

# DROUGHTS & FLOODS

## CLIMATE RISK AND EARLY WARNING INFORMATION

June 2024 | Ethiopia

Assessment of available open-source information on climate risk and early warning information, initiatives, and stakeholders in Ethiopia.

# CLIMATE RISK AND EARLY WARNING INFORMATION IN ETHIOPIA

## Key Messages

- **Local Context Deficiency:** There is a high availability of global information and models on climate risks and early warning, but a significant lack of adaptations for local context in Ethiopia.
- **Main Gaps:** The biggest data gaps across all identified platforms providing information in the context of floods and droughts in Ethiopia, are the limited availability of information with local context. Further major gaps are a lack of local leadership, and a lack of accessibility in local languages.
- **Information Availability:** More information is available on drought risk and drought early warning than on flood risk and flood early warning.
- **Drought Information Development:** Several initiatives and organizations (e.g., [E4DRR](#), [Water at Heart of Climate Action](#)) are currently working on improving drought risk and early warning information in Ethiopia (e.g., [NADMWS](#), [East Africa Drought Watch](#)).
- **Flood Early Warning Gap:** There is a critical shortage of early warning information for floods in Ethiopia. The lack of digitized local-level hydrological data, such as water levels of dam reservoirs, river discharges or water availability at water points is a key challenge, limiting the accuracy of global flood models at the local level in Ethiopia.
- **Initiatives and Collaborations:** Initiatives, like [E4DRR](#), [Early Warnings for All \(EW4All\)](#), [Ethiopia's Multi-Hazard, Impact-Based Early Warning and Early Action \(MHIBEWEA\) System](#) or the [Water at Heart of Climate Action](#) initiative, aim to enhance climate risk information and early warning information in Ethiopia (e.g., development of [East Africa Hazard Watch](#)). These efforts are supported by international organizations and research institutions while being led by Ethiopian or East African authorities and organizations.
- **Climate-smart programming<sup>1</sup>:** To enhance disaster risk reduction (DRR), early warning systems, and climate risk management in Ethiopia, future projects in the context of agricultural development, resilient infrastructures, water management, urban planning, renewable energy, or community development need to integrate [climate-smart programming](#), considering long-term climate change impacts to ensure infrastructure and community resilience. Investing in climate-smart infrastructure and training local communities in these practices is essential for building a resilient Ethiopia.

1. Climate-smart programming: Climate smart programming integrates climate change adaptation and mitigation into project design and implementation to ensure environmentally sustainable, economically viable, and socially inclusive long-term outcomes.

2. USAID. [Climate Change Risk in Ethiopia, Country Factsheet](#) (2016).

3. World Bank. [Climate Risk Profile: Ethiopia](#) (2021).

4. Shared Socioeconomic Pathways (SSP) scenarios are five narratives that describe potential future developments in socioeconomic factors like population, economy, and technology, used to project greenhouse gas emissions and assess climate change impacts. The scenarios range from a sustainable world with low challenges (SSP1) to one with high challenges (SSP5).

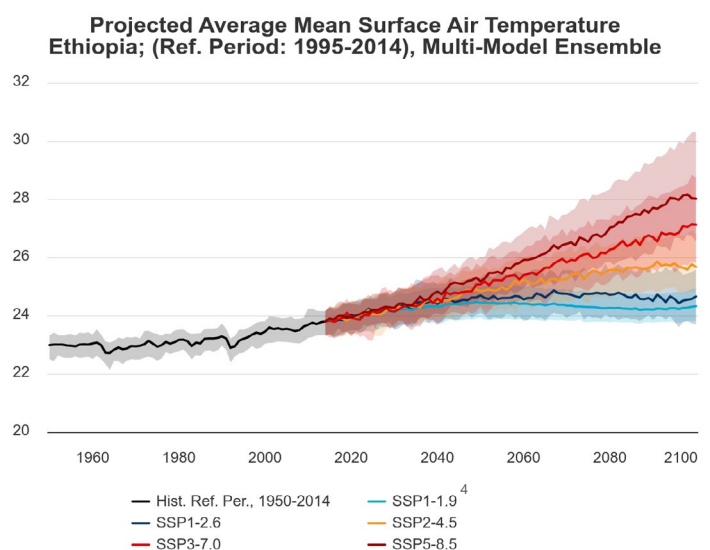
## INTRODUCTION

Ethiopia has faced multiple humanitarian crises resulting from human-induced and natural hazards. Climate related shocks are among the major factors driving these crises. The country is one of the world's most vulnerable to climate change and has frequently experienced extreme events like droughts, riverine floods and flash floods which adversely impact livelihoods and general living conditions. The key climate impacts are on agriculture, water resources, livestock, food security and human health.

It is estimated that climate change may lead to a 10% reduction of Ethiopia's Gross Domestic Product (GDP) by 2045, mainly due to impacts of drought on agricultural production.<sup>2</sup> These impacts depend largely on the extent of weather variability and extremes due to high rainfall variability and increasing temperatures. An increase of mean annual temperature of 1°C has been recorded over the country since 1960, and the increase is expected to rise to 1.8°C by the 2050s.<sup>3</sup> Overall, decline in rainfall precipitation has been recorded in the last three to four decades. The southeastern and northeastern parts of the country are lowland areas, vulnerable to rising temperatures and low precipitation. The central parts are highlands and prone to intense and irregular rainfall.<sup>2</sup>

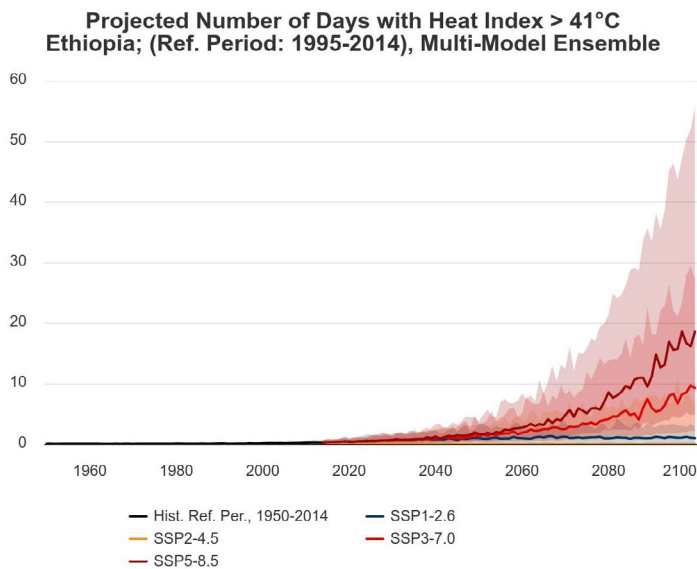
This leads to an urgency to improve early warning systems on local-level to increase preparedness, timely response, and data availability for climate risk assessments for better risk mitigation.

Figure 1.. Climate Change Projections Ethiopia. Source: [World Bank 2024](#).



Having a diverse climate and landscape with high variability of precipitation, the vulnerability of the country to climate change largely stems from its heavy dependence on rain-fed cultivation/livestock rearing and low adaptive capacity to deal with the climate change.<sup>2</sup> The current development challenges, including rapid urbanisation resulting in densely populated urban areas, economic challenges, food insecurity, depletion of natural resources, under-developed water resources, low health service coverage, inadequate infrastructure, limited awareness on climate change and weak institutional capacity are exacerbating the vulnerability and increasing exposure of the population to climate hazards.

These compounding impacts overburden efforts to respond to the humanitarian crises. Hence, it is essential to bring climate agenda to humanitarian actors' attention to take climate risks and resilience in consideration when programming their responses.

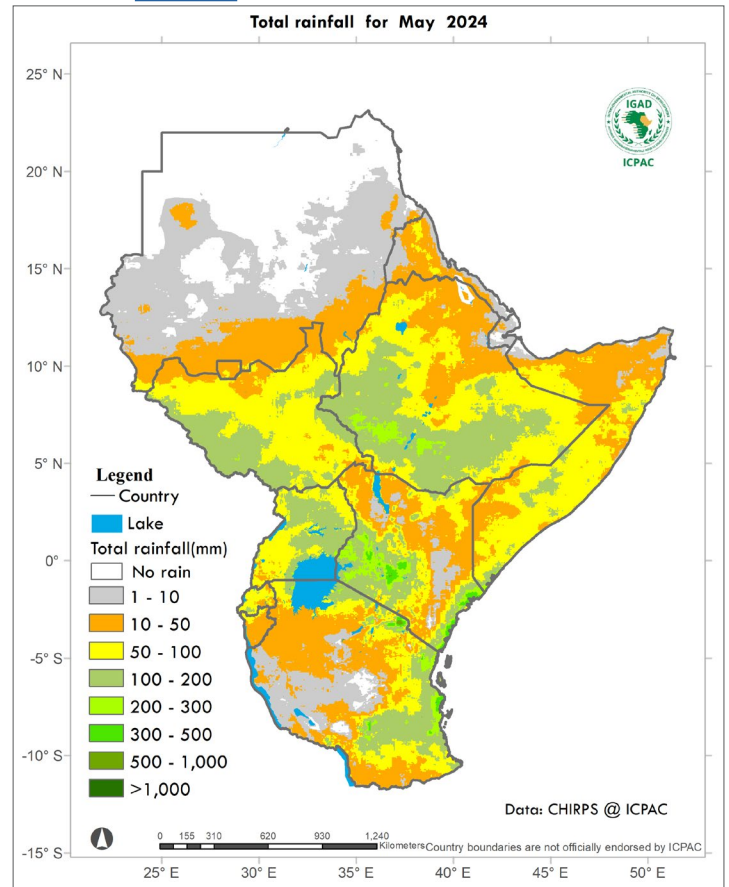
Figure 2. Climate Change Projections Ethiopia. Source: [World Bank 2024](#).

## Climate Risk & Early Warning Information in Ethiopia

**Climate risk information** in Ethiopia is crucial but faces significant challenges in dissemination, integration, and local accuracy. Stakeholders such as the [Ethiopian Meteorological Institute \(EMI\)](#) and the [Disaster Risk Management Commission \(DRMC\)](#) play key roles in collecting and disseminating climate risk information. However, disparities in technical capacity and resource allocation among regions, and lacking coherence of dissemination, result in fragmented understanding and disjointed response strategies. Efforts are ongoing to improve national climate risk frameworks and bridge local observations with scientific hazard models to enhance risk analysis and preparedness measures. Despite the availability of extensive global climate and risk models, these often lack the necessary local context and accuracy for effective decision-making and localized responses in Ethiopia. Initiatives are currently underway to strengthen regionally or nationally led projects aimed at improving the collection, dissemination, and availability of localized climate risk information across the country (e.g., [E4DRR](#)).

**Ethiopia's early warning (EW) information** landscape is diverse and extensive, encompassing various governmental and humanitarian initiatives and supported by global organizations like FAO, WFP, IFRC or the Start Network. Currently, the existing EW systems predominantly address specific natural hazards, such as droughts and floods, which are prevalent in [Ethiopia](#). While there is a wide array of drought early warning information already available or under current development, there is a major gap to flood early warning information on local level in Ethiopia. Despite efforts, disparities in capacity and coordination persist across regions, impacting information flow and response effectiveness. There is consensus on the need for improved coordination and integrating local and scientific knowledge to enhance pre-emptive actions. The 2023 [national roadmap for a multi-hazard, impact-based early warning and early action \(MHIBEWEA\) system](#) in Ethiopia aims to unify disaster risk reduction and early warning efforts from local to national levels, supported internationally but driven nationally. Simultaneously, the [Early Warnings for All \(EW4All\)](#) initiative is being implemented in Ethiopia, aiming to protect people worldwide from climate crises by 2027. This initiative seeks to enhance disaster risk knowledge and management, forecasting, early warning communication, and preparedness and response capabilities. Additionally, traditional

forecasters in pastoralist communities offer valuable insights, yet alignment with meteorological data remains a challenge, affecting community trust in early warning systems. This emphasis a critical need for a more comprehensive, [multi-hazard approach](#) that integrates local perspectives and initiatives.

Figure 3. East Africa - Climate Monitoring Product: Observed rainfall for May 2024. Source: [ICPAC 2024](#).

## Assessment of Climate Risk & Early Warning Information

A wide range of platforms and information products exist globally to aid in understanding various hazards and exposure levels, including those relevant to Ethiopia. While these resources offer critical insights into climate risks, they pose significant challenges due to their technical complexity, requiring technical expertise for effective interpretation. This complexity often limits access for non-technical stakeholders involved in humanitarian responses and aiming to promote climate-smart programming in Ethiopia. Furthermore, the abundance of online data sources and platforms presenting diverse information can overwhelm non-experts, complicating their ability to discern reliable sources for climate risk and early warning information.

**This assessment aims to identify and evaluate climate risk and early warning information available globally, regionally, and nationally for its usability by actors and stakeholders in Ethiopia.** Its primary objective is to provide guidance on navigating the landscape of climate risk and early warning information, facilitating stakeholders' access to and understanding of this crucial data. By doing so, the assessment aims to support the integration of this information into Disaster Risk Reduction (DRR) strategies, climate action project plans, anticipatory action strategies and climate-smart programming initiatives facing of climate-related challenges in Ethiopia.

## METHODOLOGY

First, an extensive review of existing secondary data sources, platforms and initiatives was conducted to identify and assess the most relevant and high-quality platforms, datasets, and initiatives. Simultaneously, a Key Informant (KI) survey was administered to gather expert opinions and user-experiences related to the 10 most promising platforms. The information collected from these two activities was analyzed to establish key attributes, usability criteria, and scores for each data source.

### Scoping Review of available open-source information, platforms, data sets, and initiatives

Firstly, a review was conducted of available open-source information, platforms, data sets, and initiative that offer climate risk or early warning information. From this review, an overview matrix was created, highlighting the specifics, limitations, weaknesses, and strengths of the platforms, datasets, and initiatives. Following this initial review, sources were categorized into four distinct groups based on their overall usability and effectiveness: 'Low', 'Medium', 'High', 'Very High' (description of categories: Annex A). Those platforms in category 'High' or 'Very High' were further assessed regarding their technical quality and user satisfaction.

### Technical Quality and User Satisfaction Assessment

The first step in assessing usability involved identifying the key usability dimensions of the platforms. Subsequently, relevant indicator variables were assigned to these dimensions. The indicators were categorized into two groups corresponding to the two main dimensions:

**Technical Quality Indicators:** These can be directly assessed by reviewing the documentation of the datasets and platforms. There are 22 indicators, each given equal weight:

1. Local leadership and ownership
2. Geographical coverage of Ethiopia
3. Level granularity
4. Information provision in local languages
5. Drought hazard information
6. Flood hazard information
7. Future climate risks or climate change impacts information
8. Food security and crop health information
9. Early warning for floods information
10. Early warning for droughts information
11. Early warning for food security information
12. Ethiopia sector-specific data provision
13. Frequency of data updates
14. User-friendly accessibility
15. Downloadable data formats
16. Provision of tutorials or guides
17. Institutional support and backing
18. Transparency of data sources
19. Peer-reviewed methodologies
20. Active user engagement opportunities
21. Data sharing capabilities
22. Potential for further development

**User Satisfaction Indicators:** These require assessment through a Key Informant (KI) survey to capture the opinions and experiences of key informants. There are 10 indicators, each given equal weight:

1. Intuitively user interface
2. Provision of interactive data exploration tools
3. Usability by non-experts
4. Platform reliability and trust
5. Comprehensiveness of climate risk coverage
6. Comprehensiveness of early warning coverage
7. Usability to support understanding climate risks
8. Usability to support understanding early warning
9. Support for decision-making
10. Overall recommendation of the platform
11. User familiarity with the platform (not scored)

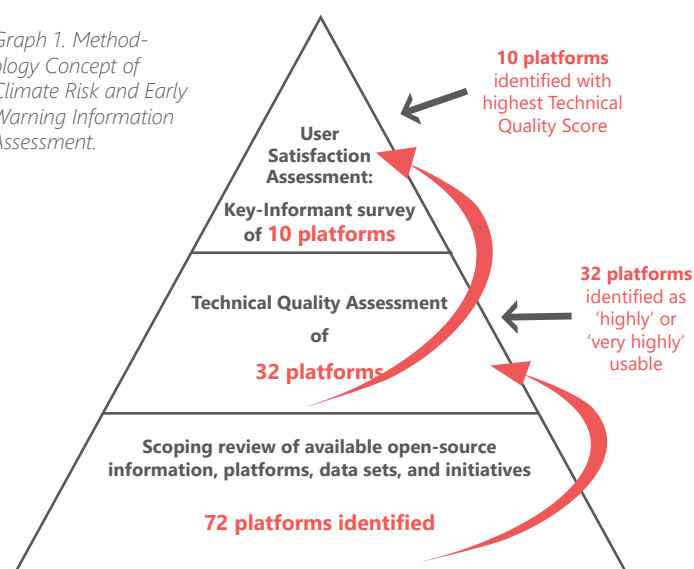
All indicators were set up as binary responses of "Yes" or "No." In the quantitative assessment, "Yes" was counted as 1 and "No" as 0. The indicators were designed so that each "Yes" represented

an increase of the quality and usability of the assessed platform. Therefore, a higher final score for each platform indicated greater quality and usability.

### Selection of platforms for the User Satisfaction Survey

From the comprehensive list of identified data sources and platforms from the scoping review (72 identified platforms), those categorized as 'High' or 'Very High' (32 platforms) were evaluated for their technical quality, resulting in a Technical Quality Score for each source. The eight sources with the highest Technical Quality Scores (scoring 14/22 points or higher) were included in the KI survey on User Satisfaction. Additionally, two sources were added to the KI survey due to their relevance and role in addressing critical data gaps of climate risks and early warning in Ethiopia (The 'IPCC Atlas' for climate change information and the 'Water Point Viewer' for early warning information to floods). The User Satisfaction survey was sent to 25 key informants, who are experts in fields such as climate risks, GIS and remote sensing, early warning, climate mitigation, or humanitarian response in Ethiopia and received 11 responses.

Graph 1. Methodology Concept of Climate Risk and Early Warning Information Assessment.



### Thematic and geographical coverage

Thematic and geographical coverage in this assessment specifically targeted climate risk and early warning information related to floods and droughts, identified as the most urgent climate-related hazards in Ethiopia. The assessment encompassed data and platforms that cover Ethiopia either entirely or partially. Special emphasis was given to sources that offer information at sub-national or local levels, aiming to provide comprehensive insights for stakeholders involved in disaster risk reduction, climate action projects, and climate-smart initiatives across different regions of Ethiopia.

### Network Analysis of Stakeholders

In addition to the assessment of information sources, a network analysis was used to map key-stakeholders and actors in Ethiopia working with climate risk and early warning information. Based on secondary data review, relevant organizations and actors, including government agencies, NGOs, research institutions and their roles in the context of climate risk and early warning information were identified. A network visualization maps these entities as nodes and their interactions, such as data sharing and collaborative efforts, as links. Special attention was given to mapping links of support provided to platforms or tools managed by Ethiopian organizations or authorities. This approach highlights key connections, collaboration hubs, and potential gaps or redundancies in the stakeholder network.

## RESULTS

### Scoping Review

A total of 72 platforms, data sets and initiatives were identified and reviewed for climate risk and early warning information. Out of those, 32 were assessed as 'highly' or 'very highly' usable to support the understanding of climate risks or early warning in Ethiopia (list of 32 platforms in Annex B). The review highlighted that while there is a high abundance of platforms with global data models, covering Ethiopia are available, information on sub-national level and with local context is limited. Global level flood and drought models have shown to lack accuracy on local level and are therefore not recommended for use on local level in Ethiopia. Out of the 72 reviewed platforms, only 6 were owned and led by Ethiopian or East African organizations or authorities and only 2 provided information in Amharic. While there are ongoing efforts to adapt existing drought early warning systems to East African or Ethiopian conditions, there is currently a major gap of early warning information to floods on local level in Ethiopia.

### Technical Quality Score

The technical quality of those 32 platforms was assessed through 22 indicators (list of 32 platforms in Annex B). The assessment showed that language options in Amharic was the indicator least met (2 platforms out of 32 provide local language options), followed by providing information on early warnings to floods (3 out of 32 platforms), and providing early warning information to droughts (5 out of 32 platforms). The strongest indicators were the ease of access to the information and institutional backing by reputable institutions (e.g., government agencies, international organizations, universities) which were both provided by all 32 platforms.

### Technical Quality Score by Platform

The 10 platforms which received the highest technical quality score are:

IGAD Climate Prediction and Application Centre (ICPAC)	95%
Ethiopia Meteorological Institute (EMI)	86%
East Africa Hazard Watch	82%
East Africa Drought Watch	77%
FAO - Geospatial Platform	68%
FEWS - Ethiopia Acute Food Insecurity	64%
EO Browser	64%
Crop Explorer	64%
IPCC Atlas	59%
Water Point Viewer	55%

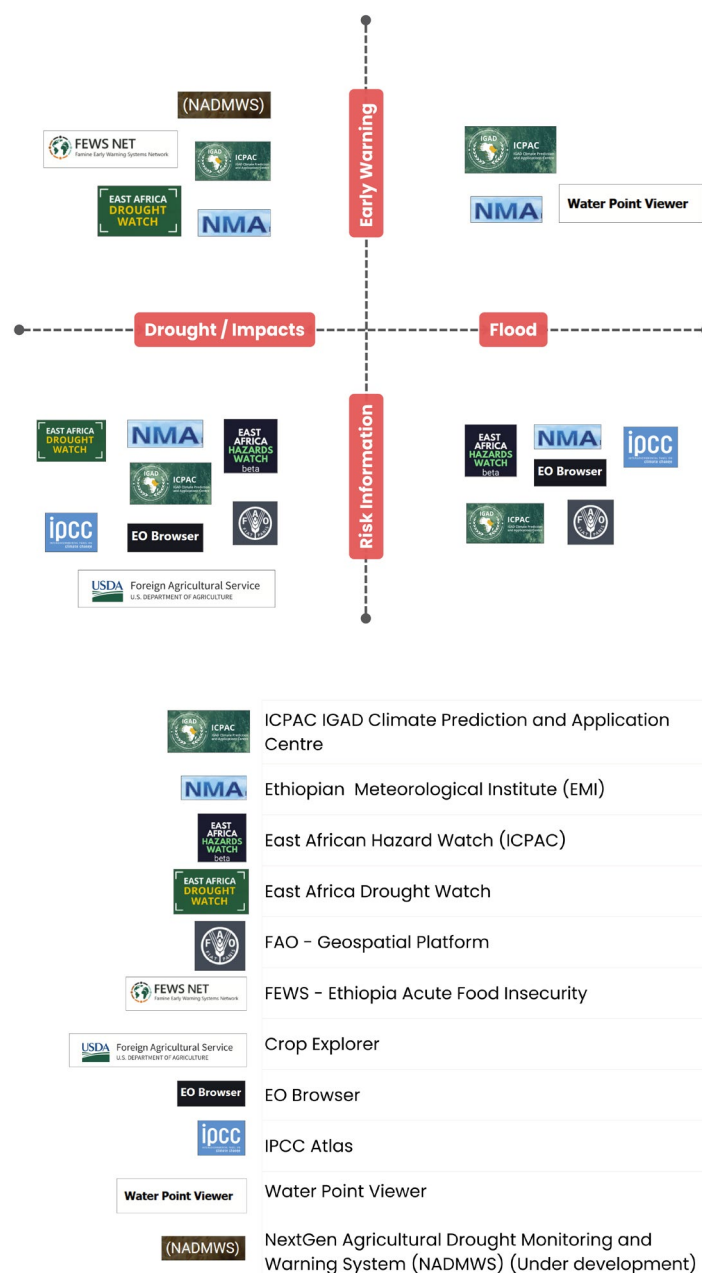
### Key Messages Technical Quality Score

- Lowest Score:** The indicators with the lowest scores across all 10 identified top platform were thematic coverage of **flood early warning**, options for **data exchange**, and availability of information in at least one **local language**, with only 2 out of 10 platforms meeting these criteria for each indicator. This highlights significant gaps in critical areas that need to be addressed to improve the platforms' effectiveness and accessibility.
- Highest Score:** The indicators with the highest scores were **frequency of updates**, **ease of access**, **interpretability of information**, **institutional backing**, **data sources**, **peer reviews and references**, and **future development**, with all 10 platforms meeting these criteria. This demonstrates strong performance in these critical areas across all evaluated platforms.

- Comparison:** Overall, the analysis reveals that twice as many platforms offer Drought Hazard Information (8/10) and Drought Early Warning Information (4/10) compared to Flood Hazard Information (4/10) and Flood Early Warning Information (2/10). This aligns with stakeholder opinions that highlight a current lack of flood early warning systems in Ethiopia. A major challenge identified is the absence of digitized local-level hydrological data necessary for calibrating and validating flood models to the local context, resulting in the inaccuracy of global flood models like GloFas on a local scale in Ethiopia.

### 10 Platforms with Highest Technical Quality Score

The following perceptual map shows the 10 platforms with highest Technical Quality Score or context for usability and alongwith a 11<sup>th</sup> platform currently under development (NADMWS) to highlight the information coverage and gaps of climate risks and early warning information to drought and floods in Ethiopia:



The illustration highlights the information gap in early warning systems for floods, whereas climate risk information for droughts is widely available for Ethiopia.

## List of 10 Platforms with Highest Usability

Following the 10 platforms with highest usability are listed along a short description of their application.

### IGAD Climate Prediction and Application Centre (ICPAC)

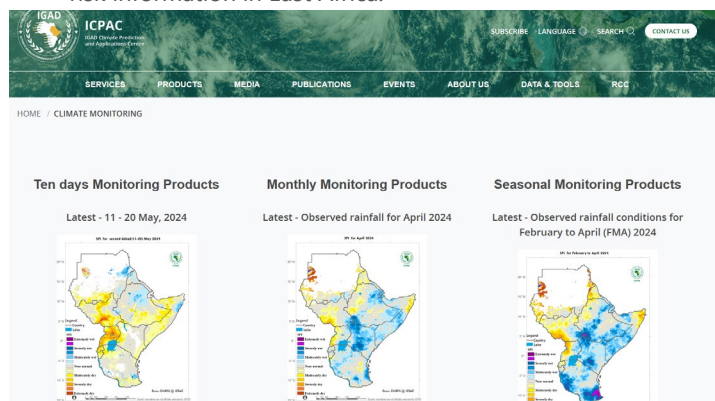
**Thematic Coverage:** Drought Risk, Drought Early Warning, Flood Risk, Flood Early Warning

**Level:** Regional (East Africa)

**Type:** Information Platform

ICPAC is a Climate Center accredited by the World Meteorological Organization that provides Climate Services to 11 East African Countries. The platform offers a wealth of monitoring and forecasting information, including data portals to secondary sources and links to various interactive platforms focused on drought monitoring, agriculture monitoring, and other hazards. Forecasting and climate monitoring information is available as detailed graphs and reports. The main advantages of this platform include its strong focus on the East African context, the variety of climate information it provides, and its robust collaboration with international organizations and research institutions.

- **ICPAC's EA Drought Watch:** Supported by Copernicus' Global Drought Observatory by the European Commission.
- **ICPAC's EA Agriculture Watch:** Supported by ASAP - Anomaly Hotspots of Agricultural Production by the Joint Research Centre (JRC) of the European Commission.
- **ICPAC's EA Hazard Watch:** Currently under development and supported by the E4DRR initiative to enhance climate risk information in East Africa.



### Ethiopian Meteorological Institute (EMI)

**Thematic Coverage:** Drought Risk, Drought Early Warning, Flood Risk, Flood Early Warning

**Level:** National (Ethiopia)

**Type:** Information Platform

The official platform of the Ethiopian Meteorological Agency (EMA) offers detailed meteorological information, including forecasts for temperature, precipitation, wind, and other weather parameters. It serves individuals, organizations, and authorities involved in weather-dependent activities, providing downloadable dekadal (every 10 days), monthly, and seasonal agrometeorological bulletins in English or Amharic. A significant advantage of the platform is its strong local context and delivering information and forecasts in local languages. However, navigating the platform and accessing data can be challenging, potentially delaying users' timely and accurate retrieval of climate and weather information. EMI collaborates with international organizations such as the International Research Institute for Climate and Society (IRI) and the Food and Agriculture Organization of the United Nations (FAO) to enhance early warning products, aiming to improve forecasting capabilities and resilience in Ethiopia.



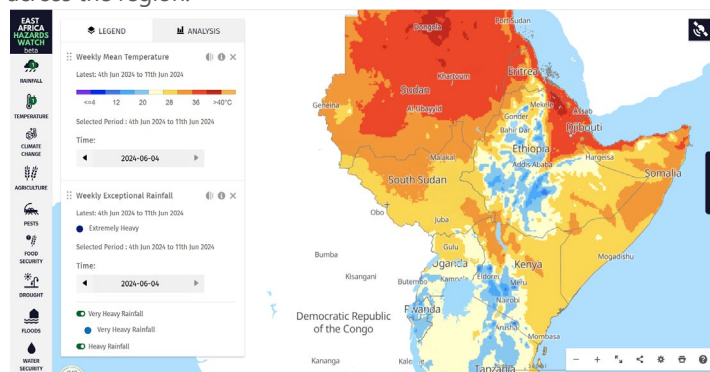
### East Africa Hazard Watch

**Thematic Coverage:** Under development: Drought Risk, Drought Early Warning, Flood Risk, Flood Early Warning

**Level:** Regional (East Africa)

**Type:** Interactive Map-Platform (Beta version)

The East Africa Hazard Watch is an evolving regional platform designed to access various data layers on natural hazards, food security, climate conditions, projections, and baseline data. Developed by the Intergovernmental Authority on Development (IGAD) Climate Prediction and Applications Centre (ICPAC) with support from the E4DRR initiative, the platform integrates a wide array of datasets from multiple sources, covering rainfall, temperature, agriculture, pests, food security, drought, floods, water security, cyclones, and environmental factors. It operates as an interactive map where users can visualize, explore, and compare data layers, with additional capabilities for generating graphs to analyze trends in defined areas. The E4DRR initiative aims to enhance disaster preparedness and resilience in East Africa through impact-based climate storylines, hazard modeling, and impact estimation, supported by The Complex Risk Analytics Fund (CRAF'd). As the East Africa Hazard Watch platform continues to develop with institutional backing, it holds significant potential to become a vital tool for climate risk assessment and early warning information across the region.



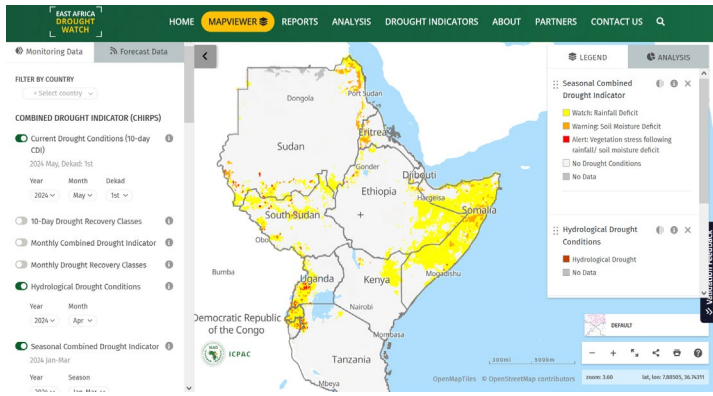
### East Africa Drought Watch

**Thematic Coverage:** Drought Risk, Drought Early Warning

**Level:** Regional (East Africa)

**Type:** Interactive Map-Platform

The East Africa Drought Watch is a near-real-time system accessible as an interactive map platform that leverages Earth observation and weather data to monitor drought conditions across East Africa. Developed in collaboration with the European Commission's Joint Research Centre and adapted from the European Drought Observatory (EDO), it offers comprehensive data integration through interactive map layers featuring indicators from various sources, including precipitation, satellite measurements, and modeled soil moisture content. Users benefit from detailed analysis tools such as graphs and layer comparisons, along with timely drought reports that provide concise overviews of imminent drought situations, making it an invaluable resource for understanding and managing drought conditions in the region.



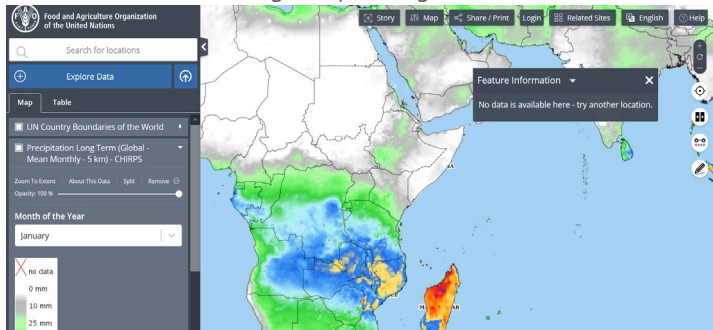
**FAO - Geospatial Platform**

**Thematic Coverage:** Drought Risk, Flood Risk

**Level:** Global

**Type:** Interactive Map-Platform

The Food and Agriculture Organization (FAO) of the United Nations Hand-in-Hand (HiH) Geospatial Platform is a Digital Public Good designed to facilitate targeted, evidence-based interventions. This open-access tool offers over 2 million data layers, integrating geographic information, key food security indicators, and agricultural statistics sourced from FAO and external partners such as NGOs, academia, the private sector, and space agencies. The platform provides access to a comprehensive database of remote sensing products, including indicators of agricultural production, vegetation health, drought, climate conditions, environmental factors, baseline data, and vulnerability indicators. Users can select and add data layers to an interactive map platform, each with a detailed description of its source and specifics. While navigating the extensive information may require initial familiarization, the platform offers high-quality, customizable data that supports informed decision-making and planning.



**FEWS NET - Ethiopia Acute Food Insecurity**

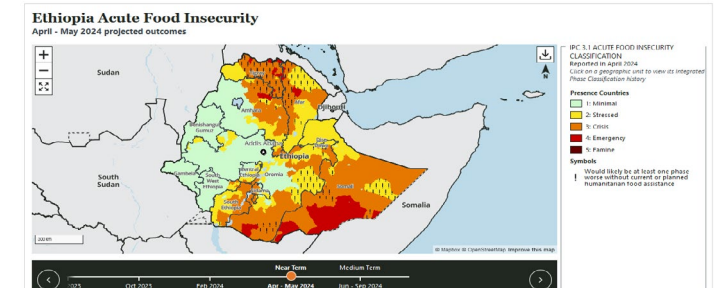
**Thematic Coverage:** Food Security, Food Insecurity Early Warning, Drought Early Warning

**Level:** National (Ethiopia)

**Type:** Information Platform

FEWS NET is a leading global provider of timely, accurate, evidence-based, and transparent early warning information and analysis of current and future acute food insecurity. This critical information is presented through interactive maps, graphs, and reports to guide humanitarian response efforts. FEWS NET work is implemented by a team of partners, including the National Aeronautics and Space Administration (NASA), the National Oceanic and Atmospheric Administration (NOAA), the University of California-Santa Barbara's Climate Hazards Centre (UCSB-CHC), the U.S. Department of Agriculture (USDA), the U.S. Geological Survey (USGS), Chemonics International Inc., the American Institutes for Research (AIR), and Tetra Tech. FEWS NET Ethiopia offers early warning and analysis on food insecurity, utilizing diverse data sources including climate, market, and nutrition information to anticipate and mitigate

food crises. The platform offers comprehensive and interactive tools for assessing and understanding food insecurity. It offers detailed, near- and medium-term projections at a sub-national level, along with historical data, providing a thorough context for current conditions. Additionally, the site features a seasonal calendar, recent precipitation and drought indicator data, and resources on livelihood zones, all of which enhance users' ability to make informed decisions and implement timely interventions. Collaboration with prestigious institutions ensures the accuracy and reliability of the information provided.



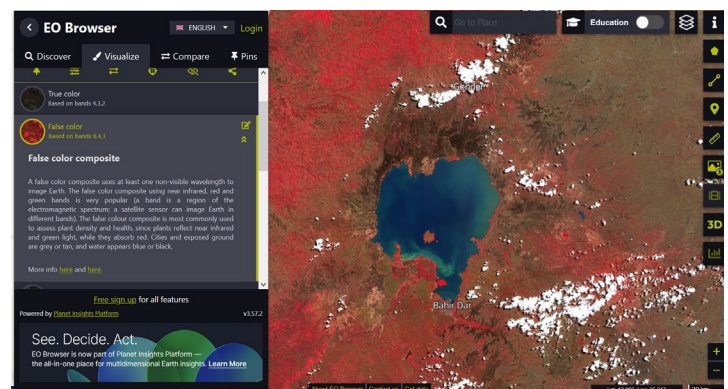
**EO Browser**

**Thematic Coverage:** Drought Impacts, Flood Impacts

**Level:** Global

**Type:** Interactive Imagery Platform & Archive

The EO Browser, developed by the European Space Agency (ESA) and Sinergise, is a robust web-based tool offering access to a wide range of satellite imagery and Earth observation data. It provides real-time and historical data from multiple satellite missions, enabling users to explore diverse types of imagery such as vegetation indices, land use, and atmospheric conditions. The platform supports advanced analysis functions including time-lapse creation, dataset comparison, and customizable visualization, making it essential for environmental monitoring, research, and decision-making. Users can browse and compare full-resolution images, select data sources, specify time ranges and cloud coverage, and examine resulting imagery and remote sensing data. Detailed descriptions of satellite products and their applications are available, along with options for exporting data as images or GIS formats. While the EO Browser facilitates comprehensive analysis of recent and historical imagery for understanding impacts like drought and environmental changes, its complexity may pose challenges for non-experts, necessitating training to effectively utilize and interpret data.



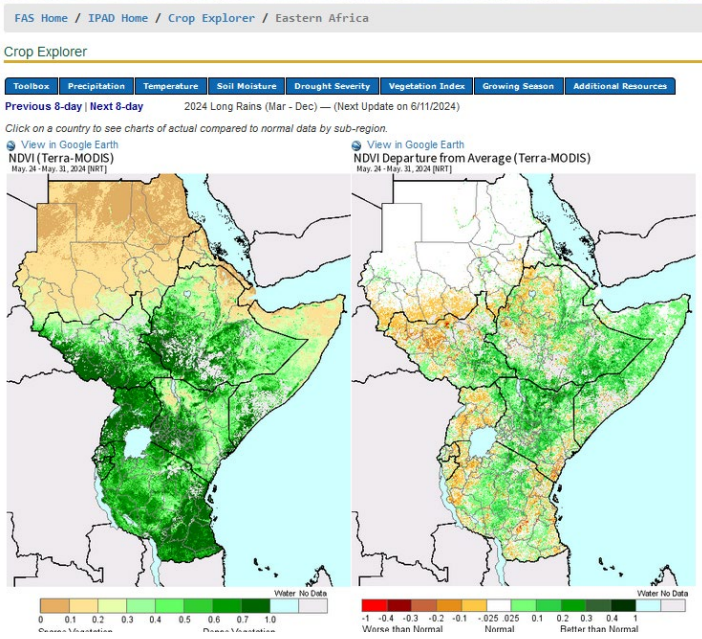
## Crop Explorer

**Thematic Coverage:** Drought Risk, Drought Early Warning, Flood Risk

**Level:** Regional (East Africa)

**Type:** Information Platform

The United States Department of Agriculture’s (USDA) Crop Explorer provides near-real-time information on East Africa and Ethiopia, including data on precipitation, temperature, soil moisture, drought severity, and vegetation (sourced from Terra-MODIS and VIIRS). Users can view and analyze various types of images, such as vegetation indices, precipitation, and temperature maps, to monitor agricultural trends and assess crop health across the region. This resource is valuable for monitoring signs of vegetation stress and drought. The data is presented as a set of maps covering East Africa, with user-selected indicators mapped out. Updated every 8 days, it allows users to select and visualize current and historical data. Maps and graphs can be exported as images, and all data layers can be directly opened and viewed in Google Earth Pro, making it easily accessible for non-experts to customize and explore data in a local context. This tool supports decision-making by offering detailed, up-to-date visual information on regional crop conditions. An advantage of the platform is its frequent updates and the ability to visualize both current and historical data, which is excellent for tracking changes over time and making informed decisions. However, the extensive data and mapping options can be overwhelming for new users, requiring some time and effort to learn how to navigate and utilize the platform effectively.



## IPCC Atlas

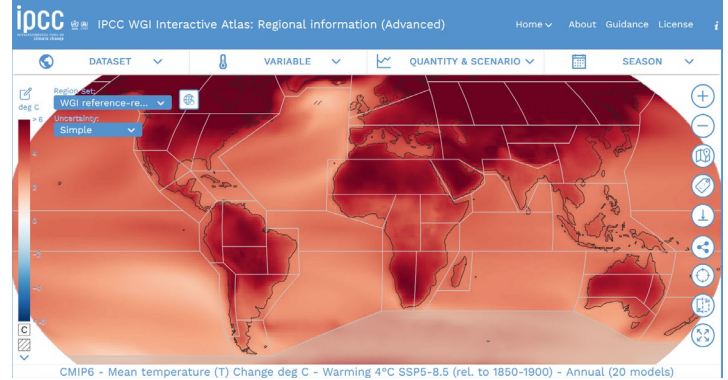
**Thematic Coverage:** Climate Change Projections & Impacts

**Level:** Global

**Type:** Interactive Map-Platform

The IPCC Interactive Atlas is a user-friendly online tool that provides access to comprehensive regional climate information from the Intergovernmental Panel on Climate Change (IPCC) reports. It offers a variety of visualization options, including maps, graphs, and time series, to facilitate the understanding and analysis of climate change impacts at regional and local levels, supporting research, policy-making, and education. The platform features a world map where users can visualize historic climate variables and future climate projections as layers. It offers a selection of different climate models and a wide array of climate variables, including precipitation, temperature, oceanic and atmospheric variables.

Users can select scenarios defining the baseline period, future period (near, medium, or long-term), and Shared Socioeconomic Pathways (SSP) scenarios. Additionally, graphs can be generated to provide context for the data. Information can be exported as print maps, graphs, or GIS files for further customization. This platform provides a comprehensive range of climate change information, allowing users to explore various future scenarios and understand potential impacts. However, to use the platform most effectively, users may need some familiarization with the interface and a basic understanding of climate change projection data.



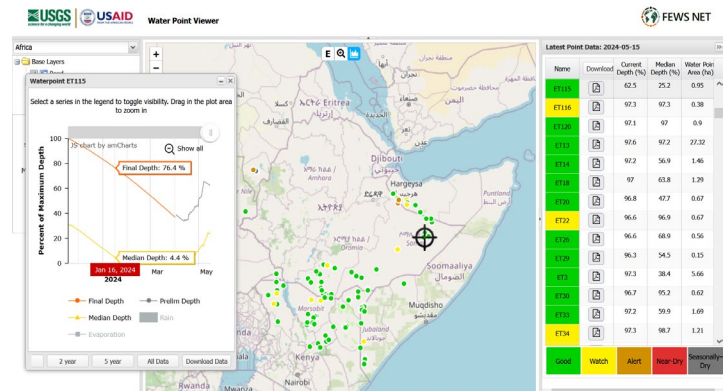
## Water Point Viewer

**Thematic Coverage:** Flood Early Warning (Future potential)

**Level:** Sub-saharan Africa

**Type:** Interactive Map-Platform

The Water Point Viewer is an interactive platform designed to track water point conditions in regions vulnerable to food and water insecurity. The platform is a collaborative effort by USGS, USAID, and FEWS NET, offering real-time information on water points across sub-Saharan Africa. It provides detailed data on water availability and quality through maps and charts displaying water levels, rainfall, and drought indicators. This tool facilitates early detection of water-related issues and supports planning for sustainable water resource management. Utilizing satellite imagery and hydrologic modeling, it delivers early warning on seasonal water patterns and variations since 1981, including daily rainfall, evaporation, and water point conditions. Users can interact via an interactive map to select water points by location, supplemented by a data table showing current and historical water depths and areas. Each water point is color-coded ('Good', 'Watch', 'Alert', 'Near-dry', or 'Seasonally dry') to indicate water stress levels. Data can be exported in tabular format or graphs. While the Water Point Viewer focuses primarily on water point data and lacks broader climate risk coverage, its role is crucial, especially in addressing gaps in water source information for flood early warning systems in Ethiopia. Further development and integration of digital data records and innovative approaches like the Water Point Viewer are essential to enhance flood modeling accuracy and enable timely flood warnings in Ethiopia.

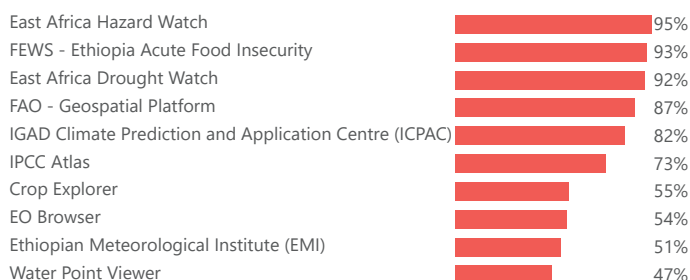




## User Satisfaction Score

The 10 platforms with highest Technical Quality Score were included in a Key-informant survey to assess user satisfaction according to 10 indicators.

### User Satisfaction Score by Platform



### Key Messages User Satisfaction Score

- **Lowest Score:** The indicator with the lowest user-satisfaction score across all platforms is the **accessibility and usability** of information for users with **low or no technical expertise** (47/111).
- **Highest Score:** The indicator with the highest score across all platforms is **trust** in the platform and its information (98/111), followed by **recommendations for use** (93/111) and the usefulness of the platforms in **supporting decision-making** (83/111).
- **Comparison:** Comparing the indicators for data range of climate risks (64/111) and data range of early warning information (56/111), and understanding climate risks (80/111) and understanding early warning information (71/111), reveals that in both cases, **information on drought scored slightly higher**. Overall, the platforms' usability to improve understanding of information is assessed more as favourably than their data range capabilities.
- **Recommendation:** Despite variations in user ratings across platforms, **all 10 platforms were recommended for use** by the KIs.

### Performance of Platforms

- East African Hazard Watch, FEWS NET – Ethiopia Acute Food Insecurity, and East African Drought Watch scored **highest in terms of supporting decision-making**. According to respondents, one of the reasons these platforms are valuable for decision-making is that they can be operated with minimal expert knowledge.
- For **climate risk information**, four platforms (ICPAC, East African Hazard Watch, FAO – Geospatial Platform, and FEWS NET – Ethiopia Acute Food Insecurity) **scored highly** in providing a wider range of climate risk data and early warning information. Conversely, EO Browser, Water Point Viewer, and the Ethiopian Meteorological Institute (EMI) received **lower scores**.
- East Africa Drought Watch, East Africa Hazard Watch, FAO - Geospatial Platform, ICPAC and FEWS NET - Ethiopia Acute Food Insecurity **scored high for usability to understand climate risks and early warning information**. Water Point Viewer, on the other hand, received a **lower score**.

- FAO - Geospatial Platform, East Africa Drought Watch, East Africa Hazard Watch, IPCC Atlas, EO Browser and FEWS NET - Ethiopia Acute Food Insecurity **scored higher** in terms of **interactivity and user-friendliness** of their interfaces while Ethiopian Meteorological Institute (EMI) and Crop Explorer received **lower scores**.

## Technical Quality Score vs User Satisfaction Score

A comparison of the platforms' rating between the Technical Quality Score and User Satisfaction Score revealed some strong differences:

- The ICPAC IGAD Climate Prediction Center saw a **decline of four positions**, from rank 1 in Technical Quality to rank 5 in User-Satisfaction scores. The platform performed the lowest in user satisfaction indicators related to the required level of expertise to access and use the data (2/11) and the availability of interactive tools for user engagement (5/11).
- The Ethiopian Meteorological Institute (EMI) was **lowered** from rank 2 of the Technical Quality to rank 9 of the User-satisfaction scores. The platform scored particularly low in indicators related to offered interactive tools for interactivity (0/11) and the range of climate risk data (2/11).
- The platform FEWS NET **improved significantly**, moving from 6th place in Technical Quality to 2nd place in User Satisfaction scores. It excelled with perfect scores for the indicators, user interface (11/11), trust (11/11), understanding early warning information (11/11), support for decision-making (11/11), and all KIs would recommend this platform for use (11/11).
- Overall, East Africa Hazard Watch, East Africa Drought Watch, and FEWS NET were **unanimously recommended** for use by all 11 Key Informants (KIs).

Graph 2. Comparison of platforms' rating between Technical Quality Score and User Satisfaction Score.

Platform	Rank by Technical Quality Score	Technical Quality Score	Rank by User Satisfaction Score	User Satisfaction Score
IGAD Climate Prediction and Application Centre (ICPAC)	1	95%	5	82%
Ethiopian Meteorological Institute (EMI)	2	86%	9	51%
East Africa Hazard Watch	3	82%	1	95%
East Africa Drought Watch	4	77%	3	92%
FAO - Geospatial Platform	5	68%	4	87%
FEWS - Ethiopia Acute Food Insecurity	6	64%	2	93%
EO Browser	6	64%	8	54%
Crop Explorer	6	64%	7	55%
IPCC Atlas	7	59%	6	73%
Water Point Viewer	8	55%	10	47%

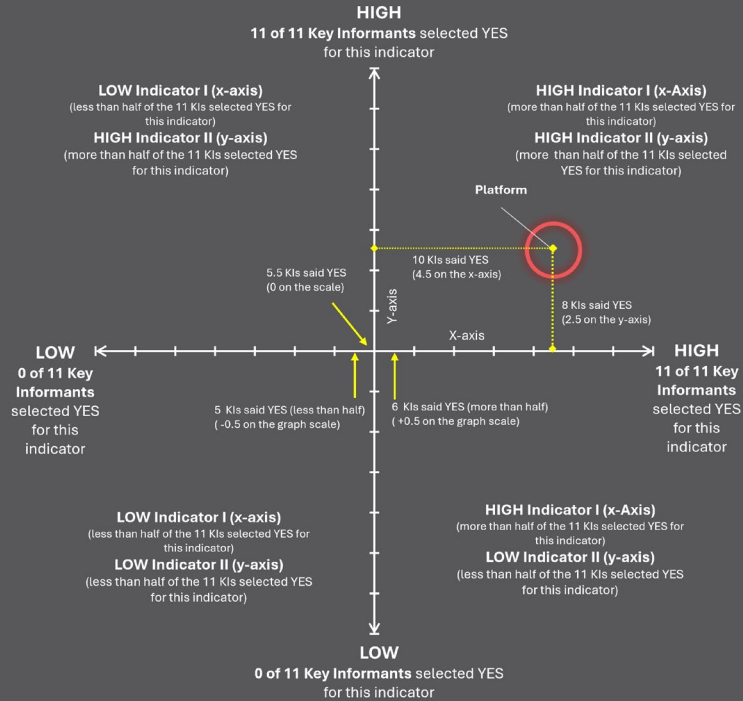
# Perceptual Maps of User Satisfaction Indicators

To visualize the platforms with the highest usability scores and identify overlaps and gaps in the data landscape of climate risk and early warning information in Ethiopia, a set of perceptual maps was created. A perceptual map is a graphical representation that shows the positioning of different platforms based on two indicators. This

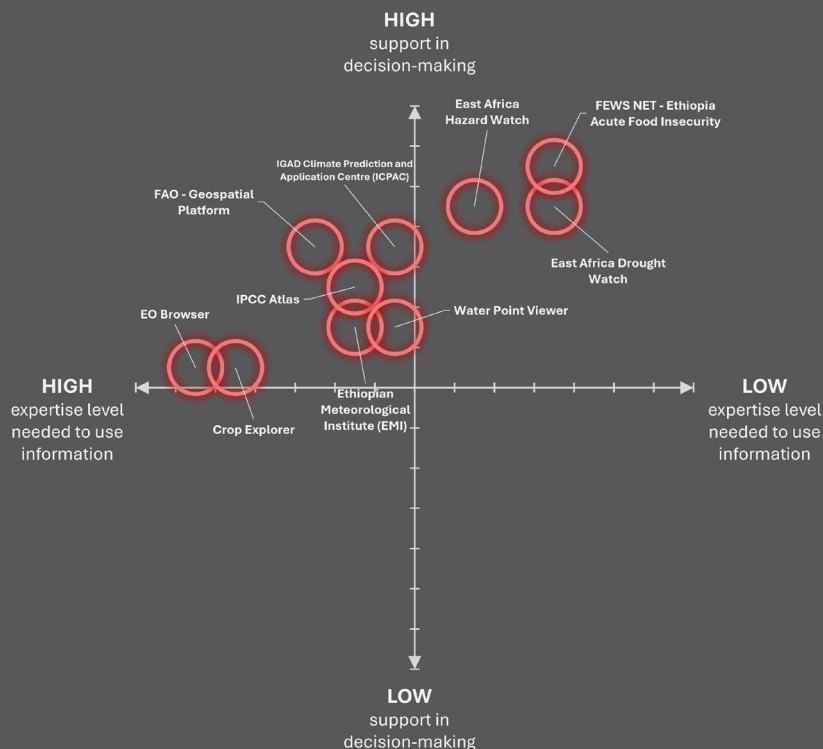
method helps in understanding how various platforms compare and highlights areas where there might be clusters of similar usability (overlaps) and isolated points (gaps). Further details on perceptual mapping can be found in this guide.

## Key Informant Survey Results: Explanatory Graph

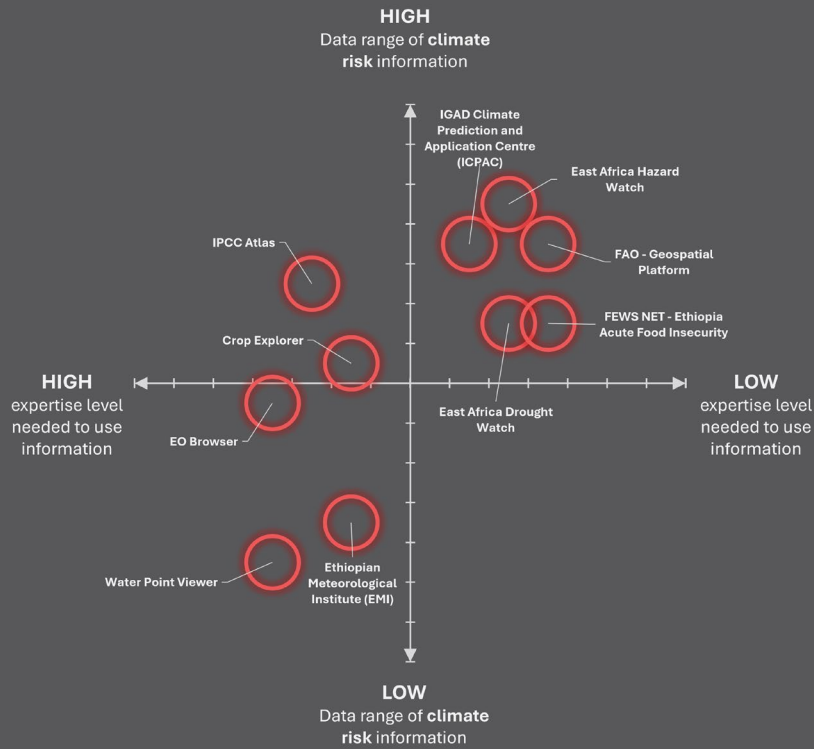
The graph illustrates the survey responses from 11 Key Informants (KIs) regarding various indicators. Each indicator's placement on the graph corresponds to the number of KIs who responded "yes." A "HIGH" designation, where all 11 KIs answered "yes," positions the point at the extreme positive end of the axis. Conversely, a "LOW" designation, where none of the KIs answered "yes," positions the point at the extreme negative end. The midpoint of the axis, marked at 5.5, serves as a threshold: if 6 or more KIs (more than half) responded "yes," the point falls on the positive side; if 5 or fewer KIs (less than half) responded "yes," the point falls on the negative side. This graphical representation effectively displays the collective opinions of the KIs on indicators, highlighting areas of consensus and divergence.



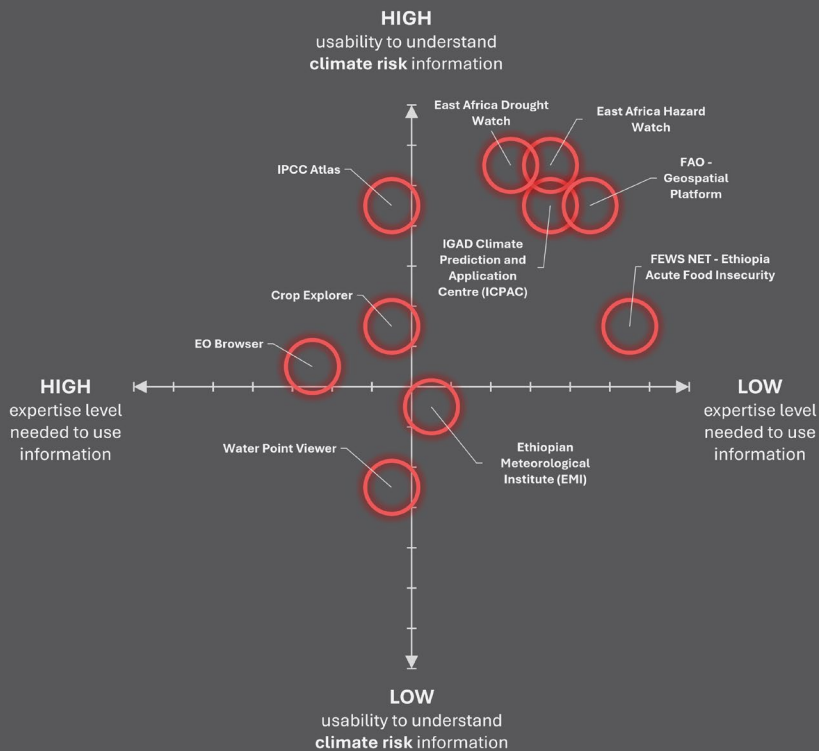
## Key Informant Survey Results: Needed Expertise Level and Decision-Making Usability of Platforms

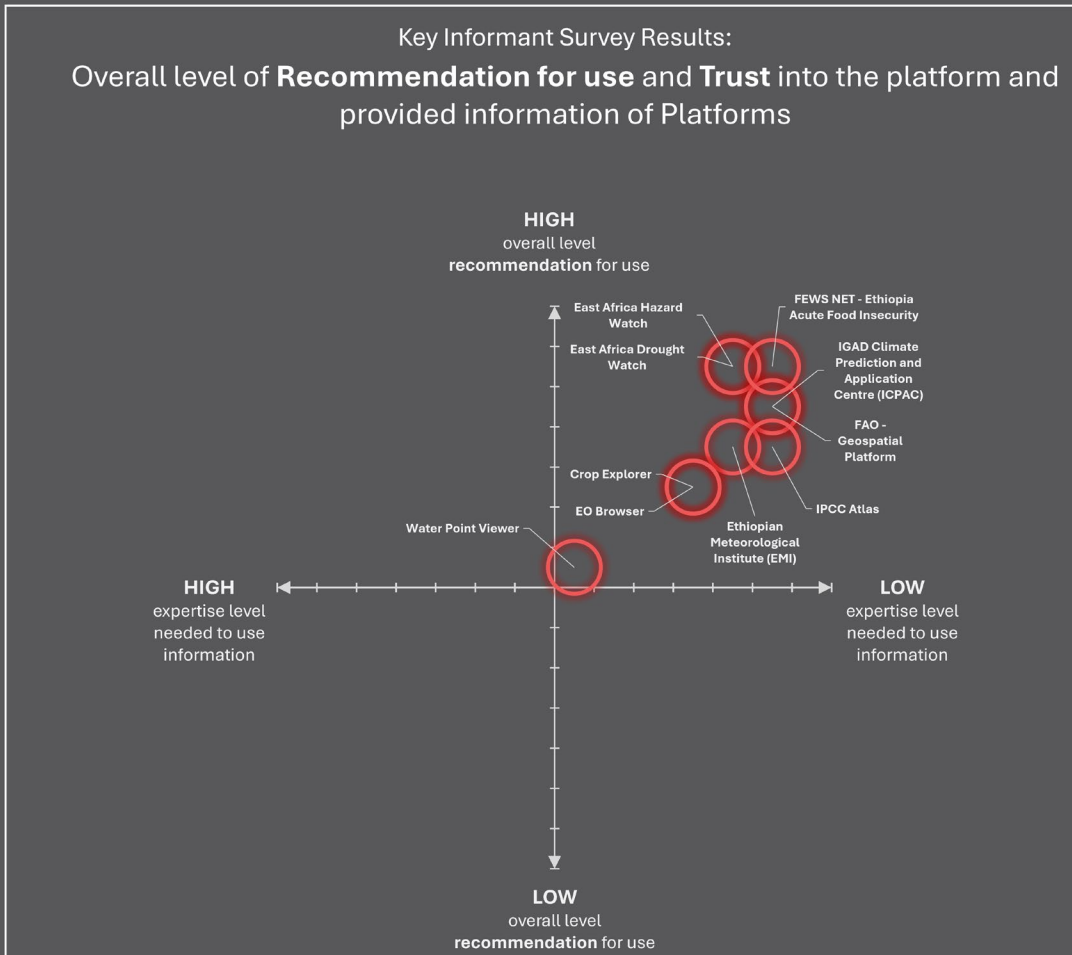
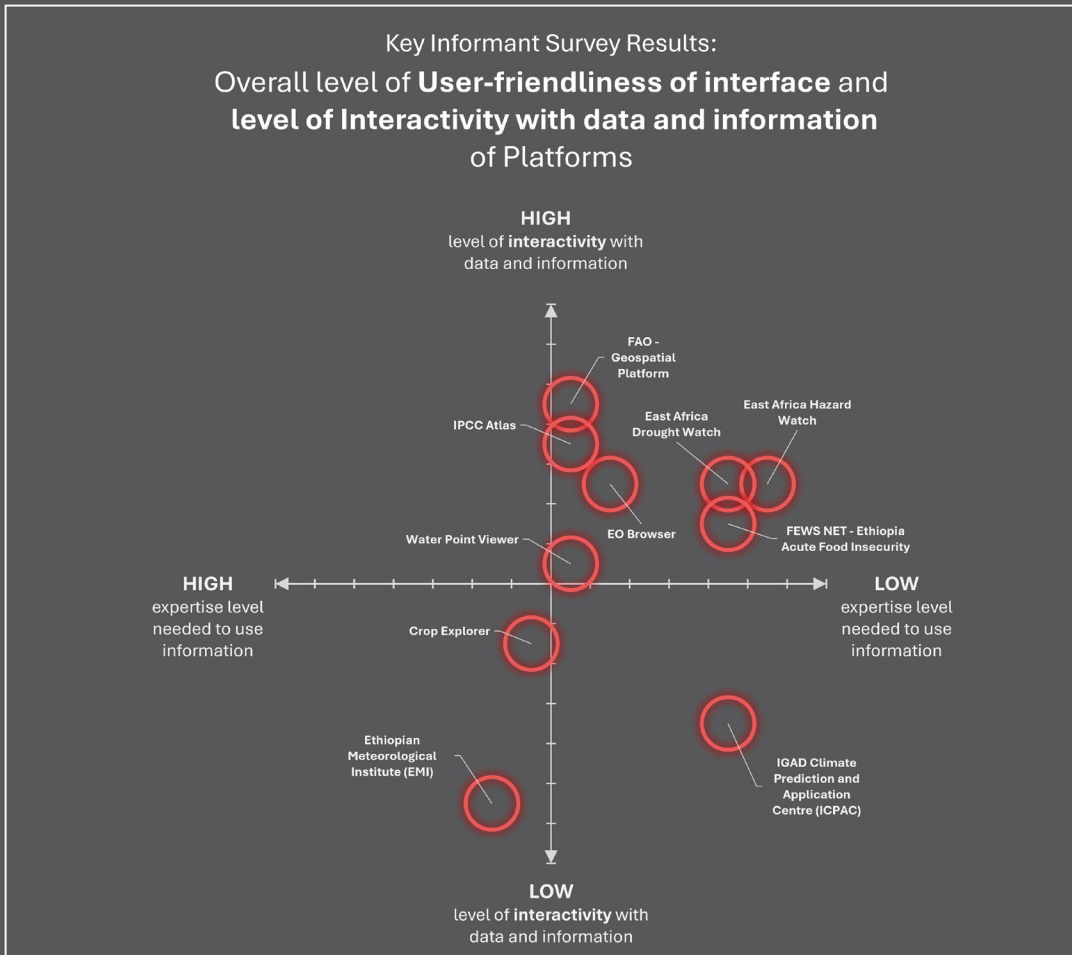


Key Informant Survey Results:  
**Data Range of Climate Risk and Early Warning Information of Platforms**



Key Informant Survey Results:  
**Overall usability to understand Climate Risk and Early Warning Information of Platforms**





## Tools, Initiatives, and ongoing Development

Several initiatives and tools have been recognized as highly beneficial for advancing the development of climate risk and early warning information in Ethiopia, owing to their relevance, contextual appropriateness, and potential for future applications:

### Enhancing Early Warning and Early Action (E4DRR) (Initiative)

The Intergovernmental Authority on Development (IGAD) Climate Prediction and Applications Centre (ICPAC) leads the CRAF'd initiative 'E4DRR' to enhance hazard modelling, impact estimation, and climate narratives for drought and flood disasters in Eastern Africa. E4DRR improves early warning systems through impact-based forecasting and event-based climate storylines. Utilizing ensemble prediction systems, it creates counterfactual, physically consistent narratives of real events. Integrated into the East Africa Hazard Watch Portal, the project addresses data gaps to provide localized, actionable information, supporting strategic responses to climate change, conflict, and displacement. Launched on 1st April 2024, it represents a significant advancement towards regional resilience.

### Water at the Heart of Climate Action Initiative (Initiative)

This initiative aims to mitigate water-related risks and disasters while bolstering community resilience in Ethiopia, Sudan, South Sudan, and Uganda. It seeks to bridge the gap between global and national policies and local insights by promoting integrated water management and proactive measures. Partners, including Red Cross Ethiopia and the Red Cross Climate Centre, have initiated actions to address climate challenges and support local communities, emphasizing the importance of safeguarding lives and livelihoods through comprehensive water management strategies in Ethiopia.

### Multi-Hazard, Impact-Based Early Warning and Early Action (MHIBEWEA) System

In 2023, Ethiopia published a national roadmap for a multi-hazard, impact-based early warning and early action (MHIBEWEA) system. This initiative is spearheaded by the Ethiopia Disaster Risk Management Commission (EDRMC) in collaboration with UN agencies and federal ministries. By 2030, the roadmap aims to enhance community resilience to various natural and man-made hazards, including droughts, flooding, conflict, and epidemics. The system will focus on mitigating impacts on food security, agriculture, displacement, and humanitarian needs.

### LEAP (Livelihood, Early Assessment and Protection) (Tool)

LEAP is a vital food security early warning tool used by the Government of Ethiopia, integrated within the national risk management framework and connected to a US\$ 160 million contingent fund. The tool allows to analyse satellite and ground-based agro-meteorological data into estimates for crop or rangeland production, facilitating the determination of livelihood protection needs. LEAP also quantifies the financial resources required to scale up the Productive Safety Net Program (PSNP) in response to significant drought events, ensuring timely and effective interventions in Ethiopia.

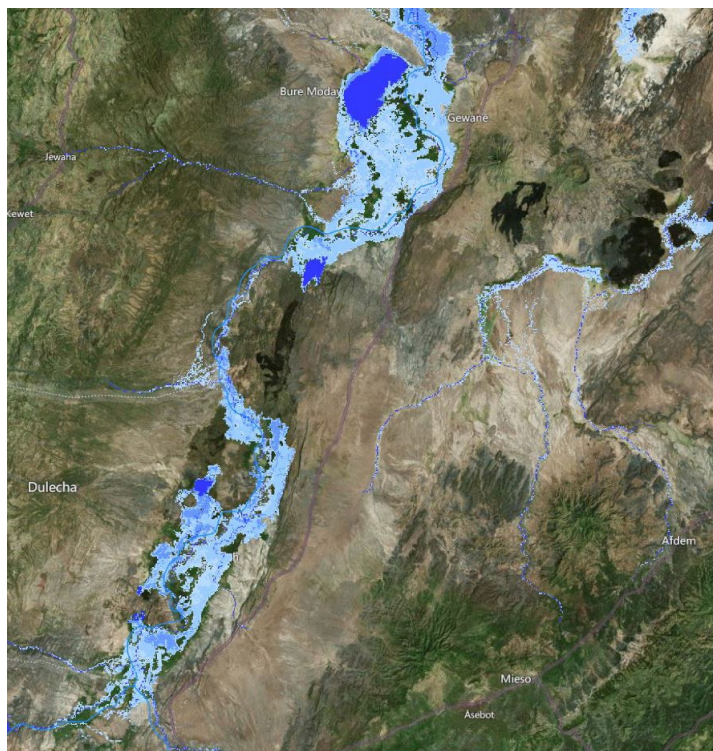
### Ethiopia's Agricultural Drought Monitoring System (NADMWS) (Platform in development)

The NextGen Agricultural Drought Monitoring and Warning System (NADMWS) is a country-specific adaptation of FAO's Global Agricultural Stress Index System (ASIS), tailored for Ethiopia. It uses remote sensing data to monitor agricultural drought by assessing water stress in croplands and grasslands, issuing early warnings for potential drought conditions in local context in Ethiopia. Integrating indicators like the Vegetation Health Index and Drought Intensity, NADMWS provides timely insights into drought severity and its impacts. Supported by FAO and International Research Institute for Climate and Society at Columbia University (IRI), the platform will be led by the Ethiopian Meteorological Institute (EMI) upon its launch in 2024.

### Copernicus Emergency Management Service (CEMS) & Global Flood Awareness System (GloFas) (Tool)

CEMS provides timely information and support for emergency response across various disasters, including meteorological, geophysical, man-made, and humanitarian crises. It includes both the Mapping Service and the Global Flood Awareness System (GloFas), allowing authorized users to activate services through Service Request Forms (SRFs) during ongoing or forecasted events. CEMS supports initiatives like ICPAC's East Africa Drought Watch, enhancing collaboration for disaster prevention, preparedness, response, and recovery activities in Ethiopia. While GloFas flood models have shown inaccuracies at the local level in Ethiopia due to the lack of crucial input data sets of water body indicators necessary to calibrate flood models, there is significant potential for improvement. If these data gaps can be closed, GloFas holds great promise for enhancing Ethiopia's early warning systems for floods in the future.

Figure 4. Global Flood Awareness System (GloFas): Flood hazard 100 year return period in rural Ethiopia. Source: [GloFas 2024](#).

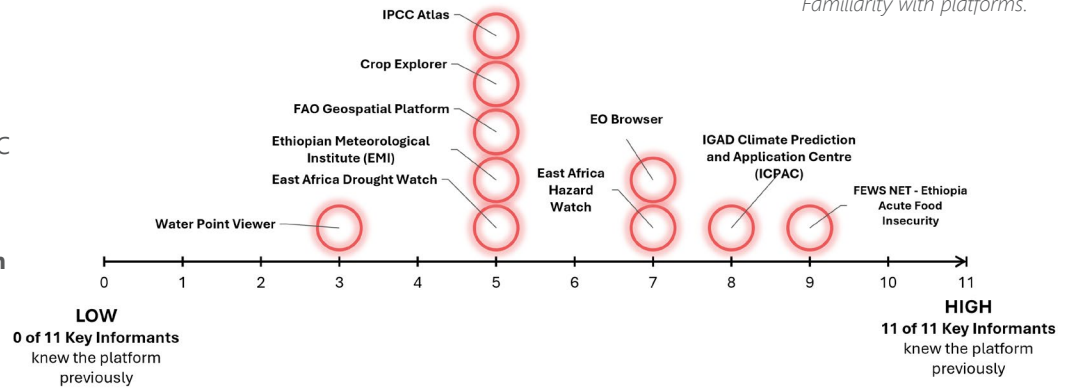


**These initiatives and tools** highlight the importance of integrated approaches and advanced technologies in improving early warning systems, disaster preparedness, and resilience to climate-related risks.

## User Awareness of Platform

Among the platforms surveyed, FEWS NET was **known by the majority** of Key Informants (9/11) prior to the survey. Following FEWS NET, the platforms well known by Key Informants included ICPAC IGAD Climate Prediction Center (8/11), East Africa Hazard Watch (7/11), and EO Browser (7/11). On the other hand, Water Point Viewer was the **least known** platform (3/11), followed by IPCC Atlas (5/11).

Graph 3. Key-Informant Survey Results: Familiarity with platforms.



## Stakeholder Network

In Ethiopia, various stakeholders play crucial roles in enhancing climate risk information and early warning systems for floods and droughts.

**National** agencies such as the National Meteorological Institute (EMI), the Disaster Risk Management Commission (DRMC), and the Ministry of Agriculture collaborate to collect, analyze, and disseminate climate and early warning information within the country. They further coordinate efforts with organizations like the Ethiopian Red Cross Society.

**Regional** bodies, including the Intergovernmental Authority on Development (IGAD) and the African Centre of Meteorological Applications for Development (ACMAD), provide platforms for sharing regional climate data and forecasts, ensuring that national agencies in Ethiopia are aligned with regional strategies and receive the necessary support.

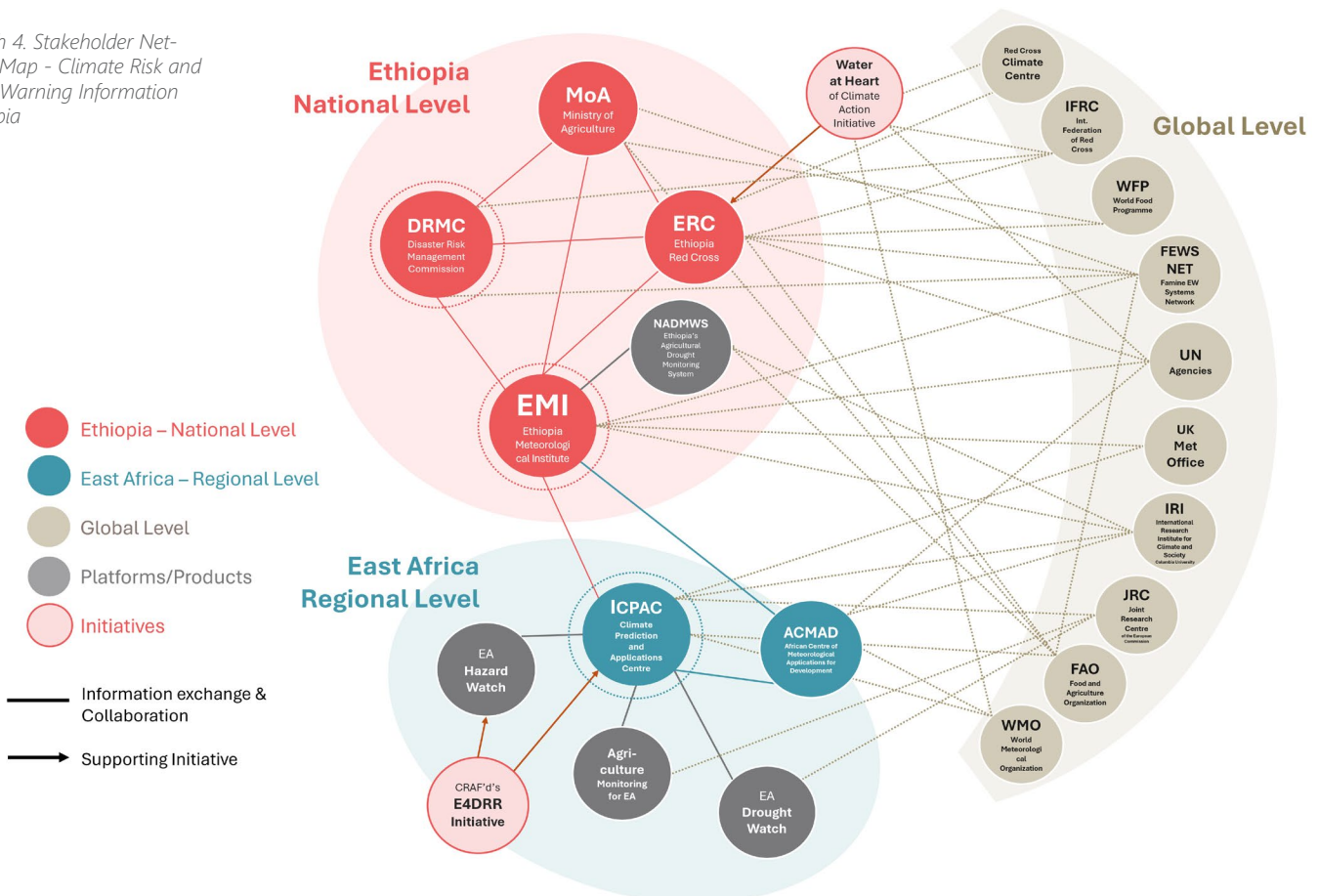
**Global** organizations such as the World Meteorological Organization (WMO), the World Food Programme (WFP), the

United Nations Office for the Coordination of Humanitarian Affairs (OCHA), the Food and Agriculture Organization (FAO), the Famine Early Warning Systems Network (FEWS NET), the Joint Research Centre (JRC), the International Research Institute for Climate and Society (IRI), and the United Kingdom Meteorological Office (UK Met Office) offer technical assistance, data, and resources to enhance national and regional early warning systems and disaster response capabilities in Ethiopia.

**Initiatives** such as Water at the Heart of Climate Action and Enhancing Early Warning and Early Action (E4DRR) play a crucial role in forwarding the development of new solutions and tools and building cross-organizational collaborations. By understanding these stakeholders, their roles and their interconnections, climate risk and early warning systems for floods and droughts can be improved further in Ethiopia.

(This is not an exhaustive list, but it highlights some of the key players involved in these critical efforts. A list of these stakeholders and their roles can be found in Annex C.)

Graph 4. Stakeholder Network Map - Climate Risk and Early Warning Information Ethiopia



## Next Steps - Future Collaborations and Recommendations

This assessment aimed to identify information availability and gaps in the climate risk and early warning information landscape, and to explore opportunities for future collaborations to enhance climate resilience and improve early warning mechanisms. Following list contains key recommendations and opportunities for future development and collaborations.

### Capacity Building

The assessment identified several platforms that are particularly useful for accessing climate risk and early warning information on floods and droughts in Ethiopia. Detailed descriptions of 10 platforms are provided, with an additional 32 highly useful platforms listed in Annex B. To integrate this information into climate-smart programming for local actors in Ethiopia, capacity building is essential. The goal should be to introduce most useful platforms, demonstrate their use cases, identify user needs, and facilitate access to information for non-experts through in-person workshops and training sessions.

### Enhancing Climate Risk Information Platforms

The platform [East Africa Hazard Watch](#), hosted by ICPAC and supported by the [E4DRR initiative](#), is highly promising for providing additional climate risk information to East Africa and Ethiopia. Strengthening collaborations to support this platform should be a priority.

### Enhancing Early Warning Information Platforms

Initiatives such as [E4DRR](#), [Water at Heart of Climate Action](#), [Early Warnings for All \(EW4All\)](#), [Anticipatory Action Piloting](#) and [Ethiopia's Multi-Hazard, Impact-Based Early Warning and Early Action \(MHIBWEA\) System](#) are making significant advancements in early warning information for East Africa and Ethiopia. Substantial progress has been made in enhancing drought early warning systems—such as adapting global drought models to regional or local Ethiopian conditions (e.g., the [East Africa Drought Watch](#) supported by Copernicus and the [NADMWS](#) initiative). However, major gaps remain in local flood early warning systems due to a lack of local input data and require further focus as a priority.

### Closing Data Gaps for Flood Early Warning

To develop effective local flood early warning systems, it is crucial to collect hydrological data from water points and bodies for calibration, validation, and monitoring purposes of flood models. Technical innovations are needed to close these data gaps. It is recommended to focus on exploring technical solutions for digital hydrological data collection and to target pilot areas where anticipatory action planning for riverine floods is already underway by [IFRC](#), [ERC](#), the [Climate Centre](#), the [Water at Heart of Climate Action](#) Initiative and other partners. This would allow for a coordinated effort to develop a holistic flood early warning pilot system with the potential for future scaling.

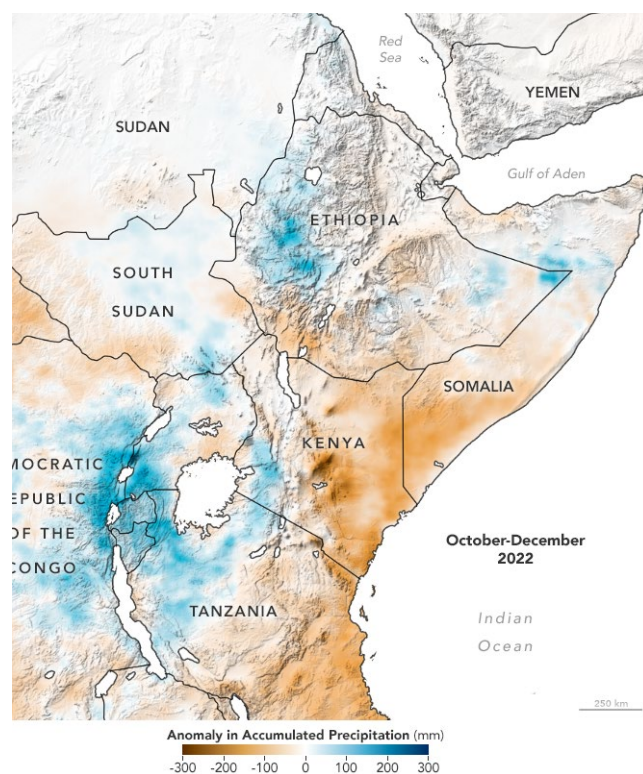
### Climate-Smart Programming

To enhance disaster risk reduction (DRR), early warning systems, and climate risk management in Ethiopia, future projects need to integrate climate-smart programming. (E.g., [Climate-smart programming Guide](#) by [IFRC](#) & [Red Cross Climate Centre](#)). Utilizing climate change projections to assess future impacts ensures the development of infrastructure and community initiatives that are resilient to future climate conditions. Investing in climate-smart infrastructure and training local communities in these practices will enhance resilience and sustainability. Overall, incorporating climate risks into all project stages is essential for building a resilient Ethiopia.

### Copernicus Support and Future Potential

The Copernicus program currently supports the [East Africa Drought Watch](#) hosted by ICPAC. However, Copernicus' [Global Flood Awareness System \(GloFAS\)](#) has shown to lack local accuracy due to the aforementioned lack of local level input data. With an advancement of hydrological data collection in Ethiopia, adapting the GloFAS system to regional conditions holds significant potential to improve flood early warning systems in the future in Ethiopia.

Figure 5. Example Case of Drought Impacts: Worst Drought on Record Parches Horn of Africa (March - September 2022): In 2022 the Horn of Africa experienced its worst drought on record, causing severe food insecurity for 21 million people due to consecutive failed rainy seasons and high food prices. Source: [NASA 2022](#)



## Limitations

The methodology of examining data sources in Ethiopia presents several limitations. Moreover, limited access to certain data sources or platforms can hinder a comprehensive review, leading to the oversight of crucial climate risk or early warning information. Additionally, biases in data collection processes may skew the findings, reflecting disparities in geographic coverage, demographic representation, or sectoral focus. Technological infrastructure constraints, such as internet connectivity issues or inadequate data storage capabilities, might also impede access to and usability of certain data sources, particularly in remote or underserved areas. Additionally, the necessity to access data and engage with stakeholders and partners in person in Addis Ababa within a short timeline further compounds these limitations, potentially restricting the breadth of the review and its representativeness of Ethiopia's climate risk and early warning information. Lastly, the dynamic nature of climate risk and early warning information requires continuous monitoring and reassessment of data sources over time to ensure the study's relevance and effectiveness in informing decision-making processes regarding climate resilience in Ethiopia.

## About REACH

REACH Initiative facilitates the development of information tools and products that enhance the capacity of aid actors to make evidence-based decisions in emergency, recovery and development contexts. The methodologies used by REACH include primary data collection and in-depth analysis, and all activities are conducted through inter-agency aid coordination mechanisms. REACH is a joint initiative of [IMPACT Initiatives](#), [ACTED](#) and the [United Nations Institute for Training and Research - Operational Satellite Applications Programme \(UNITAR-UNOSAT\)](#).

## Annex A:

Through a scoping review, 72 platforms and data sources were identified and categorized into four distinct groups based on their overall usability and effectiveness:

<b>Low</b>	<p>The source matches at least one:</p> <ul style="list-style-type: none"> <li>• The data does not load, or links are broken</li> <li>• A newer version of the data set, platform or initiative is available, outdating this one.</li> <li>• A more granular version of the same data set, platform or initiative is available at another sources.</li> <li>• The user-interface or data directory is very complicated to navigate and understand, even for experts.</li> </ul>
<b>Medium</b>	<p>The information from the source is partially usable:</p> <ul style="list-style-type: none"> <li>• Out of multiple data sets on a platform, some are high quality, while some are outdated or overall low quality.</li> <li>• Another source with similar information but overall high usability and better quality is available.</li> <li>• The data source provides high quality information but accessing and interpreting the information needs high technical expertise.</li> <li>• Information is accurate on global level but does not provide accurate insights on sub-national level.</li> </ul>
<b>High</b>	<p>The information from the source is highly usable:</p> <ul style="list-style-type: none"> <li>• The information is accurate, up-to date and credible.</li> <li>• The user-interface is designed for access and use by non-experts or low-experts.</li> <li>• Information is provided on sub-national level for Ethiopia.</li> </ul>
<b>Very High</b>	<p>Factors as of 'High' match, and in addition:</p> <ul style="list-style-type: none"> <li>• The platform, data set or initiative is owned and led by Ethiopian authorities or organizations.</li> </ul>



## ANNEX B: List of 32 Platforms and their Technical Quality Score

Name	Link	Technical Quality Assessment																							Technical Quality Score
		Leadership & Ownership	Local Context				Thematic Coverage								Timeliness	Accessibility	Format		Source Reliability & Transparency			Stakeholder Engagement			
		Ownership	Geographical Coverage	Granularity	Language Options	Drought hazard	Flood hazard	Food Security	Climate Change	Drought EW	Flood EW	Food Insecurity EW	Sector-Specific Information	Frequency of Updates	Ease of Access	Data Formats	Interpretability	Institutional Backing	Data Sources	Peer Reviews and References	User Feedback	Data exchange	Future development		
ICPAC IGAD Climate Prediction and Application Centre	<a href="#">ICPAC</a>	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	21	
Ethiopian Meteorological Institute (EMI)	<a href="#">NMA</a>	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	0	1	1	1	1	1	19	
East African Hazard Watch (ICPAC)	<a href="#">East Africa Hazard Watch</a>	1	1	1	0	1	1	1	1	0	0	1	1	1	1	1	0	1	1	1	1	1	1	18	
East Africa Drought Watch	<a href="#">East Africa Drought Watch</a>	1	1	1	0	1	0	1	0	1	0	1	1	1	1	1	1	1	1	1	1	1	0	1	17
FAO - Geospatial Platform	<a href="#">FAO - Geospatial Platform</a>	0	1	1	0	1	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	0	0	1	15
FEWS - Ethiopia Acute Food Insecurity	<a href="#">FEWS.NET - Ethiopia</a>	0	1	1	0	0	0	1	0	0	0	1	1	1	1	1	1	1	1	1	1	0	1	14	
Crop Explorer	<a href="#">Crop Explorer</a>	0	1	1	0	1	0	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	1	14
EO Browser	<a href="#">EO Browser</a>	0	1	1	0	0	0	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	14
Global Infrastructure and Risk Model and Resilience Index (GIRI)	<a href="#">GIRI - Map Viewer</a>	0	1	1	0	1	1	0	1	0	0	0	1	1	1	1	1	0	1	1	1	1	0	0	13
Map-X Climate	<a href="#">Map-X Climate</a>	0	1	1	0	1	1	0	1	0	0	0	1	0	1	1	0	1	1	1	1	0	1	1	13
Copernicus Global Flood Awareness System	<a href="#">GloFas</a>	0	1	1	0	0	1	0	0	0	1	0	1	1	1	1	1	1	1	1	1	0	0	1	13
Earth Map	<a href="#">Earth Map</a>	0	1	1	0	0	0	1	1	0	0	0	1	1	1	1	1	1	1	1	1	0	0	1	13
IPCC Atlas	<a href="#">IPCC Atlas</a>	1	1	0	0	1	0	0	1	0	0	0	0	1	1	1	1	1	1	1	1	1	0	1	13
World Bank Climate Change Knowledge Portal - Ethiopia	<a href="#">Climate Knowledge Portal - Ethiopia</a>	0	1	0	0	0	0	0	1	0	0	0	1	1	1	1	1	1	1	1	1	1	0	1	12
NASA Worldview	<a href="#">EOSDIS Worldview</a>	0	1	1	0	1	0	1	0	0	0	0	1	1	1	0	1	1	1	1	1	1	0	0	12
Agriculture Monitoring for Eastern Africa (ICPAC)	<a href="#">Agriculture Monitoring for Eastern Africa</a>	1	1	1	0	0	0	1	0	0	0	1	1	1	1	0	1	1	0	1	0	0	1	1	12
FAO - Map Catalog	<a href="#">FAO Map Catalog</a>	0	1	1	0	1	1	1	1	0	0	0	1	0	1	1	1	0	1	1	1	1	0	0	12
HDX - Ethiopia	<a href="#">HDX</a>	0	1	1	0	0	0	1	0	0	0	0	1	1	1	1	0	1	1	1	0	1	1	1	12
Water Point Viewer	<a href="#">Water Point Viewer</a>	0	0	1	0	1	0	0	0	1	0	0	1	1	1	1	1	1	1	1	1	0	0	1	12
DAHITI - Database for Hydrological Time Series of Inland Waters	<a href="#">DAHITI</a>	0	0	1	0	0	0	0	0	1	0	0	1	1	1	1	1	1	1	1	1	1	0	1	12
UN-SPIDER Data Portal	<a href="#">UN-SPIDER Data Portal</a>	0	1	1	0	1	1	1	0	0	0	0	1	0	1	1	1	0	1	1	1	0	0	1	11
Map-X Risk	<a href="#">Map-X Risk</a>	0	1	1	0	0	1	0	0	0	0	0	0	1	1	1	0	1	1	1	1	0	1	1	11
Aqueduct Flood Risk Maps	<a href="#">Aqueduct Flood Risk Maps</a>	0	1	1	0	0	1	0	1	0	0	0	0	1	1	1	0	1	1	1	1	0	0	1	11
FAO - Locust Hub	<a href="#">FAO Locust Hub</a>	0	1	1	0	0	0	1	1	0	0	0	0	1	1	1	1	1	1	1	0	0	0	1	11
HDX - NDVI Ethiopia	<a href="#">HDX NDVI - Ethiopia</a>	0	1	0	0	0	0	1	0	0	0	0	0	1	1	1	0	1	1	1	1	1	1	1	11
Ethiopia - Climate Change Risk Profile	<a href="#">Climate Risk Report</a>	0	1	0	0	1	1	1	1	0	0	0	1	0	1	1	1	1	1	1	0	0	0	0	11
Disaster Charter	<a href="#">International Charter</a>	0	0	1	0	1	1	0	0	0	0	0	0	1	1	1	1	0	1	1	0	1	1	0	10
Global River Flood Hazard Map	<a href="#">IBC Global riverine flood hazard maps</a>	0	1	1	0	0	1	0	0	0	0	0	0	1	1	1	0	1	1	1	1	0	0	1	10
Global Rainfall Watch	<a href="#">Global Rainfall Watch</a>	0	1	1	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	10
ASAP - Anomaly Hotspots of Agricultural Production - Platform	<a href="#">ASAP - Platform</a>	0	1	0	0	0	0	1	0	0	0	1	1	1	1	0	0	1	0	1	0	0	0	1	9
Emergency Events Database EM-DAT	<a href="#">EM-DAT</a>	0	0	0	0	1	1	0	0	0	0	0	0	1	1	1	0	1	0	1	1	0	0	0	8
FAO - Crop Calendar	<a href="#">FAO - Crop Calendar</a>	0	1	0	0	0	0	1	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	8
Number of platforms to which each indicator applies (Maximum value: 32/32 platforms)		6	28	25	2	16	15	19	12	5	3	7	24	28	32	27	20	32	28	26	16	7	24		

## Annex C: Stakeholder List

### Stakeholders and their Roles

#### National Level

1. **National Meteorological Institute (EMI)**
  - **Information Received:** Weather and climate data, satellite imagery.
  - **Sources of Information:** WMO, ICPAC, ACMAD, UK Met Office, satellite data providers, and local weather stations.
  - **Information Provided:** Weather forecasts, climate predictions, early warnings.
  - **Interconnection:** Central agency coordinating with other national and regional bodies.
2. **Disaster Risk Management Commission (DRMC)**
  - **Information Received:** Hazard reports, climate data, vulnerability assessments.
  - **Sources of Information:** EMI, Ministry of Agriculture, humanitarian organizations, local reports, FEWS NET.
  - **Information Provided:** Disaster risk reduction strategies, early warning dissemination, response coordination.
  - **Interconnection:** Works closely with EMI, regional governments, and humanitarian agencies.
3. **Ministry of Agriculture (MoA)**
  - **Information Received:** Climate data, agricultural forecasts, risk assessments.
  - **Sources of Information:** EMI, DRMC, FAO, international agricultural research organizations.
  - **Information Provided:** Agricultural advisories, drought response plans, food security updates.
  - **Interconnection:** Collaborates with EMI, DRMC, and regional agricultural offices.
4. **Ethiopian Red Cross Society (ERCS)**
  - **Information Received:** Early warning alerts, disaster reports.
  - **Sources of Information:** DRMC, EMI, international Red Cross and Red Crescent network, local communities.
  - **Information Provided:** Community awareness programs, emergency response services.
  - **Interconnection:** Engages with national and international humanitarian networks.

#### Regional (East Africa) Level

5. **Intergovernmental Authority on Development (IGAD) Climate Prediction and Applications Centre (ICPAC)**
  - **Information Received:** Regional climate data, satellite imagery, global climate models.
  - **Sources of Information:** WMO, member state meteorological agencies, international climate research institutions, UK Met Office.
  - **Information Provided:** Regional climate outlooks, early warnings, capacity building.
  - **Interconnection:** Facilitates cooperation among member states, including Ethiopia.
6. **African Centre of Meteorological Applications for Development (ACMAD)**

- **Information Received:** Continental and global climate data.
- **Sources of Information:** WMO, national meteorological agencies across Africa, satellite data providers, IRI (Columbia University).
- **Information Provided:** Climate forecasts, early warning bulletins.
- **Interconnection:** Provides data and support to East African countries, including Ethiopia.

#### Global Level

7. **World Meteorological Organization (WMO)**
  - **Information Received:** Global climate and weather data, satellite imagery.
  - **Sources of Information:** National meteorological agencies, international satellite data providers, global climate models.
  - **Information Provided:** International climate standards, early warning guidance.
  - **Interconnection:** Supports national meteorological services worldwide, including Ethiopia's EMI
8. **World Food Programme (WFP)**
  - **Information Received:** Climate risk data, food security assessments.
  - **Sources of Information:** EMI, DRMC, global food security monitoring systems, local assessments.
  - **Information Provided:** Food assistance plans, emergency response strategies.
  - **Interconnection:** Works with national governments, including Ethiopia, to address food insecurity.
9. **United Nations Office for the Coordination of Humanitarian Affairs (OCHA)**
  - **Information Received:** Disaster reports, humanitarian needs assessments.
  - **Sources of Information:** National governments, humanitarian organizations, global disaster monitoring systems.
  - **Information Provided:** Coordination of humanitarian response, early warning dissemination.
  - **Interconnection:** Facilitates international support and coordination for disaster response.
10. **Food and Agriculture Organization (FAO)**
  - **Information Received:** Agricultural and climate data, food security reports.
  - **Sources of Information:** National governments, international research bodies, local agricultural assessments.
  - **Information Provided:** Agricultural advisories, food security updates, risk management strategies.
  - **Interconnection:** Collaborates with national and regional agricultural organizations.
11. **Famine Early Warning Systems Network (FEWS NET)**
  - **Information Received:** Climate data, agricultural data, food security assessments.
  - **Sources of Information:** EMI, DRMC, FAO, regional monitoring systems.

- **Information Provided:** Early warnings on food insecurity, drought and flood alerts, livelihood analyses.
- **Interconnection:** Provides data to national and international stakeholders.

## 12. Joint Research Centre (JRC) of the European Commission

- **Information Received:** Climate risk data, satellite imagery, environmental assessments.
- **Sources of Information:** Global monitoring systems, satellite data providers, national meteorological and environmental agencies.
- **Information Provided:** Climate risk models, early warning systems, scientific research and reports.
- **Interconnection:** Collaborates with international bodies and provides technical support to regional and national agencies.

## 13. International Research Institute for Climate and Society (IRI) at Columbia University

- **Information Received:** Climate data, global weather models, research studies.
- **Sources of Information:** Global climate monitoring systems, satellite data, academic research.
- **Information Provided:** Climate predictions, risk assessments, capacity building.
- **Interconnection:** Supports national and regional climate services with research and technical expertise.

## 14. UK Met Office

- **Information Received:** Global climate and weather data, satellite imagery.
- **Sources of Information:** National meteorological agencies, global monitoring systems, research institutions.
- **Information Provided:** Weather forecasts, climate projections, early warning guidance.
- **Interconnection:** Provides data and expertise to national meteorological services, including Ethiopia's NMA.

## 15. International Federation of Red Cross and Red Crescent Societies (IFRC)

- **Information Received:** Disaster reports, early warning alerts, humanitarian needs assessments.
- **Sources of Information:** National Red Cross and Red Crescent Societies, global humanitarian monitoring systems, local communities.
- **Information Provided:** Disaster response coordination, capacity building, community resilience programs.
- **Interconnection:** Collaborates with national and international humanitarian organizations, supports local Red Cross and Red Crescent Societies, including the Ethiopian Red Cross Society.
- **IFRC's role in Anticipatory Action for Floods and Droughts:**
  - ◇ **Forecast-based Financing (FbF):** IFRC implements FbF mechanisms to provide timely funding based on weather forecasts. This enables early action before disasters strike, such as distributing emergency supplies or reinforcing infrastructure.
  - ◇ **Early Warning Systems:** IFRC supports the development and dissemination of early warning systems for floods and droughts. This includes

training local communities to understand and respond to warnings effectively.

- ◇ **Community Preparedness:** IFRC engages in community-based programs to enhance local capacity for disaster preparedness and response. This includes organizing drills, creating emergency plans, and educating the community on risk reduction measures.
- ◇ **Capacity Building:** IFRC provides training and resources to the Ethiopian Red Cross Society and other local partners to improve their ability to respond to disasters promptly and effectively.
- ◇ **Coordination with Authorities:** IFRC works closely with the Ethiopian government and other stakeholders to ensure coordinated efforts in anticipatory action, ensuring that early actions are integrated into national disaster management plans.

## Summary of Interconnections

- **National Agencies (EMI, DRM, Ministry of Agriculture):** Collaborate to collect, analyze, and disseminate climate and early warning information within Ethiopia. They also coordinate with community organizations like the Ethiopian Red Cross Society.
- **Regional Bodies (IGAD, ACMAD):** Provide a platform for sharing regional climate data and forecasts, ensuring that national agencies in Ethiopia are aligned with regional strategies and receive support.
- **Global Organizations (WMO, WFP, OCHA, FAO, FEWS NET, JRC, IRI, UK Met Office, IFRC):** Offer technical assistance, data, and resources to enhance national and regional early warning systems and disaster response capabilities in Ethiopia.

By understanding these stakeholders, their roles, the information they receive, their sources, and their interconnections, we can improve the effectiveness of climate risk and early warning systems for floods and droughts in Ethiopia.