sustainable development in Central Africa". In the light of the many-sided challenges relating to climate variability and change facing virtually all African countries, the fifteenth session of RA I, held in Marrakesh (Morocco) in November 2010, agreed to set up RCCs in all of the Regional Economic Communities. On this occasion, RA I entrusted the African Centre of Meteorological Application for Development (ACMAD), which has a pan-African mandate, with the role of coordinating all RCCs on the continent under the name of RCC-Africa. At the Fifth Central African Climate Outlook Forum, (PRESAC-5), held in Yaoundé (Cameroon) in September 2011, the need for rapid implementation of the decisions of AMCOMET and RA I regarding RCCs in Africa was clearly understood and supported by all participants, who included national and international specialists on climate issues, experts from the United Nations International Strategy for Disaster Reduction (UNISDR), and representatives from WMO, ACMAD and ECCAS. In the Libreville Ministerial Declaration of June 2012 on the strategy for risk prevention, disaster management and climate change adaptation and the disaster preparedness and response plan of action for Central Africa, the Ministers and Heads of delegation responsible for disaster prevention and management in the ECCAS Member States, basing themselves on the conclusions of a series of multisectorial meetings, undertook "to establish up a regional climate centre in Central Africa". In the Addis Ababa Declaration in support of the implementation of the Global Framework for Climate Services (GFCS) in Africa (September 2012), representatives of the African Union Commission (AUC), the Regional Economic Communities (CEMAC,

ECOWAS, IOC, IGAD, SADC) and the Secretariat of the African, Caribbean and Pacific (ACP Secretariat, now known as OACPS) Group of States, on the invitation of the Minister of Water and Energy of the Federal Democratic Republic of Ethiopia, in the presence of the representatives of the World Meteorological Organization (WMO), the European Organization for the Exploitation of Meteorological Satellites (EUMETSAT), the United Nations Economic Commission for Africa (UN-ECA), the African Centre of Meteorological Application for Development (ACMAD) and the European Union (EU), solemnly agreed to "provide support to CEMAC and IOC in the establishment of Regional Climate Centres in the Central African and Indian Ocean regions". On the basis of the decision taken during the Second Session of AMCOMET, held in Zimbabwe in October 2012, and following several informal consultations, it was agreed that concerted efforts should be made jointly with ECCAS, whose mandate is primarily focused on the promotion, integration and harmonization of socio-economic development policies at sub-regional level, in order both to highlight the requisite technical and organizational aspects for the establishment of an RCC in Central Africa and develop the necessary strategies for its designation as a WMO RCC.

C. Achievements under SAWIDRA-AC Project

CAPC-AC has hosted the SAtellite Weather and Information for Disaster Resilience in Central Africa (SAWIDRA-AC) project from july 2018 to august 2021. The Project aimed to improve the core capacities of ECCAS and NMHSs to meet the needs of Disaster Risk Management (DRM) agencies and socio-economic sectors for effective use of weather and climate services as well as community focused real-time early warning systems. CAPC-AC strives to build capacities of the 11 NMHSs in statistical and dynamical daily, weekly, sub seasonal and seasonal forecasting to enable them to deliver improved weather and climate services. The project was financed under the 10e European Development Funds (EDF) and administered by the Climate for Development Funds (ClimDev) of the African Development Bank. Under this Project, sustainability has been built in tho ways: (i) on infrastructures and (ii) on human resources. SAWIDRA-AC project has procured key goods and services, in the form of meteorological infrastructure mainly a High Performance Computer (HPC) Server, Early Warning and Public Weather Services Systems, PUMA/MESA and Weather Information System (Meteo Factory). Summary of these achievements are reported in Table 1. On the other hand, experts have been trained on weather and climate forecast and modeling, data management, PUMA and MESA stations maintenance and administration and IT purposes (see Table 2). This expertise is now available at CAPC as Support Staff under the Start-up Unit of CAPC operationalization created by ECCAS Commission for Two years duration.

Table 1: Summary of achievement under SAWIDRA-AC

EQUIPMENTS PROCURED UNDER SAWIDRA PROJECT

Item	Provider	Total Amount (Euro)	Amount Paid (Euro)	Implemented Percentage of the contract (%)	Amount to be paid (Euro)
PUMA 2015-MESA	Telespazio	96 000	96 000	100%	0
HPC	Intertech Group	769 238	590 620,94	76,78%	178617,06
MeteoFactory	MeteoFrance International	499390	366 951,77	73,48%	132438.83
Local Network	Wise Computer	30 158.30	0	0%	0
Electric transformer (250 KVA)	ENEO CAMEROUN	43 255.50	43 255.50	100%	0
Generator (150 KVA)	FAY&CO.Sarl	42 380.82	42 380.82	100%	0
Optical Fiber	CAMTEL	1654.07	1654.07	100%	0
Laptops	ZARATHOUSTRA	35 421.53	35 421.53	100%	0
Vehicule	Cami Toyota	36 587.8	36 587.8	100%	0
Total		**1 554 086.02**			**311 055.83**

The procurement of the Local Network was not approuved by the Bank

Table 2: Human resources profile trained under SAWIDRA-AC

Gender	Number	Profile
Female	01	• Maintenance et administration des stations MESA et PUMA 2015 ; • Exploitation de la station PUMA 2015 ; • Production des bulletins de Prévisions immédiate, courte et moyenne échéance et de suivi des séquences sèches et humides • Briefing • Analyse des données d'observation (Synop, METAR)
Male	03	• IT, Webmaster • Maintenance et administration des stations MESA et PUMA 2015 ; • Exploitation de la station PUMA 2015 • Exploitation de la station MESA/e-Station • Installation de la Climate Station de ClimSA • Exploitation en cours de la Climate Station de ClimSA • Maintenance et administration du réseau informatique ; • Production des bulletins hebdomadaires et intra-saisonniers ; • Production des bulletins pour le suivi des séquences sèches et humides • Traitement, Représentation et Analyse des données météorologiques et climatiques • Briefing • Assistant encadreur académique • Production des cartes (saisonnière et annuelle) d'impact d'évènement extrêmes en Afrique Centrale • Production des Cartes pour le rapport du Climat en Afrique • Préparation des données pour les RCOF • Modélisation Atmosphérique ; • Production des cartes par QGIS/ARCGIS

3. Role of the WMO-RCC

WMO RCCs are centers of excellence that create regional climate products including long-range forecasts in support of regional and national climate activities and thereby strengthen the capacity of WMO Members in a given region to provide national users with tried-and-tested climate services. All WMO RCCs must meet certain mandatory functions defined by WMO and comply with the elements of guidance published by the WMO Commission for Climatology for technical climate issues and by the WMO Commission for Basic Systems for operation. In addition to the mandatory functions, the services provided by WMO RCCs encompass other, highly recommended functions, all defined and specified in Part II of the WMO Manual on the Global Data-Processing System (GDPS), under designation criteria, and may include other functions in addition to those required by the region.

3.1 Central African RCC Institutional Context

In informal consultations, a consensus emerged to not only place the regional climate centre for Central Africa under the auspices of the ECCAS and to designate it as the RCC for Central Africa but above all to make it a ECCAS specialized body. In this connection, and in accordance with ECCAS's fields of intervention, special emphasis should be placed on generalized risk management in the sub-region. Likewise, to ensure participatory development and better mainstreaming of climate-related information into the implementation of investment projects, there is a need to encourage users of climate services and other development partner institutions to become involved in data collection and product development. To qualify for designation as a WMO Regional Climate Centre, the RCC of Central Africa must be able to provide, inter alia, the activities relating to the mandatory functions of all WMO RCCs.

3.2 RCC functions

WMO provides RCC to fulfill two types of functions, the first being mandatory and the second considered as highly recommended.

3.2.1: Mandatory functions

- Operational long-range forecasting activities (both dynamic and static, on a time frame ranging from one month to two years, depending on regional needs):
    - ☐ Interpret and evaluate long-term forecasts prepared by the global production centres (some of which may be obtained through the main centers for long-range

forecast multi-model ensembles – see supplement II.12 in Part II of the WMO Manual on the Global Data-Processing System (GDPS); rely on the Standardized Verification System for Long-range Forecasts (see supplement II.8); communicate relevant information to RCC users; and provide the global production centres with feedback; and

- ☐ Evaluate the use made of the products and services provided by the RCCs on the basis of the feedback provided by RCC users.

- Operational climate surveillance activities:
  - ☐ Prepare climate diagnoses, including analyses of climate variability and extremes, at the sub-regional level;
  - ☐ Develop a baseline climatology for the sub-region; and
  - ☐ Introduce a climate monitoring system.
- Operational data services, in support of long-range operational forecasting and climate monitoring:
  - ☐ Develop sets of sub-regional climate data subject to quality control, preferably in the form of data at grid-points; and
  - ☐ Provide basic climate and archival services, when NHMSs so request.
- Training in the use of RCC operational products and services:
  - ☐ Provide information on the methodologies and specifications relating to mandatory RCC products along with guidelines on their use; and
  - ☐ Coordinate training activities for interpreting and using mandatory RCC products.

3.2.2 Highly recommended functions

- Climate Prediction and Climate Projection (beyond 2 years timeframe)
- Non-operational data services
- Coordination Functions
- Training and Capacity building
- Research and Development

In the operational framework, each activity to be carried out should be broken down into specific products to be supplied on a regular basis, with strict adherence to the frequency of updating for each product. When RCC activities are executed, due consideration should always be given to the obligation to comply with the standards of the WMO Information System and to respect the principles of the WMO Communities as regards the exchange of data and products.

4. Structure of the RCC of Central Africa

The establishment of an RCC in Central Africa in particular and in each Economic Community in Africa in general comes in response to the difficulties which the individual National Meteorological and Hydrological Services (NMHSs) in the area face in fulfilling their mission and providing national users with high-quality climate services. The RCC of Central Africa has the distinctive feature of being a WMO RCC in the making. Consequently, its structure must be consistent with the organizational framework of WMO RCCs.

WMO RCCs may be organized in two ways: for a given region, their functions may be performed by a single (multifunctional) centre, or these functions may be divided up between several centres – or nodes – of a WMO RCC network.

In order to define the structure of the RCC of Central Africa and ensure its sustainability, the comparative analysis of the two options took the following factors into consideration:

- Availability in terms of:
  - ★ Basic infrastructure (a sufficient number of suitable premises equipped with essential basic resources such as water, electricity, air conditioning, etc.);
  - ★ Suitable IT facilities (for processing data, running global models and scenarios, archiving, etc.);
  - ★ Communication media (information management system, satellite data receiving system, website);
  - ★ The necessary human resources (technical support staff, scientific staff, administrative staff); and
  - ★ Facilities for mobilizing outside scientific expertise and contributions from stakeholders and partners

Certain management competences of WMO RCCs have also been factored in to facilitate the choice of the likely structure, in particular those which stipulate that:

- The competences of the WMO RCCs are intrinsically regional and neither encroach upon nor replace national competences; and
- The main clients of WMO RCCs are National Meteorological and Hydrological Services (NMHSs) and the other WMO RCCs in the region and neighboring areas as well as the international bodies recognized by the competent WMO Regional Council (RC).

Organizational structure	Drawbacks (weak points)	Advantages (strong points)
Multi-functional RCC	➢ Infrastructural means are difficult to identify ➢ More financial means must be ➢ mobilized Scientific and technical staff must be beefed up	➢ Synergy of action in a single pole ➢ Technical means are optimized ➢ Information is centralized ➢ It is easier to mobilize outside scientific expertise and secure contributions from stakeholders and partners ➢ − Easy to supervise activities
Networked RCC	➢ Dispersion of senergy and poles for concentrating information ➢ Duplication of technical means ➢ Harder to secure outside support ➢ Harder to coordinate activities	➢ Infrastructural means are easier to identify ➢ Possible to take advantages of means available to the NMHS

Regardless of the organizational mode chosen, solutions will have to be found to overcome shortcomings. At this stage, thought should be given to available means for implementation and to political will.

4.1 Option 1: A multifunctional RCC

Depending on the means available, one could:

- Envision creating a centre of excellence from scratch; or
- Consider using an existing centre which could be turned into an RCC, thereby taking advantage, at least in the start-up phase, of the framework for operations and possibly the available material and technical infrastructures.

4.2 Option 2: A networked RCC

Also depending on the means available, one could:

- Envision creating from scratch a specialized, fully equipped centre with a clear mandate in conjunction with an RCC in a pre-established network; or
- Consider taking advantage of existing centres, given that embedding a specialized centre in a National Meteorological Centre (NMC) could be a temporary solution in the start-up phase. The NMC's material and technical infrastructures could serve both structures. Here as well, special emphasis should be placed on defining missions and specifying fields of competence in order to ensure smooth coexistence.

5. Functioning

5.1 Prerequisites

In order to host an RCC and perform the functions assigned to it as per the standards specified in the WMO Manual on the Global Data-Processing System as a pilot centre or designated centre, any pilot centre or group of centres needs:

1. Clear internal terms of reference as well as clear terms of reference from the host country and the competent WMO Regional Council to carry out and pursue coherent, high-quality climate activities for the benefit of a given region or sub-region; and
2. Suitable resources to establish and sustainably operate the centre, in particular the basic material infrastructure (a sufficient number of suitable premises equipped with the essential basic resources such as water, electricity, air conditioning, office furniture, etc.), suitable IT facilities (for data processing, modelling, archiving, etc.), communication media (information management system, satellite data reception system, website, etc.), the necessary human resources (technical support staff, scientific staff, administrative staff, etc.). The quality and nature of these resources will depend on a number of factors, such as the scope of the programme to be executed and the size of the area to be covered.

5.2 Institutional framework

5.2.1 Protocol establishing the RCC of Central Africa

The internal terms of reference of the new structure must be clearly defined by a Protocol establishing the Regional Climate Centre of Central Africa and its adoption as a specialized institution of the Economic Community of Central African States/Central African Economic and Monetary Community (ECCAS/CAEMC).

This key document, which will serve as the Centre's Statutes, must be signed by all of the representatives of Member States. The Protocol specifies the aims of the Centre, its operational structure, its functioning, its staffing, its funding sources and its partnerships.

5.2.2 Headquarters agreement

The Centre's external terms of reference must be clearly defined by a Headquarters Agreement covering the RCC between the host country and ECCAS/CEMAC. This document spells out the legal framework for the Centre's operation in the host country.

5.3 Infrastructural framework

5.3.1 Basic material infrastructure

The Centre must have clean, fully-equipped premises in an appropriate setting. In order to ensure a rapid start-up for the Centre, it would be desirable for the host country to make available to the centre, either permanently or on a temporary basis, a sufficient number of secure, easily accessible premises. These premises must be supplied with water and electricity and be equipped with a reliable telecommunications system. Office furniture may be procured over time, as need be.

5.3.2 Technical infrastructure

In addition to the system for information and communication and the one for satellite data reception, the centre must have adequate high-quality IT resources that meet its needs.

5.3.3 Funding

The funding sources for the centre, which will have to be spelled out in the Protocol establishing the RCC, shall come from:

- Member States' assessed contributions;
- Voluntary and/or special contributions;
- Subsidies, donations and bequests;
- Contributions from cooperation partners;
- Payment for services rendered; and
- Other funding sources which may be approved by the ECCAS.

In the case at hand and as a basis for the RCC's functioning, contributions by stakeholders are key to the centre's survival. Payment of assessed contributions by Member States is essential for

mobilizing outside resources and expertise of all kinds. In order to ensure the long-term functioning of the RCC, the centre must have a funding system based on an effective resource mobilization mechanism.

6. Resource mobilization strategy

This mobilization, which is the heart of the matter, concerns the infrastructural, institutional, human and financial resources to be identified.

6.1 Infrastructural resources

As noted above under "Prerequisites" (5.1.2), for setting up the RCC and ensuring its long-term

functioning, appropriate resources are required, in particular the basic material infrastructure (a sufficient number of secure, easily accessible premises, supplied with such essential basic resources as water, electricity, air conditioning and office furniture), sufficient IT equipment (for data processing, modelling, archiving, etc.), means of communication (information management system, satellite data reception system, Web page, etc.).

As far as the basic infrastructure is concerned, thought should be given to equipping the centre or nodes with generators to cope with the frequent power outages in the sub-region. For environmental and cost reasons, any opportunities to use renewable energy should be seized.

With regard to equipment:

- Good use should be made of existing tools (such as the satellite data reception system installed as part of the Puma and/or AMESD projects, which plays a key role in developing the necessary risk management products, especially in the sub-region), supplementing them as need be; and
- Special attention should be given to equipment quality in the case of procurement.

6.2 Institutional resources

The host country (countries) and WMO RA I must provide clear terms of reference so that the centre may conduct and pursue coherent, high-quality climate activities which benefit the sub-region. Concrete steps must be taken to derive maximum benefit from partners' institutional support.

6.3 Human resources

Human resources is primarily built on the personnel from the SAWIDRA project and professionals trained under this project. A memorandum of understanding between the stakeholders, especially the member countries, for the making available and secondment of primarily technical and scientific personnel, could help meet the centre's needs. Given its status as a specialized institution, the RCC of Central Africa would follow ECCAS regulations with regard to staff recruitment and pay.

As the main climate research platform for the sub-region, the centre would be manned by permanent staff and project staff.

ACMAD's experience with mobilizing scientific and technical expertise could be exploited to ensure the sustainability of the centre's activities. Partnerships for the exchange of specialists and expertise could be concluded with the other centres.

6.4 Financial resources

In order to facilitate the mobilization of financial resources for the functioning of the centre, whose structure remains to be defined, the RCC of Central Africa, given its status as a specialized institution, would rely on ECCAS and CAEMC, which are the main intergovernmental cooperation organizations for the sub-region. In its efforts to secure funding for its activities, it is clear that the RCC will have to develop effective resource mobilization strategies with a view to deriving maximum benefit, in addition to contributions from countries, WMO and its partners and known potential partners (ADB, WB, EU, etc.), from the various multilateral funding mechanisms, bilateral, sub-regional and regional development institutions and multilateral development banks.

It is understood that Members' contributions constitute the RCC's primary funding source, as funds from development partners are merely complementary. Payment of assessed contributions by Member States is essential to ensure the proper functioning of the centre.

7. Implementation stages

To be designated as a WMO RCC, after the launch period (start-up phase), there must be a successful demonstration (demonstration phase), after which the centre of excellence reaches the maturity phase.

7.1 Start-up phase

This phase begins when the Centre's Director is appointed. During this phase, which may last two or even three years, the framework for operations is created, the structural bases are laid, the goals assigned to the centre are evaluated and clarified, partners are mobilized and consortia of technical, scientific and financial partners are developed. Also during this phase, needs are clearly identified and appropriate strategies are designed. This phase corresponds to a trial period, which paves the way for the demonstration stage.

7.2 Demonstration phase

During this period, the aim is to prepare the ground for a WMO centre for excellence, build synergies for action between the RCC, NMHSs and development partners, and lay the foundations for the elaboration of a plan of action to meet the goals set. The services provided during this phase are evaluated on a regular basis, with methods readjusted as necessary.

7.3 Services

Services provided are listed as follow:

- Establishment of a sub-regional database as a priority;
- Appropriation of the process for seasonal climate forecasting (PRESAC);
- Sub-regional climate monitoring;
- Preparation of various forecasts at the sub-regional level;
- Preparation of sets of sub-regional climate data;
- Exploitation and evaluation of global models;
- Management of climate risk; Provision of early warnings in the framework of disaster risk management; Development of a website for product dissemination; and
- Organization of training workshops for NMHSs (on product use, database establishment and maintenance, interpretation of PLEs, etc.).

7.3.1 Production strategy

The strategy will be built upon existing expertise and exchanges with other RCCs and Regional organizations such as IOC. It will:

- Take advantage of all competencies available in the sub-region, especially on SAWIDRA project;

- Benefit from the experience of the other regional centres like ICPAC, ACMAD and all research centres and universities conducting climate research on the continent; and
- Explore the opportunities provided by many research centres in Europe (such as UNESCO'S, International Centre for Theoretical Physics in Trieste, Italy), in the Americas (African Desk, IRICS at Columbia University, New York, USA), Asia and elsewhere, KIT in Germany, …) and where climate research on Africa is conducted, for example the Laboratory of Environmental Modeling and Atmospheric Physic of the University of Yaounde I, Cameroon.

7.3.2 Maturity phase

After a successful demonstration phase, the centre must both consolidate its gains and develop a strategic action plan to overcome shortcomings and take due account of the specificities of the sub-region:

- Weather and climate applications for various sectors of development (agriculture and food security, health, water resource management, energy, forest, etc.);
- Climate risk monitoring and management; and
- Research on climate and development, etc.

8. Recommendations

R1. After evaluation of national needs and capacities to provide/use the products and services of an RCC and based on an analysis of the various consultations with both stakeholders and some potential partners, to ensure the successful establishment of an RCC in Central Africa, it would be desirable to emphasize synergy of action as regards the organizational mode and to opt for a multifunctional Centre.

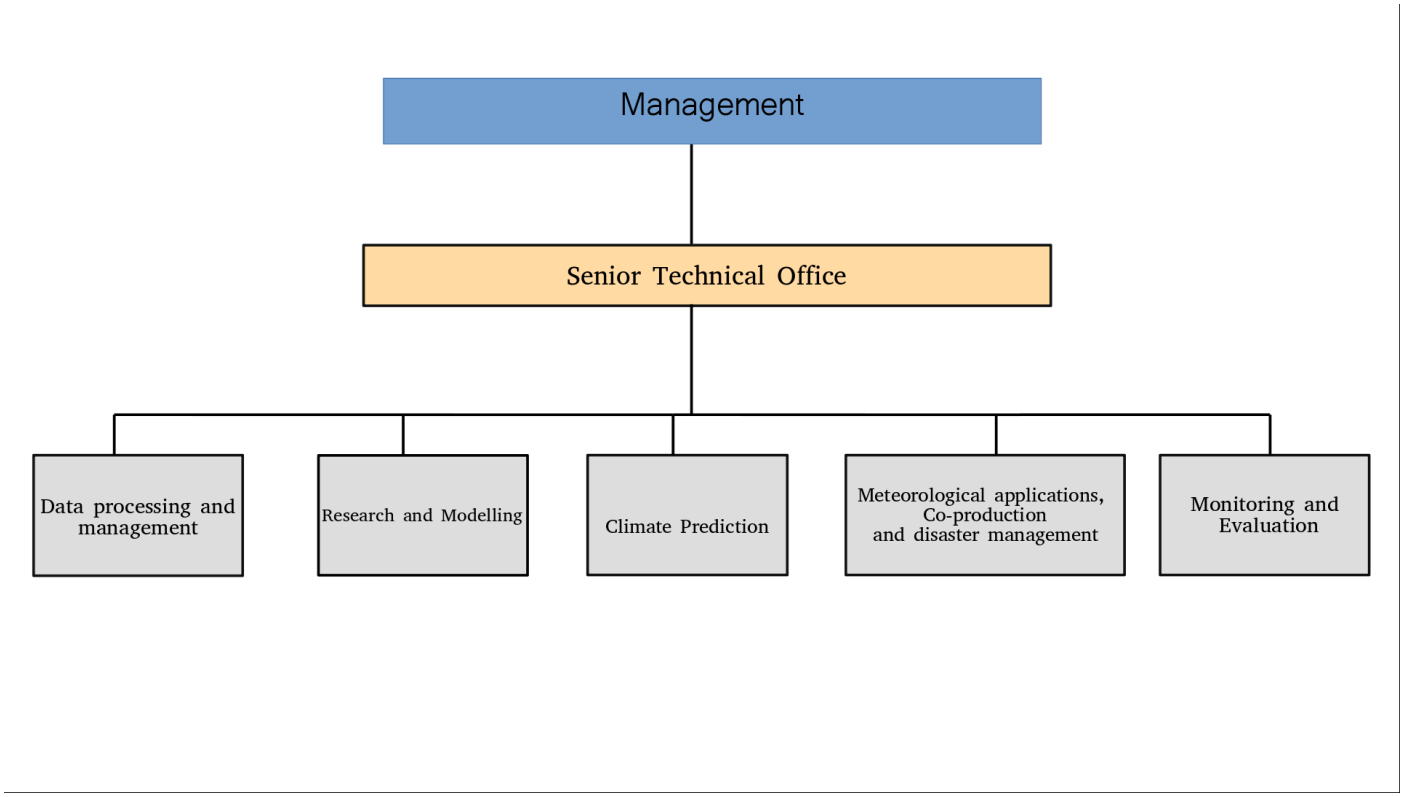
R2. Central Africa is the only Regional Economic Community in Africa that lacks such a facility. Therefore, to enable the Centre to begin its activities, it is desirable that the host country agrees to provide, on a temporary or permanent basis, the basic infrastructure (adequate premises in a user-friendly, secure and easily-accessible setting, fitted with the necessary equipment and adequate computer and communication tools).

R3. In order to maximize the opportunities for support to NMHSs which ECCAS and CAEMC offer, it would be desirable, while maintaining the status of an ECCAS/CAEMC specialized institution, to change the name to Central Africa Climate Prediction and Applications Centre, abbreviated as CAPC-AC.

R4. The proposed structure of the RCC of Central Africa, at its inception and during the demonstration phase, should consist of a management office and five departments (Data processing and management, Network and modeling, Climate prediction, Meteorological applications and disaster management, and Administration and finance.

9. Organizational Staffing and Procurement Plan

9.1 Draft Flowchart for the Demonstration Period



9.2 Defining posts and needs

Services	Functions	Staff	Offices equipments
Management	Supervision and coordination	1 Coordinator 1 Deputy Coordinator 1 Administrative and Financial assistant 1 cleaning person 2 security guards	3 laptops 1 projector
Monitoring and Evaluation	Reporting and Following-up	1 Expert	1 laptop
Senior Technical Office	Training, Technical Team Lead of all WMO-RCC Functions,	1 Key Expert	1 Laptop 1 Desktop PC 1 Projector 1 Storage Disk 1 Black Board
Data processing and management	Training for NMHSs in data collection, archiving, exchange and management, sharing of data processing methods, regional data networking and database administration	1 Expert 1 Expert in data processing and telecommunication	1 server 2 Desktop PCs 2 laptops 4 Storages Disks
Research and Modeling	NWP capacity-building, evaluation and adaptation of models, downscaling, attempts to	1 NWP expert 1 telecommunication network and system	1 information and telecommunication system, 1 satellite

	develop regional models	expert P3	data reception system
Climate forecasting	Long-term forecasting, Improvement and appropriation of the PRESAC process, exploitation of global climate models and scenarios, various regional climate statistics	1 Expert 1 forecaster	2 desktop PCs 2 Desktop for data 2 laptops
Meteorological applications, Co-production and disaster management	Development of climate applications in various development sectors, monitoring and mapping of disasters and climate risks associated with impacts on specific sectors and vulnerability analyses; joint research on climate risk reduction issues	1 Expert 1 forecaster 1 risk assessment expert	3 desktop PCs 3 Desktop for data 3 laptops

9.3 Staff recruitment plan for the first four years

The following staff is already assigned at CAPC-AC by the ECCAS commission under the Start-up unit of the Centre:

Meanwhile, the Start-up unit mandate will end in April 2023.

Management Staff	01 Coordinator, 01 Deputy Coordinator 01 Senior Expert in Monitoring and Evaluation 01 Administrative and Financial assistant 02 security Guards 01 Cleaner
Technical Staff	01 Senior Technical Officer in NWP and Modeling 01 Senior Technical Officer in Climate Forecast
Technical Support staff** ** Trained under SAWIDRA-AC	01 forecaster in Weather and Climate, Station Maintenance and Administration 01 IT, Webmaster, Data Scientist and Management, Station Maintenance and administration 01 Modeler, Model tuning, data assimilation and verification, Station maintenance and administration, QGIS/ARCGIS Expert 01 Observer

The demonstration phase will start with this staff under the assumption that a formal contract is signed with the ClimSA Project for technical staff as short-term assistance. However, the CAPC will call for technical support in a specific area depending on the evolution of the situation.

9.4 Procurement plan for IT and telecommunication equipment

9.4.1 Exiting IT Equipment

item	Caractéristques	statut
High Performance Computing	42 Tflps 28 CPU 20 cores per CPU	Not installed (delivered since juillet, 09 2020)
Système d'Information Météorologique (METEOFACTORY)	2 Serveurs de type Proliant G11	Not installed (delivered since July 26 2021)
PUMA 2015 MESA e-Station	Monitoring and Prediction sofwares	Installed, operational
Réseau Local	LAN, WAN	Installed, not operational
Back up generator	150 KVA	Installed, not operational
Climate Station		

9.4.2 Types and characteristics of IT and telecommunication tools to be procured

Article	Description
Desktop PC	Desktop : Processor: core i7, frequency: 2.4 GHz or more RAM: 16 Go or more, hard drive: 2To or more
	Desktop PC: Processor: core i7, frequency: 2.4 GHz or more 16 Go of RAM; hard drive: 2 To, graphic card 21" dual display
PC server	Personal Computer (PC) server : Processor : core 40/80 or more, frequency : 2.5 (x2) GHz or more RAM: 1024 Go, hard drive: 12 To or more
Database server	High Performance Computing Server (HPC server): Processor: minimum 8 cores, preferably 12; Frequency: minimum 2.0Ghz, preferably 2.4Ghz; RAM: minimum 32GB, preferably 64GB; RAID technology storage: minimum 16 disques or more.

High-Performance Computer (HPC)	42 Tflops 28 CPU 20 cores per CPU
Laptop	Processor: core i7, frequency: 2.4 GHz or more RAM: 8Go or more, hard drive: 1To or more
Uninterrupted Power Supply (UPS)	SMART UPS On-line 01 KVA, 220 V
Uninterrupted Power Supply (UPS)	SMART UPS On-line 05 KVA, 220 V
All-in-one	A3/A4 paper format
Storage disks	USB external disk drive, capacity 2 TO or more
Projector	EPSON EB-X51
Regional climate models	PRECIS from UK MET Office RegCM4.1 from ICTP
Software	Scanning software with license
	Image library management software
Application software	(IRI, GIOVANNI, NCEP/NOAA, ECMWF) climate database management system
Statistical softwares	CDO, NCL, Python, RStudio, GRAD's, PyCPT, R-Instat, ClimSOFT, CLIDATA
Cartographical analysis software	QGIS, ArcGIS, SURFER, ENVI
Compilers	• Fortran 77, • Standard Fortran 90, • ANSI C, • C ++
Satellite data reception system	Identical to the one installed by Telespazio France as part of the supply contract AMESD EuropeAid/128227/D/SUP/ET
PUMA Station	Desktop : Processor: core i5, frequency: 2.4 GHz or more RAM: 8 Go or more, hard drive: 2To or more
MESA e-Station	Desktop : Processor: core i5, frequency: 2.4 GHz or more RAM: 8 Go or more, hard drive: 2To or more

Climate Station (CS)	Desktop : Processor: core i5, frequency: 2.4 GHz or more RAM: 8 Go or more, hard drive: 2To or more
Nowcasting SAF Station (en cours d'installation)	Desktop : Processor: core i5, frequency: 2.4 GHz or more RAM: 8 Go or more, hard drive: 2To or more
Information and telecommunication system	Based on a PC server (WEB, MAIL, FTP), processor: core i7 or more, frequency: 2.4 GHz or more RAM: 8 Go, hard drive: 2 X 1To or more of RAID, and a VSAT Internet connection with Wimax support.

10. Draft operating Budget (5 first years)

N°	Budget line	Year 1	Year 2	Year 3	Year 4	Year 5
1	Current expenses					
2	Annual wages					
3	Various activities (meetings, seminars					
4	Technical means					
5	Logistics					
Total						
Total						