



## **Terms of Reference**

# **Consultancy Service to upgrade Ethiopian Meteorology Institute (EMI) Maproom for Awash, Rift Valley and Omo Basins**

**September 2024**

## **1. Background**

Climate data, such as precipitation and temperature, are the foundation for the provision of effective climate services and risk management. However, the use of climate data and information products for climate risk management has been limited in Ethiopia due to the challenges surrounding easy access to climate information products. For many users, the availability of climate data by itself may not lead to the uptake and use of such data. These data must be presented in user-friendly formats addressing specific climate information needs to be used for decision-making by governments as well as the public and private sectors. The generated information should also be easily accessible, whether through open websites, public media, or other dedicated delivery channels.

The Ethiopia Meteorological Institute (EMI) has managed to overcome these challenges by generating climate information products, each of which is co-generated and tailored to the requirements of users, and making these products available to the public through an interactive web portal called the “Maproom” (see Annex 1). The Maproom is a collection of interactive maps and other figures that enables users to navigate and generate information on past, present, and future climate. The Maproom is dynamic in that the maps and figures are generated by the user on the fly, as the Maprooms are linked to the original climate datasets. This platform offers the functionality to extract and present required information at different temporal (daily to seasonal) and spatial scales (point, box, basin, sub-basin, or administrative or other boundaries). This enables users to focus on a specific area and time window of interest. The current version of the Maproom includes a generic “Climate Maproom” and some application-specific Maprooms. The climate Maproom has three parts with information on the past (historical), present (monitoring) and future (forecast) Maprooms. The historical information is under the “climate analysis” Maproom, monitoring information under the “climate monitoring” Maproom, whereas forecast information is found in the “climate forecast” Maproom. The climate analysis Maprooms help users analyze historical climate including seasonality, trends, probability of extreme rainfall and temperature for specific locations, and impacts of different phases of El Nino Southern Oscillation (ENSO) and the Indian Ocean Dipole (IOD) on rainfall and temperature over different parts of Ethiopia. The monitoring Maproom enables users to follow the progress of the current at ten-daily, monthly, and seasonal time scale. The forecast Maproom presents seasonal forecast in a flexible way. The Application-specific Maprooms are sector-specific and so far includes climate and health climate, climate and agriculture, climate and water, and disaster management Maproom. These

application Maprooms help users assess the impact of different climate conditions on specific sectors. For example, climate suitability for malaria transmission, which could help users, government and health practitioners timely monitor and develop appropriate measures against malaria. Examples of application-specific Maprooms in this guide will include “climate and agriculture”, “climate and health”, as well as “climate and water” Maprooms.

The data used for the Maprooms have been generated by blending high-quality climate data collected from the national meteorological station network and freely available remote sensing products and climate models reanalysis products. The results are an over 40-year time series of rainfall and temperature for every 4-km grid across Ethiopia

The Maproom would need to be upgraded to make them more user-friendly and more appealing to users. EMI also wishes to add more products to the Maproom including specific products for the Awash, Rift valley and Omo basins as part of the Ethiopia Flood Management Project (EFMP).

The Maproom is written in a scripting language called Ingrid, which was used to develop the IRI Data Library. Though Ingrid is powerful for data analysis, it is not a widely used language, and thus training is not available outside IRI. Use of Ingrid also means installation of the IRI Data Library at EMI in order to create and run the Maproom. Thus, there is a need to replace Ingrid with a more flexible and widely used programming language such as Python. This will enable EMI to create more user-friendly data presentations (map and graphs) and to train IT staff on Python locally. This will ensure that EMI can run the Maproom independently without a need to connect to the IRI data library. The current EMI-Maproom is also installed on an external hard disk, and should be transferred to a server or workstation provided by EMI. These would make the EMI Maproom fully owned, administrated and operated by EMI Staffs, ensuring its sustainability.

In line with this, EMI will hire a consulting firm to:

- Upgrade the existing Maproom;
  - a. Revise the presentation of the different components of the Maproom to make it easier to navigate and use.
  - b. Develop and implement a Python version of important EMI Maproom products in collaboration with relevant EMI staff;

- c. Implement the new version EMI Maproom on a server/Workstation machine;
- Add new climate information products in consultation with EMI staff; and
  - Capacitate (train) EMI staff on Maproom development, administration, and use.

## **2. Objectives**

The objective of the consultancy services is to provide technical assistance to EMI in upgrading its Maproom through the installation of EMI-Maproom on a new Server/Workstation, updating the underlying software, adding more products, and making it more user-friendly and more appealing to users.

The specific objectives are:

- a. Update the programing language used to develop the current Maproom, and update existing Maprooms with the new programing language;
- b. Install the updated Maproom on a local Server/Workstation (EMI will make available two servers for installation of the new version);
- c. Review and improve the structure and look (user interface) of the Maprooms to make the products more user friendly and more appealing;
- d. Add new climate information products based on users need; and
- e. Train EMI staff on the development, administration, and exploitation of the Maproom.

## **3. Scope of work**

### **3.1. Conduct consultative workshop with relevant users and EMI staff,**

The consultant will conduct a three-day workshop with EMI and Federal and regional/sub national stakeholders like Ministry of Water and Energy, Regional water and energy bureaus, basin development authorities and decision makers to review the current structure and look of the Maproom to solicit feedbacks on what need to be added and/or improved. This will involve presentations and discussions on the existing Maprooms. This will enable stakeholders to understand the existing Maproom and then provide feedback on what needs to be changed or added. The current Maproom contains a number of Maproom products under different tabs. Some of these tabs may need restructuring in order to make the Maproom easier to navigate use. Stakeholders may also suggest additional products. Thus, the consultant will use the

workshop results as input to revise the structure of the Maproom , improve/modify some of the graphics in the Maproom, and identify new climate products.

### **3.2. Improve existing Maproom**

The existing Maprooms (**Annex 1**) should be improved for better functionality, ease of navigation, and graphics quality. These improvements would also need to respond to users' feedback obtained the consultative workshop. The current version of the programming language used to develop the Maproom products is outdated and would need to be changed to a new programming language that EMI staff can learn on their own, preferably Python. Thus, the main components of these improvement would converting the overall structure and key Maproom products into python programming language. The key Maproom products include the monitoring Maproom, analysis (monthly, seasonal, extremes, trends, ENSO), forecast, DRM, and water Maprooms.

### **3.3. Add new climate information products**

The consultant will add new Maproom products, particularly to the Climate and Water Maproom. These new products are relevant to the Ethiopia Flood Management Project. The main focus of these products is the project area (upper Awash-basin up to Koka dam); however, it is preferred if the products could be developed for the whole country with the ability to zoom into an area of interest. These new Maproom products include the following:

- Historical probability maps and graphs of extreme rainfall;
- Historical probability maps and graphs of rainfall during the different The El Niño-Southern Oscillation (ENSO) and Indian Ocean Dipole (IOD) phases;
- Seasonal and sub-seasonal probabilistic forecast at basin and sub-basin levels;
- Ten-daily rainfall monitoring with the option of using either administrative or watershed boundaries, or both;
- Other products that will be identified during the consultation workshop with key-stakeholders.

### **3.4. Train EMI staff on the development, administration, and exploitation of the Maproom**

The consultant is expected to develop a training program to conduct training (min of 10 days) for EMI staff. The consultant should prepare a detailed module for the training activities on the following areas:

- The main Python libraries used in the Maproom development (this assumes the trainees already have been trained on Python basics);
- Installation and maintenance of the Maproom software;
- Modification of some existing Maproom's and creation of new ones;
- Converting some Maproom's from the old to the new programming language, in consultation with the client;
- Navigation and use of the different Maproom's

### **3.5. Train users on the new Maproom**

Conduct a one-week hands-on training workshop for users from relevant institutors on how to navigate, understand and ultimately use relevant climate information products in the Maproom. This training should include:

- Climate basics
- Overview of the Maproom
- Detailed hands-on training on specific Maproom products that are relevant to the project, and
- Specific application of the Maproom

### **4. Indicative Scheduling/Timetable**

The schedule and time table for the consultancy services if 18 months.

### **5. Outputs and Deliverables**

The expected deliverables from the consultant are the following.

- Inception report;
- Installation of updated Maproom's programing language and associated report;
- Report on the enhanced/revised Maproom structure;
- New Maproom products and associated detailed report;
- Training EMI staff and training report;
- Training materials.

## 6. Team composition

The Consulting firm shall be a legally established firm and committed to put together a team of the required qualification with demonstrated experience on creating Maprooms and developing and implementing training programs. Curriculum vitae of the qualifications and experience of the key experts of the team will be used to evaluate the technical proposal. The composition of the consultant's staff are as follows;-

Key Experts: At least three key experts for this assignment. Together they should cover the following expertise:

- Team leader
- Meteorologist/climate services expert: Significant experience with Maproom and climate services
- Computer Science: Significant experience with programming languages of python to produce a new Maproom products, as well as capacity building experience

### A. ESTIMATED STAFF MONTH INPUT FOR KEY STAFFS

The total contract duration is 12months where as the estimated Staff months for the Services for all key staffs is 18 person-months is shown below.

S. No	Key Expertise Name	Required Number	Estimated Staff Month	Total Staff Months
1	Team Leader	1	10	10
2	programmers	2	4	8
	<b>Total</b>	<b>3</b>		<b>18 months per person</b>

### ADDITIONAL RESPONSIBILITIES OF THE CONSULTANT

The provisions of the Services are all to be executed in Ethiopia. For the duration of the Services the Consultant shall provide in Ethiopia

- his own office facilities, accommodations,
- transport and all other facilities, equipment, utilities, consumables,
- staff, support staff and any other resources necessary for the complete execution of the Services; and the

The costs of provision of each and all the aforesaid shall be detailed in the Consultant's financial proposal. In the financial proposal, the consultants are required to prepare a clearly showing the remuneration and reimbursable expense separately.

### 6.1. Qualifications of Staff and Skills Required

The following table indicates the qualification and skill required of the experts.





S/No.	Expertise name	No of person	Qualification and Experience	Estimated Person Month
1	Team Leader	1	<p>General Education: master's degree in Meteorological Sciences/ Meteorology.</p> <p>General experience: 10 years of professional experience with a focus on weather and climate services.</p> <p>Specific Experience:</p> <ul style="list-style-type: none"> <li>• 10 years of professional experience in the area of climate services and climate services tool development; preferably with some experience in Ethiopia or at least other part of Africa;</li> <li>• three publications in the area of combining ground observation with satellite and reanalysis, climate services, and climate tool development;</li> <li>• 5-year experience as a team leader in a similar assignment.</li> <li>• Familiarity with NMHS operations in developing map-room, and other tools</li> <li>• 5-year previous engagement/cooperation with map-room development in NMHS.</li> </ul>	10
2	Two programmers	2	<p>General Education: master's degree in Climate, Computer science or related discipline</p> <p>General Experience: 10 years of professional experience in developing climate services</p> <p>Specific Experience:</p> <ul style="list-style-type: none"> <li>• 10 years of professional experience in developing online climate information products.</li> <li>• Proven experience in tools development, and administration and programming, including expertise in Python programming</li> <li>• Proven and solid knowledge and experience in providing similar service to other different organizations, preferably NMHS in Africa</li> <li>• Proven experience in proposal and report writing.</li> </ul>	4*2=8

<b>S/No.</b>	<b>Expertise name</b>	<b>No of person</b>	<b>Qualification and Experience</b>	<b>Estimated Person Month</b>

## 7. Accountability and reporting relationships

The consultant firm is accountable to the Meteorological Early Warning Division within the Ethiopian Meteorological Institute, which is responsible for monitoring and supporting the consultant throughout the assignment period.

## 8. Inputs provided by the Client

The Client will:

- 1) Organize the first consultative meeting (3.1), including covering local workshop costs;
- 2) Organize EMI staff and users training on the Maproom (3.4 and 3.5), including covering relevant local workshop costs;
- 3) Make computers, office space, and other relevant tools available for the consultant for the activities taking place at Client's site;
- 4) Assign a focal person or team of experts for review of the deliverables, for timely feedback and submission of respective final reports by the firm.

## 9. Evaluation of technical proposals

The technical proposal will be evaluated based on the following criteria's;

- ✓ Experience of the firm related to the assignment ---- 5%
- ✓ Adequacy and quality of the proposed methodology, and work plan in responding to the Terms of Reference (TORs): ----- 35%
- ✓ Key Experts' qualifications and competence for the Assignment - ----- 50%
- ✓ Capacity building and Training ----- 5%
- ✓ Participation by nationals among proposed key experts ----- 5%

## 10. Payment Schedule

This will be a lump-sum contract and payment for the consulting firm will be effected as per the following modality:

<b>Time frame</b>	<b>Activity</b>	<b>Deliverables</b>
First payment (25%)	Sign of contract Prepare inception report	Contract signed Inception report

Second payment (50%)	Applying python computer programming language to use for upgrading the Maproom  Develop and present for discussion algorithms or general approach	- Well-designed interactive climate bulletin production tool - Testing, validation and backup -
Final payment (25%)	Prepare training materials  Conduct training for EMI experts/Staff and users	- Training reports

## 12. Duration of Assignment, Duty Station and Expected Places of Travel

Duration: 12 months  
Duty Station: Ethiopia and where consultant is based  
Expected places of travel: Addis Ababa

## Annex 1. Current EMI Maproom

The EMI Maproom consists of a generic Climate **Maproom** and some application-specific Maprooms. The application-specific Maprooms are **Climate and Agriculture**, **Climate and Health**, **Climate and Water**, and **Disaster Risk Management** (Figure 1).

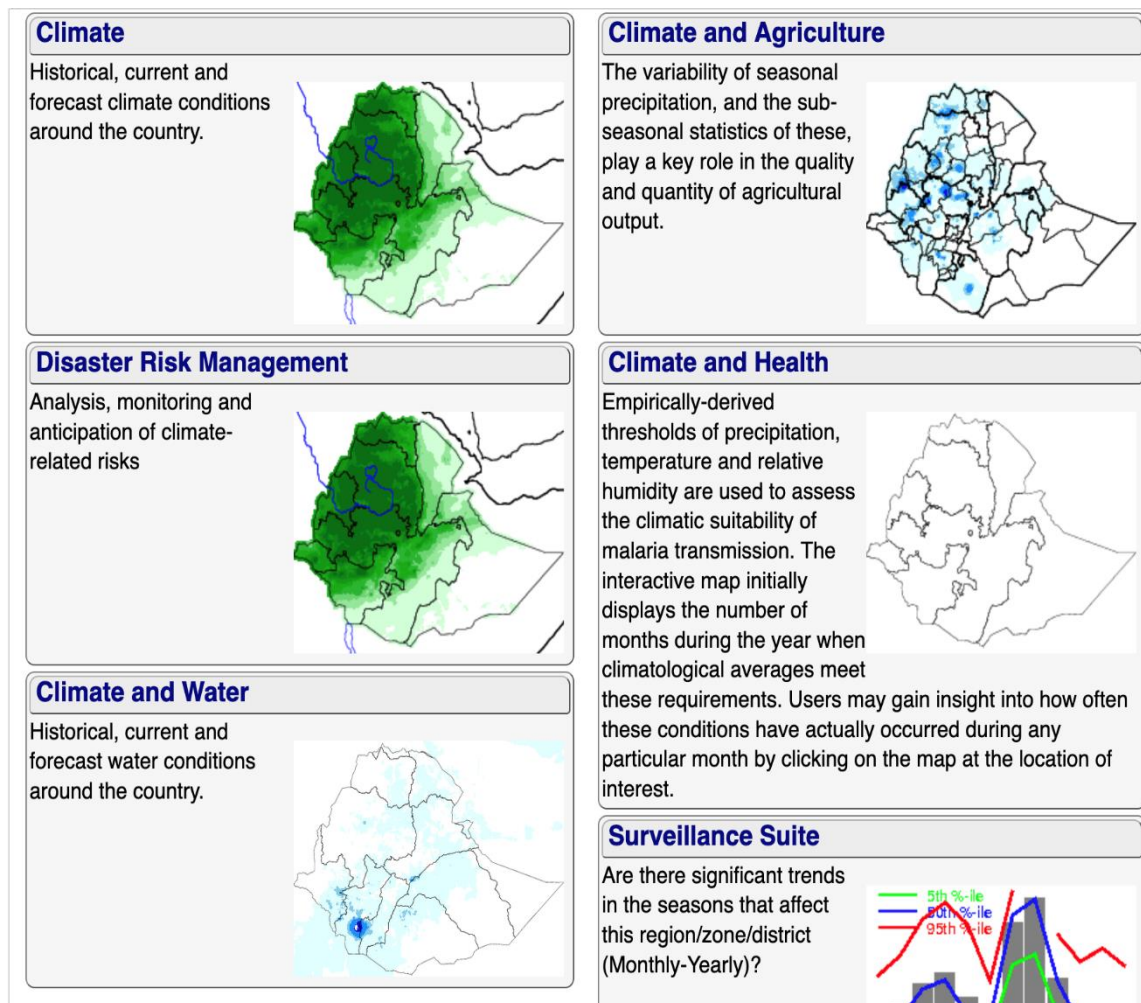


Figure 1: The current version of EMI's Maproom

Each of these Maprooms is further divided into sub-Maprooms that present different types of climate information products. The overall structure of the Maproom is presented in Figure 2 below. The “Climate Maproom” provides an interactive platform for exploring information on the past (historical), present (monitoring), and future (forecast) climate (Figure 3). The historical analyses is presented under the “Climate Analysis Maproom”, monitoring information under the “Climate Monitoring Maproom”, and forecast under Climate Forecast Maproom”. Each of these Maprooms are also further divided into thematic tabs (Figure 2, Figure 3). As shown in Fig 2, this applies to all the other (application) Maprooms.

All the sub-Maprooms display information as maps, graphs, and tables to allow users to visualize the data to their specific needs.



Figure 2. Circular diagram showing the sub-Maprooms of the EMI Maproom, potential uses, and the related products in concentric circles. Different sub (branch) Maprooms are observed as one goes out from the center of the circle.

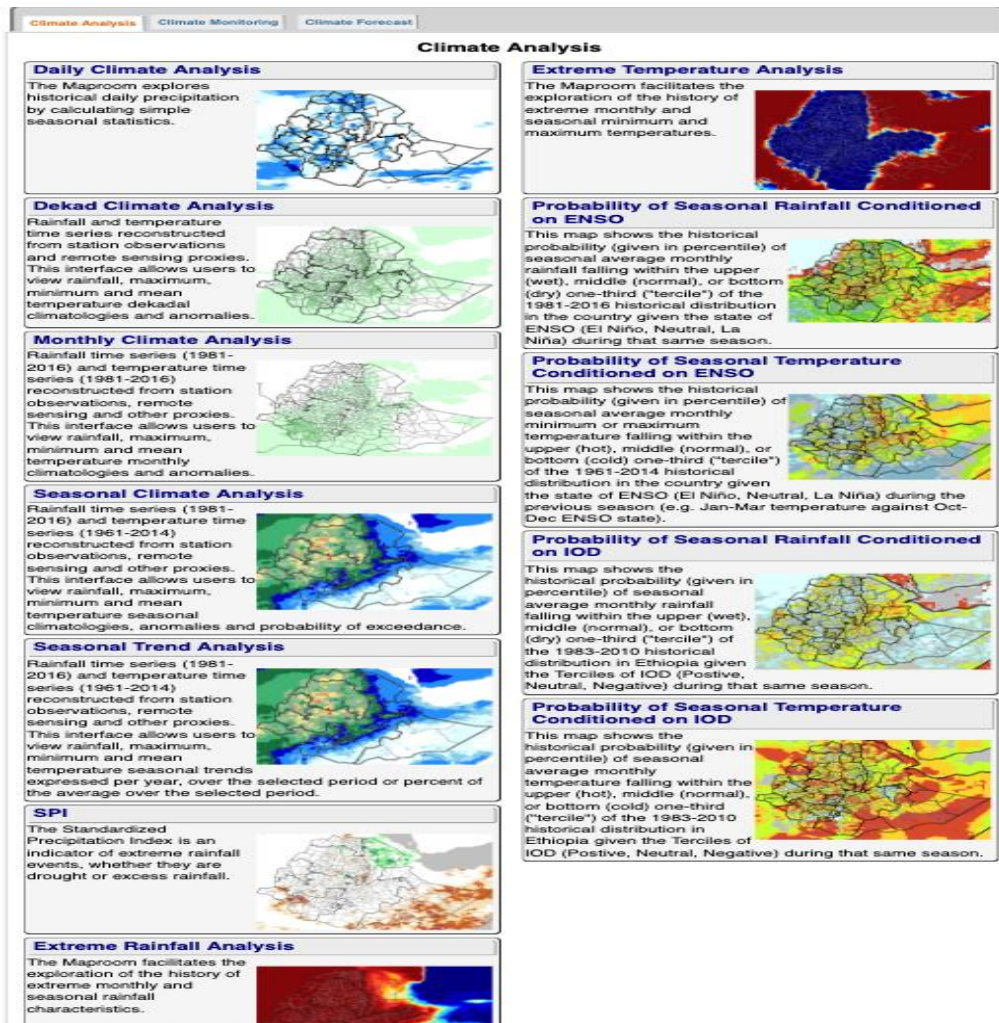


Figure 3: Sub components of the Climate Analysis Maproom.