Ethiopian Disaster Risk Management Commission (EDRMC)

National Flood Anticipatory Action Framework for Ethiopia



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Acronyms

Acronym	Meaning
AA	Anticipatory Action
AAR	After-Action Review
AAsTWG	Anticipatory Action Sub- Technical Working Group
AMHEWAS	African Union's Africa Multi-Hazard Early Warning and Early Action System
CERF	Central Emergency Response Fund
CRGE	Climate Resilient Green Economy
DI	DesInventar
DREF	Disaster Response Emergency Fund
DRFS	Disaster Risk Financing Strategy
DRM	Disaster Risk Management
DRRF	Disaster Risk Response Fund
EDRMC	Ethiopian Disaster Risk Management Commission
EMI	Ethiopian Meteorological Institute
ENSO	El Niño-Southern Oscillation
EPHI	Ethiopian Public Health Institute
ERCS	Ethiopia Red Cross Society
EW4All	Early Warnings for All
FMAM	February - March
IFRC	International Federation of Red Cross and Red Crescent Societies
IGAD	Intergovernmental Authority on Development
IOD	Indian Ocean Dipole
JJAS	June, July, August and September
MEL	Monitoring, evaluation, and learning
MH-IB-EW-EAS	Multi-Hazard Impact-Based Early Warning and Early Action System
MOA	Ministry of Agriculture
MoE	Ministry of Education
MOH	Ministry of Health
MoWE	Ministry of Water and Energy
NDCs	Nationally Determined Contributions
NEWTC	National Early Warning Technical Committee
NFIs	Non-food Items
NGOs	Non-governmental Organizations
OND	October - November
RRT	Rapid Response Team
SDGs	Sustainable Development Goals
SOPs	Standard Operating Procedure
UN	United Nations
WASH	Water Sanitation and Hygiene

1. Introduction and Background

Flooding is among the most recurrent and damaging natural hazards in Ethiopia, resulting in loss of life, displacement of populations, destruction of infrastructure, disruption of livelihoods, and significant socio-economic losses each year. Climate change is further increasing the frequency, intensity, and unpredictability of extreme rainfall events, exacerbating flood risks and placing growing pressure on disaster risk management systems.

Ethiopia is highly exposed to riverine, flash, and urban flooding, particularly in the Somali, Afar, Gambella, Oromia, Amhara, Southern Ethiopia, and Dire Dawa regions. Floods affect an estimated 250,000 people annually and cause nearly USD 200 million in damage to buildings and infrastructure each year. In 2024 alone, floods affected more than 560,000 people, displaced approximately 57,000 individuals, and placed over 1.9 million people at risk nationwide. Evidence also indicates a significant increase in flood-prone areas, from fewer than 25 locations before 1990 to more than 540 areas during the 2010s, reflecting rapidly expanding flood exposure and vulnerability across the country (UNDRR, 2024; WHO, 2024; Frontiers in Sustainable Food Systems, 2024).

In this context, strengthening proactive, impact-based, and anticipatory approaches to disaster risk management is essential to reduce disaster losses, protect vulnerable populations, and support climate-resilient development through timely early warning and early action. Anticipatory Action (AA) offers a practical and evidence-based approach for reducing the humanitarian impacts of floods by enabling early, pre-agreed actions before a hazard occurs. By linking risk analysis, forecasting, predefined triggers, pre-arranged financing, and coordinated early actions, anticipatory action helps safeguard lives, livelihoods, assets, and essential services while improving the efficiency and effectiveness of disaster response.

Ethiopia has made significant progress in strengthening its national early warning and early action system through the development of a Multi-Hazard Impact-Based Early Warning and Early Action Roadmap, aligned with the global Early Warnings for All (EW4All) initiative. Building on these efforts and drawing on the experience gained from implementing the country's drought Anticipatory Action Framework, Ethiopia has initiated the development of a Flood Anticipatory Action Framework to address the increasing scale and complexity of flood risks and to institutionalize early action within the national disaster risk management system. Lessons and operational experiences generated through anticipatory action pilots and flood preparedness initiatives implemented by different agencies in the country have also been used as inputs.

Against this backdrop, the Ethiopia Flood Anticipatory Action Framework provides a foundation for establishing a nationally coordinated, risk-informed, and forward-looking approach to flood anticipatory action. The framework seeks to strengthen the link between early warning and early action by defining institutional arrangements, forecasting and trigger mechanisms, financing approaches, coordination structures, and operational procedures required to implement timely, effective, and scalable anticipatory actions at national and basin levels. Through this approach, Ethiopia aims to reduce the humanitarian and economic impacts of flooding, strengthen resilience among at-risk communities, and advance the country's commitment to proactive disaster risk management.

1.1 Rationale

Flooding is one of the most frequent and damaging climate-related hazards in Ethiopia, causing recurrent loss of life, displacement, destruction of infrastructure, livelihood disruptions, and significant economic losses. The frequency, intensity, and geographic extent of floods have increased in recent years due to climate variability and change, environmental degradation, rapid urbanization, and the growing exposure of people and assets in flood-prone areas. Ethiopia’s high dependence on climate-sensitive livelihoods, particularly rain-fed agriculture and pastoralism, further heightens vulnerability to flood impacts on food security, livelihoods, and essential services.

Floods occur across the country in various forms, including riverine floods in major basins, flash floods in highland catchments, and urban flooding associated with rapid settlement expansion and inadequate drainage systems. Recent flood events have demonstrated the growing scale of risk, affecting millions of people, causing displacement, damaging critical infrastructure, and undermining development gains. Beyond immediate humanitarian impacts, floods contribute to disease outbreaks, loss of productive assets, disruption of markets and services, and increased pressure on already vulnerable communities.
Although Ethiopia has made significant progress in strengthening disaster risk management and early warning systems, flood response remains largely reactive, with interventions often initiated after impacts have already occurred. This approach can result in avoidable losses, higher response costs, and prolonged recovery needs. At the same time, advances in meteorological, and hydrological forecasting provide increasing opportunities to anticipate flood risks and act before disasters occur.

Globally, evidence shows that anticipatory action, based on forecasts, predefined triggers, and pre-arranged financing, can significantly reduce humanitarian impacts, protect lives and livelihoods, and

improve the efficiency of disaster response. Ethiopia has already established a strong foundation through the Drought Anticipatory Action Framework and the Multi-Hazard Impact-Based Early Warning and Early Action Roadmap (2023-2030), aligned with the Early Warnings for All initiative. Thus, the development of the Ethiopia Flood Anticipatory Action Framework is both timely and necessary. The framework will provide a nationally coordinated mechanism that links early warning information to timely and targeted anticipatory actions through agreed triggers, institutional arrangements, financing mechanisms, and operational procedures. By enabling government institutions, humanitarian partners, technical agencies, and communities to act ahead of forecasted flood events, the framework aims to reduce loss of life, protect livelihoods and critical infrastructure, minimize displacement, and strengthen resilience to flood risk across Ethiopia.

1.2 Evolution of Anticipatory Action in Ethiopia

Anticipatory Action has evolved from a predominantly reactive humanitarian approach toward a more proactive, forecast-based and risk-informed system. Earlier disaster response largely relied on mobilizing assistance after a shock occurred. With advances in climate forecasting, early warning systems, risk analysis, and pre-arranged financing, humanitarian actors increasingly began using forecast information to trigger actions before a predictable hazard reaches critical levels. The approach developed from forecast-based financing and forecast-based action initiatives into broader anticipatory action frameworks that integrate early warning, anticipatory action, pre-positioned resources, and institutional decision-making.

In Ethiopia, the evolution of anticipatory action reflects a broader transition from predominantly reactive disaster response toward proactive and risk-informed disaster risk management. Historically, disaster management efforts focused largely on post-disaster response, particularly for recurrent droughts and floods. However, increasing climate-related hazards, including droughts and floods, combined with advances in forecasting, risk analysis, and early warning systems, highlighted the need for a more anticipatory approach. This shift has been supported by national policy reforms and institutional initiatives aligned with the Sendai Framework for Disaster Risk Reduction, the Paris Agreement, and the Early Warnings for All (EW4All) initiative. A key milestone was the development of the Roadmap for a Multi-Hazard Impact-Based Early Warning and Early Action System (2023-2030)**,** which established a strategic framework for strengthening risk knowledge, impact-based forecasting, preparedness, coordination, and early action across hazards.

Operationally, Ethiopia began implementing anticipatory action through collaborative initiatives led by the EDRMC and partners. Initial efforts focused on drought-related food insecurity, introducing core anticipatory action elements such as forecast-based triggers, pre-agreed actions, coordinated financing, and preparedness planning. These experiences informed the development of Ethiopia's Common Framework for Drought Anticipatory Action, providing an important foundation for scaling anticipatory approaches across other hazards.

As flood risks intensified across the country, attention increased toward developing flood-specific anticipatory action mechanisms. Recurrent flooding in major river basins and flood-prone regions underscored the need for early interventions to reduce displacement, livelihood losses, infrastructure damage, and humanitarian impacts. At the same time, improvements in hydrometeorological monitoring, flood forecasting, and satellite observation enhanced the technical feasibility of flood anticipatory action.

Building on national experience and international good practices, Ethiopia has initiated several flood-focused anticipatory action efforts, including the development of flood trigger models, pilot initiatives in flood-prone basins, and flood anticipatory action planning processes. These initiatives have explored how forecast information can be linked to predefined actions such as anticipatory cash assistance, evacuation support, livestock protection, pre-positioning of relief supplies, and community preparedness measures.

The Ethiopia Flood Anticipatory Action Framework represents the next step in this evolution. It seeks to institutionalize a nationally coordinated, government-led approach that connects flood forecasting and early warning systems with timely and targeted early actions. Building on lessons from drought anticipatory action, flood pilots, and global experience, the framework aims to strengthen preparedness, reduce humanitarian impacts, protect lives and livelihoods, and enhance resilience to increasing flood risks across Ethiopia.

1.3 Linkages with Global and National Policies and Strategies

The Ethiopia Flood AA Framework is aligned with key global, regional, and national frameworks on disaster risk reduction, climate adaptation, resilience building, and sustainable development. By integrating forecast-based early action into Ethiopia's disaster risk management system, the framework supports the country's transition from reactive disaster response to proactive, risk-informed, and impact-based disaster management. At the global level, the framework contributes to the implementation of the Sendai Framework for Disaster Risk Reduction (2015-2030), particularly its emphasis on disaster

preparedness, early warning, and anticipatory action. It also supports the Paris Agreement by strengthening climate adaptation and resilience to climate-related hazards and contributes to the achievement of relevant Sustainable Development Goals (SDGs), notably SDGs 1 (No Poverty), 2 (Zero Hunger), 11 (Sustainable Cities and Communities), and 13 (Climate Action). Furthermore, the framework aligns with the Early Warnings for All (EW4All) Initiative and reflects internationally recognized good practices in anticipatory action and forecast-based financing.

At the regional level, the framework is consistent with the objectives of the African Union's Africa Multi-Hazard Early Warning and Early Action System (AMHEWAS) and the IGAD Framework for Multi-Hazard Early Warning and Early Action. These initiatives promote integrated early warning systems, regional cooperation, trans-boundary risk management, and coordinated early action to strengthen resilience across the Greater Horn of Africa.

At the national level, the framework supports the implementation of Ethiopia's Disaster Risk Management (DRM) Policy, which promotes a proactive, multi-hazard, and resilience-oriented approach to disaster management. It is also aligned with the country's Climate Resilient Green Economy (CRGE) Strategy, Nationally Determined Contributions (NDCs), and other national climate adaptation and resilience-building priorities. A key policy foundation for the framework is Ethiopia's Roadmap for the Multi-Hazard Impact-Based Early Warning and Early Action System (MH-IB-EW-EAS) 2023-2030, which provides the national vision for a people-centered, impact-based, and action-oriented early warning and early action system. The Flood AA Framework operationalizes this vision by linking flood forecasting and risk information with predefined triggers, financing mechanisms, coordination arrangements, and timely early actions. Through these linkages, the Ethiopia Flood Anticipatory Action Framework provides a nationally owned and internationally aligned mechanism for reducing flood impacts, protecting lives and livelihoods, strengthening resilience, and advancing sustainable development.

1.4 Objectives

1.4.1 Overall Objective

To establish and operationalize a government-led, harmonized, and community-centered Flood Anticipatory Action system enabling pre-agreed actions to be triggered and implemented before forecasted flood events, with measurable improvements in preparedness and response capacity and contributing to reductions in loss of life, humanitarian needs, livelihood disruption, and damage to critical infrastructure, productive assets, and essential services among at-risk communities.

Specific Objectives

The framework aims to:

- **Link flood forecasting, risk analysis, and early warning information** to predefined triggers and timely, evidence-based early actions.
- **Establish clear activation protocols, coordination arrangements, and roles and responsibilities** across national, regional, zonal, woreda, and community levels.
- **Strengthen institutional capacity and coordination** for anticipating, preparing for, and responding to flood risks through forecast-based and impact-oriented anticipatory action systems.
- **Facilitate the timely mobilization of pre-arranged financing and operational resources** to enable the implementation of anticipatory actions before flood impacts escalate.
- **Promote community engagement, localization, and inclusive approaches**, ensuring the meaningful participation of women, youth, persons with disabilities, and other at-risk groups in anticipatory action planning and implementation.
- **Protect lives, livelihoods, productive assets, critical infrastructure, and essential services** through targeted and timely early actions that reduce the impacts of flooding.
- **Strengthen monitoring, evaluation, accountability, learning, and evidence generation systems** to improve the effectiveness, scalability, and sustainability of flood anticipatory action interventions.

1.5 Scope

The Ethiopia Flood AA Framework focuses on **riverine floods**, which recurrently threaten lives, livelihoods, infrastructure, public services, and economic activities across the country.

The framework applies across all administrative levels, including national, regional, zonal, woreda, and community levels, and promotes coordinated action among government institutions, technical agencies, humanitarian and development partners, civil society organizations and the private sector.

The framework covers the following key components:

- Flood risk monitoring, forecasting, and impact-based early warning systems;
- Development and application of forecast triggers and activation thresholds for anticipatory action;
- Pre-agreed early actions, SOPs, and preparedness measures;
- Forecast-based financing and resource mobilization mechanisms to support timely action;
- Institutional coordination, governance, and decision-making arrangements;
- Community engagement, risk communication, localization, and inclusive participation;

- Operational preparedness and readiness planning at all levels;
- Monitoring, evaluation, accountability, learning, and knowledge management systems; and
- Capacity strengthening, innovation, and evidence generation to support the institutionalization and scaling of anticipatory action.
- Anticipatory Action complements emergency response by enabling early, pre-agreed actions before a forecasted flood occurs, while ensuring that rapid response mechanisms remain available during and after the event for impacts that exceed forecast thresholds or could not be anticipated.

The framework is intended to guide both strategic planning and operational implementation of flood anticipatory action across Ethiopia. While providing a common national framework, it allows for contextual adaptation to different river basins, geographic areas, urban settings, and local risk profiles.

1.6 Guiding Principles

The Flood Anticipatory Action Framework is anchored in the following key principles:

- **Government Leadership**: The EDRMC leads the overall coordination, planning, and implementation of anticipatory action to ensure national ownership and sustainability.
- **Science-Based and Data-driven Decision-Making**: Actions are informed by credible risk data and forecasts, risk modeling, anticipatory financing, and evidence-based trigger thresholds to ensure relevance, timeliness, and effectiveness.
- **Integration with Sector Systems**: Anticipatory action is aligned with existing disaster risk management, humanitarian, and development systems to avoid duplication and ensure coherence across sectors.
- **Inclusivity and Gender Responsiveness**: The framework promotes equitable access to anticipatory action, incorporating gender, age, disability, and social inclusion considerations throughout the planning and implementation phases.
- **No-Regret Approach**: Anticipatory actions are designed to deliver value even if the anticipated flood event does not occur, ensuring that communities benefit regardless of the outcome.
- **Transparency and Accountability**: Clear roles, responsibilities, and communication protocols are in place to promote trust and efficiency among all stakeholders.
- **Community Engagement**: Local knowledge, participation, and leadership are central to all phases of anticipatory action, ensuring that interventions are context-specific and locally appropriate

- **Trust and Confidence Building: Building** trust is essential for effective anticipatory action, enabling stakeholders to act confidently on forecast information and agreed triggers. It is strengthened through transparency, clear communication, and collaborative decision-making.
- **Timelines:** The framework will enhance implementation of timely anticipatory actions to reduce flood impacts. Clearly defined timelines linked to forecast lead times ensure that decisions and anticipatory actions are implemented before flooding occurs.

2 Hazard and Risk Context

Building on the rationale and policy context outlined above, understanding Ethiopia's flood hazard and risk profile is essential for designing effective anticipatory actions and trigger mechanisms. Flooding is one of the country's most significant natural hazards, increasingly affecting lives, livelihoods, infrastructure, agricultural production, and development gains. Flood risks are widespread across major river basins, including the Awash, Abay (Blue Nile), Baro-Akobo, Omo-Gibe, Wabe Shebelle, and Genale-Dawa**,** as well as in rapidly growing urban areas such as Addis Ababa and Dire Dawa**.**

Flood risk in Ethiopia is driven by the interaction of hazard, exposure, and vulnerability**.** Climate change is increasing the frequency and intensity of extreme rainfall events, while large-scale climate drivers such as the El Niño-Southern Oscillation (ENSO) and the Indian Ocean Dipole (IOD) influence seasonal rainfall patterns and flood occurrence. At the same time, environmental degradation, including deforestation, land degradation, wetland loss, and unsustainable land-use practices, has reduced the landscape's capacity to absorb and regulate runoff, contributing to more frequent and severe flooding.

Socio-economic factors further amplify flood risk. Rapid population growth, expansion of settlements into flood-prone areas, dependence on climate-sensitive livelihoods, inadequate drainage and flood-control infrastructure, and limited coping capacities increase the vulnerability of communities and assets. Pastoral and agro-pastoral populations are particularly exposed, as floods can damage grazing areas, crops, water sources, transport networks, and essential services, often resulting in displacement and increased humanitarian needs.

Emerging evidence indicates that Ethiopia is experiencing increasingly intense hydro-climatic extremes, with severe droughts and floods occurring more frequently and sometimes within the same regions and seasons. Climate projections suggest rising extreme rainfall, increased flood hazards in several river basins, and growing exposure of infrastructure and settlements. Flood risks remain particularly high in lowland riverine areas, the Somali Region, the Central Rift Valley, Gambella, Amhara, South Ethiopia and rapidly urbanizing centers, underscoring the need for a proactive and anticipatory approach to flood risk management.

2.1 Flood Types

Ethiopia experiences four main types of flooding namely riverine, flash, urban and shoreline (backflow inundation) floods. Each has distinct characteristics and poses unique challenges to anticipatory action planning. For disaster risk management and anticipatory action in Ethiopia, riverine floods and flash floods are considered the most significant and recurrent flood hazards, as they affect large populations, infrastructure, agriculture, and livestock across many regions. However, this framework addresses the riverine flood, which has significant impact compared to others.

Riverine Flood

This results from river systems overflowing their banks due to intense or prolonged rainfall in the upstream catchments. It usually develops gradually and can last for several days or weeks. In Ethiopia, reverine flood is among the most significant natural hazards, particularly in the **Awash, Baro-Akobo, Omo-Gibe, Tekeze, Genale Dawa, and Wabi Shebelle** river basins.

Riverine flood typically occurs seasonally (Belg, Kiremt and Deyr/Hageya) and can be forecasted with moderate lead time using hydrological models and upstream rainfall data. It impacts wide geographic areas and tend to last longer than other flood types, causing significant displacement and infrastructure damage. The impacts of riverine floods are summarized as follows:

Sector/Subject	Major Impacts
Human	Deaths, injuries, displacement, disease outbreaks
Agriculture	Crop losses, livestock deaths, irrigation damage
Infrastructure	Roads, bridges, houses, schools, health facilities, utilities damaged
Economy	Livelihood losses, business disruption, reconstruction costs
Environment	Soil erosion, sedimentation, inundation, water pollution, habitat degradation
Society	Food insecurity, migration, disruption of services

Flash Flood

Triggered by intense, short-duration rainfall, and occur rapidly often within hours and with little warning. This flood is especially dangerous due to its sudden onset, high velocity, and limited predictability. It is more common in areas with steep terrain, dry soil, or limited vegetation cover, and urbanized areas with poor drainage.

In Ethiopia, most flash flood prone areas include; Dire Dawa City Administration, Afar Region, Somali Region (especially Fafan, Sitti, and Wabi Shebelle catchments), Eastern and Western Hararghe (Oromia), South Ethiopia Region, Sidama Region, Central Ethiopia Region, Amhara Region (steep highland catchments), Tigray Region and Addis Ababa and other rapidly urbanizing towns. The main impacts of flash floods include loss of human life, damage to houses and public infrastructure, destruction of roads and bridges, crops and livestock losses, soil erosion and sediment deposition and displacement of communities.

Urban Flood

Urban flooding results from heavy rainfall in cities and towns with poor drainage systems/blocked drainage channels, and unplanned settlements. These floods can result from both local rainfall and upstream flows. As an example, cities like Dire Dawa and Addis Ababa have experienced urban flooding during intense rainfall events. Main impacts of urban floods include loss of life and displacement in humans, water borne diseases, damage on roads, bridges, houses, schools and hospitals, and disruption of electricity, water supply, and telecommunications services. The Dire Dawa flood of August 2006 is widely regarded as Ethiopia's most severe urban flood disaster. Exceptional rainfall over the surrounding catchments caused the Dechatu River to rise rapidly, and inundating large parts of the city. The disaster resulted in more than 200 fatalities, thousands of displaced residents, destruction of thousands of homes and severe damage to roads, bridges, utilities, and commercial areas.

Shoreline flood (backflow inundation)

Occurs in areas like the Lake Tana basin (Fogera/Dembia plains), Lake Abaya and lake Chamo in South Ethiopia, and Lake Turkana overflow in Dasenech woreda of South Ethiopia where lake levels reverse, causing, alongside tributary overflows, significant inundation. Communities around Rift Valley lakes and other inland water bodies may be affected when water levels exceed their normal limits.

2.2 Historical Trends in Ethiopia

The development of Ethiopia's Flood Anticipatory Action Framework is grounded in the analysis of 30 years (1991-2024) of flood records from the DesInventar (DI) database and EDRMC flood occurrence data. The analysis confirms that riverine flooding is one of the country's most recurrent and damaging hazards, causing repeated loss of life, displacement, livelihood disruption, crop and livestock losses, and damage to critical infrastructure.

Historical flood events were assessed using key impact indicators include fatalities, number of people directly affected, displacement and evacuation, crop and livestock losses, and infrastructure damage. Events were further analyzed by season and month to identify patterns in occurrence and severity. The results show that the most severe floods occur during the JJAS season (June-September), particularly in August and September, with recurrent flooding concentrated in major hotspot areas such as South Ethiopia (Dasenech), Gambella (Itang, Jikawo, Lare, Gog, Jor and Wanthoa), Afar (Amibara, Asayita, Dubti and Gewane), the Wabi Shebelle Basin (Kelafo, Mustahil, Gode and Ferfer), and Amhara (the Lake Tana floodplain particularly Fogera, Libo Kemkem, Dera and Dembia), Oromia (Awash basin).

These hotspots have experienced repeated severe flood impacts over the past three decades, typically recurring every 2-5 years. Examples include recurrent flooding in South Ethiopia (2001, 2005, 2006, 2007, 2010, 2021, 2023 and 2024), Gambella (1993, 1995, 1996, 2000, 2001, 2007 and annually from 2020-2024), Afar (1993-1996, 2005-2007, 2019, 2020, 2023 and 2024), and Somali Region (1995, 1997, 2003, 2005, 2006, 2007, 2019 and 2023). Between 2019 and 2023, floods displaced more than 1.5 million people nationwide, causing repeated damage to housing, farmland, and critical infrastructure. Recurrent flooding in the same locations has highlighted gaps in preparedness, early warning coverage, and timely early action underscoring the need for anticipatory approaches that move beyond reactive response (EDRMC data). These events consistently resulted in large-scale humanitarian needs and emergency response interventions.

3 Institutional Arrangement and Governance

Ethiopia’s anticipatory action is embedded within the national Disaster Risk Management (DRM) architecture, which is led by the EDRMC. The commission as the lead institution is responsible for strategic coordination, activation decisions, and integration of anticipatory action into national disaster risk management systems. The Ethiopia Flood Anticipatory Action Framework adopts a government-led, multi-sectoral, and multi-level coordination approach that connects national policy, technical forecasting systems, humanitarian coordination mechanisms, and community-based implementation structures. This framework is aligned with the new National DRM Policy. It builds on existing platforms such as the National Early Warning Technical Committee (NEWTC), National Anticipatory Action sub-Technical Working Group (AAsTWG) and the Roadmap for Multi-Hazard, Impact-Based Early Warning and Early Action (2023–2030), ensuring that flood AA contributes to a broader, integrated approach to disaster risk governance.

3.1 Institutional Roles and Responsibilities

Effective implementation of Flood AA in Ethiopia requires strong institutional coordination, clearly defined mandates, and collaborative engagement among government institutions, technical agencies, humanitarian actors, development partners and donors, civil society organizations, media institutions, and at-risk communities.

The DRM council gives strategic guidance, coordination, communication, oversight and direction to the implementation of the Ethiopian Flood anticipatory action framework. Several key institutions support AA with complementary mandates. The Ethiopian Meteorological Institute (EMI) provides meteorological forecasting, climate services, and impact-based weather information that underpin early warning systems. The Ministry of Water and Energy (MoWE) is responsible for hydrological monitoring, river flow forecasting, and the generation and dissemination of riverine flood forecasts and early warnings, providing timely information to decision-makers and at-risk communities. Sectoral ministries, and specialized institutions including those responsible for agriculture, health, education, finance, transport, infrastructure, social protection and others play critical roles in translating early warning information into sector-specific preparedness and early actions, while regional governments, humanitarian partners, and local authorities support coordinated implementation at sub-national and community levels. Flood AA demands strong multi-sectoral and multi-level collaboration from federal institutions down to regional, zonal, and community actors. Regional local DRM structures in particular operationalize early actions at community level. The framework further emphasizes localization, community participation, inclusive governance, and last-mile early warning dissemination through the engagement of media institutions, civil society organizations, faith-based organizations, and at-risk communities.

Table: Institutional Roles and Responsibilities for Ethiopia Flood Anticipatory Action Framework

Institution / Actor	Key Roles and Responsibilities
Ethiopian Disaster Risk Management Commission (EDRMC)	▪ Lead overall governance, coordination, and oversight of the Flood AA Framework. ▪ Chair and coordinate the National Anticipatory Action Sub- Technical Working Group (AAsTWG). ▪ Integrate flood AA into national DRM systems and preparedness frameworks. ▪ Validate triggers and activation protocols. ▪ Coordinate national-level activation, operational readiness, and inter-agency response. ▪ Document and share lessons learnt

	▪ Provide AA capacity building activities, both technical and financial to enhance sub-national AA implementation ▪ Facilitate risk and vulnerability analysis
Ethiopian Meteorology Institute (EMI)	▪ Generate and disseminate seasonal and short-term weather forecasts. ▪ Provide technical leadership on meteorological analysis and impact-based forecasting. ▪ Support development and calibration of flood triggers and warning thresholds.
Ministry of Water and Energy (MoWE)	▪ Lead hydrological monitoring and river basin analysis. ▪ Manage River gauge and hydrological data systems. ▪ Provide flood forecast ▪ Support flood hazard mapping, scenario analysis, and flood trigger development
Other Line Ministries and Sectoral Bureaus	▪ Integrate flood AA into sectoral preparedness and contingency plans. ▪ Implement sector-specific early actions. ▪ Ensure sector specific AAs are implemented at all sub-national levels
Regional, city Administration, Zonal, Woreda, and Kebele DRM Structures	▪ Operationalize flood AA plans at subnational levels. ▪ Coordinate local-level preparedness and early action implementation. ▪ Mobilize local AA actors and community structures. ▪ Conduct risk and vulnerability analysis
Humanitarian and Development Partners	▪ Provide technical, operational, and financial support. ▪ Support risk analysis, trigger design, and vulnerability mapping. ▪ Contribute to implementation of anticipatory interventions. ▪ Align their AA implementation with the national flood AA framework
Ethiopian Red Cross Society (ERCS) and IFRC	▪ Support community-based early warning and anticipatory action. ▪ Contribute to scaling-up of flood AA initiatives. ▪ Support simulation exercises and preparedness capacity building. ▪ Support flood AA system building ▪ Provide technical expertise, operational tools, logistics, and coordination support. ▪ Support vulnerability analysis, and anticipatory planning. ▪ Mobilize technical and financial resources.
UN Agencies	▪ Provide technical expertise, operational tools, logistics, and coordination support. ▪ Support vulnerability analysis, and anticipatory planning. ▪ Mobilize technical and financial resources. ▪ Contribute to scaling-up of flood AA initiatives ▪ Support community-based early warning and anticipatory action.
Donors and Financing Institutions	▪ Provide predictable and flexible financing for anticipatory action. ▪ Support forecast-based funding models. ▪ Align investments with nationally led AA priorities ▪ Provide financial support for AA system building
Media Institutions	▪ Disseminate timely, locally tailored and accurate early warning information.

	▪ Support public awareness and risk communication. ▪ Strengthen last-mile warning dissemination.
Civil Society, Community-Based and Faith-Based Organizations	▪ Support community mobilization, early warning dissemination and localized implementation. ▪ Facilitate inclusion of vulnerable groups. ▪ Support evacuation and community preparedness activities.
Communities and Local Leadership Structures	▪ Participate in community risk assessment, early warning dissemination, preparedness planning and implementation. ▪ Contribute to integrate indigenous knowledge and local risk indicators to the AA implementation. ▪ Implement household and community-level preparedness measures. ▪ Facilitate identification of vulnerable/target groups

3.2 Integration with Forecasts

Seasonal flood outlooks issued by the Ethiopian Meteorological Institute (EMI) will be used at the general readiness stage to identify potential flood risks across Ethiopia. These outlooks support risk-informed decision-making by identifying areas where flooding is likely to occur and by informing the design of anticipatory actions before impacts materialize.

The integration of seasonal flood forecasts with exposure data and exceptional rainfall forecasts enhances preparedness and enables more effective readiness planning of the flood season. Key components of this approach include:

- **Utilizing multiple timescale forecasting information** (seasonal and short-term/exceptional rainfall forecasts) to monitor the evolution of flood threats and support progressive preparedness actions.
- **Linking forecast outputs to predefined triggers and thresholds** to ensure the timely and evidence-based activation of anticipatory actions and early preparedness measures.
- **Enhancing coordination among lead government agencies** - including the EDRMC, MoWE, and the EMI as well as technical agencies and humanitarian partners, to agree on risk levels, pre-agreed actions and intervention areas. .

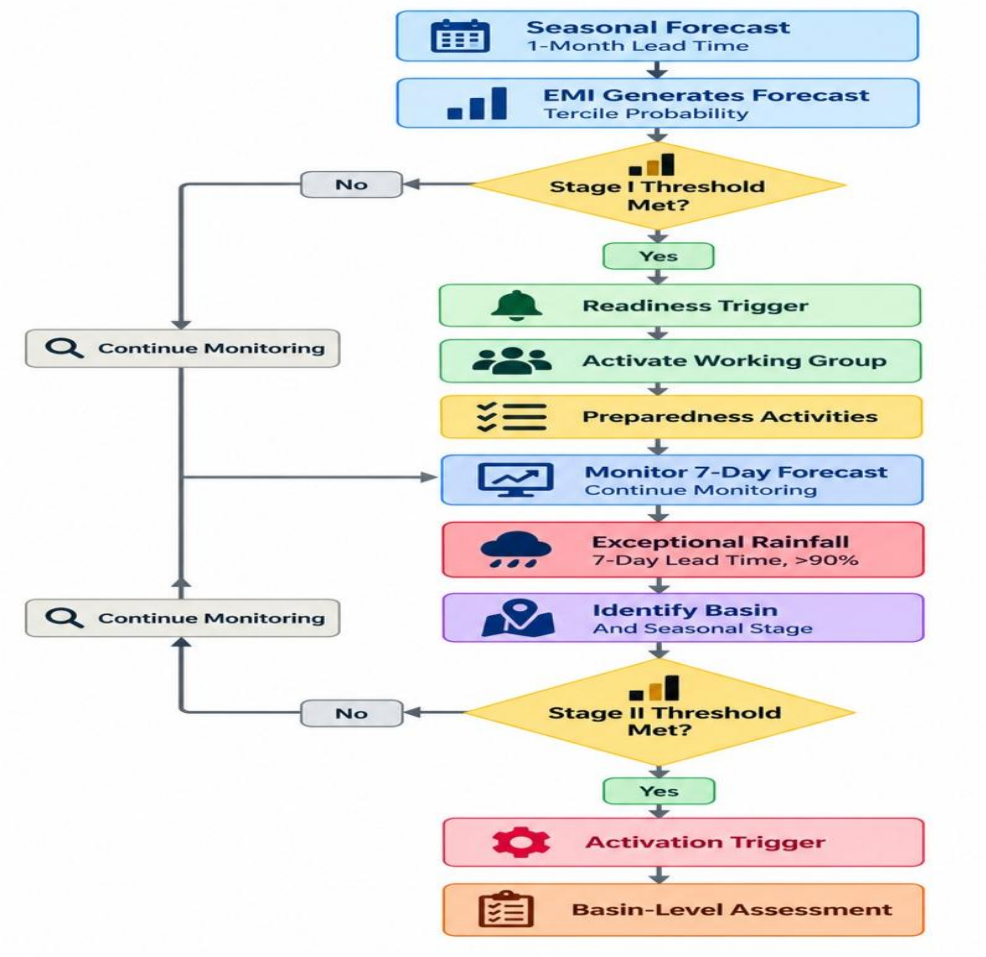
By combining meteorological forecasts, exposure information, and exceptional rainfall indicators, stakeholders can better anticipate potential flood impacts and implement targeted preparedness measures. Strengthening the reliability, accuracy, and operational usability of flood forecasts remains essential for effective anticipatory action, enabling timely interventions and reducing the humanitarian consequences of riverine flooding across Ethiopia.

4 Forecasting, Triggers, and Thresholds

A trigger for Flood AA is a predefined decision point that determines when preparedness and early actions should be initiated before an anticipated flood event. The purpose of the trigger system is to ensure that humanitarian and disaster risk management actors can act proactively, rather than reactively, when there is sufficient evidence that a flood event is likely to occur and may result in significant impacts on vulnerable populations. The establishment of trigger thresholds is a critical component of anticipatory action programming. Triggers must be scientifically robust, operationally feasible, and closely linked to forecast information and expected humanitarian consequences. A trigger should therefore identify situations in which forecasted rainfall and associated flooding are likely to exceed normal conditions and generate impacts that surpass the coping capacity of affected communities.

An effective trigger mechanism must balance two competing considerations. On one hand, it should avoid activating actions too frequently for events that are unlikely to result in significant impacts, thereby preventing unnecessary expenditure of resources. On the other hand, it must be sufficiently sensitive to ensure that actions are initiated early enough to reduce losses and protect lives and livelihoods before flooding occurs.

In Ethiopia, where flood risk varies significantly across seasons, river basins, and climatic zones, the trigger system is designed to integrate seasonal, and short-term/exceptional forecast information with historical flood event. This approach enables anticipatory actions to be linked to forecast scenarios that have historically been associated with damaging flood events. By doing so, the framework promotes evidence-based decision-making and strengthens the effectiveness of early action interventions. To maximize the use of available forecast information and provide adequate lead time for preparedness measures, a two-stage trigger system is adopted.



4.1 Methodology for Threshold Development

4.1.1 Stage I: General Readiness (Pre-Activation Phase)

The General Readiness Phase represents the first stage of the flood anticipatory Action process. It serves as an early preparedness stage designed to alert stakeholders of an elevated flood risk and initiate general readiness measures before the confirmation of a severe flood event. This stage is triggered by seasonal forecast information, allowing institutions to begin planning and preparedness activities weeks before potential flooding occurs. The primary objective is to ensure that the necessary operational, logistical, financial, and coordination arrangements are in place.

For flood anticipatory action in Ethiopia, the General Readiness Phase is triggered based on the one-month lead seasonal outlook forecast issued by the EMI. Once General Readiness is triggered, a range of preparedness activities may be initiated. These include the activation of the National Anticipatory Action Sub-Technical Working Group (AAsTWG), review of seasonal risk assessments, coordination among

relevant stakeholders, validation of potentially affected geographic areas, and planning for possible activation of AA. Preparedness measures implemented during this phase may include:

- Conducting national AAsTWG coordination meetings.
- Identifying priority districts and communities at risk.
- Mobilizing resources and funding
- Reviewing framework agreements with suppliers and service providers. Enhancing monitoring of meteorological and hydrological developments.

The General Readiness Phase does not necessarily imply that anticipatory actions will be activated. Rather, it represents a precautionary stage that ensures operational readiness while additional forecasts and risk information continue to be monitored. Because Ethiopia experiences distinct rainfall regimes and flood-generating mechanisms throughout the year, separate readiness thresholds are established for each of the country's major rainfall seasons, namely:

- FMAM (February–May) – Belg Season;
- JJAS (June–September) – Kiremt Season and
- OND (October–November) – Bega Season.

This seasonal differentiation recognizes that rainfall characteristics, flood frequency, and exposure patterns that vary across the country and therefore require season-specific trigger thresholds.

Methodology for Threshold Development

The development of trigger thresholds for general readiness is based on a systematic analysis of historical forecast data and observed flood occurrences. The methodology aims to establish an objective relationship between seasonal rainfall forecasts and flood events that have occurred in Ethiopia over the past three decades.

The EMI generates seasonal climate outlooks for the three seasons using tercile probability forecasts. These forecasts express the likelihood that seasonal rainfall will fall within one of three categories: Below Normal, Normal, or Above Normal. For operational purposes, EMI divides the country in to climatologically homogeneous zones, commonly referred to as homogeneity boxes. Each homogeneity box represents an area with similar rainfall characteristics and forecasts behavior. In some cases, different homogeneity boxes within a single river basin may display different tercile forecast categories. To ensure a consistent and practical methodology for anticipatory action, the homogeneity box covering the largest spatial extent of the basin is selected to represent the basin-level seasonal forecast. This approach provides a standardized basis for threshold development and operational decision-making.

Historical seasonal forecast records from 1991 to 2024 were used to conduct the correlation analysis between tercile probability and flood event. For each basin and season, forecast probabilities are extracted and linked with documented flood occurrences. This creates a historical data set that enables the identification of forecast conditions associated with flood events.

The analysis focuses on the following tercile forecast categories:

- Below Normal Rainfall
- Normal Rainfall
- Above Normal Rainfall

However, historical flood analysis has demonstrated that severe flood events in Ethiopia are not limited to seasons forecasted as Above Normal. In several instances, significant flooding has occurred during seasons classified as Normal. This observation highlights the importance of relaying on Normal to Above Normal Rainfall Probability in addition to the above normal forecast. This combined category captures a broader range of potentially flood-generating conditions and reflects the reality that flooding can occur even when seasonal rainfall is not exceptionally high at the national or basin scale. Consequently, forecast-based trigger options are considered during the threshold-setting process, which are Above Normal Rainfall Probability and Normal to Above Normal Rainfall Probability.

The selection of the most appropriate trigger category depends on the historical relationship between forecast probabilities and observed flood occurrences within each basin and season. To establish operational thresholds, historical flood records are analyzed alongside seasonal forecast probabilities. For every flood event recorded between 1991 and 2024, the corresponding seasonal forecast probabilities are identified and examined. The analysis then determines the most frequent (mode) probability value that was associated with a documented flood event. This mode probability is considered the operational threshold because it represents the frequent forecast condition under which flooding has historically repetitively occurred. Using this value ensures that readiness actions are activated whenever forecast conditions reach levels previously associated with flood impacts. This methodology provides an objective, evidence-based basis for trigger development and reduces reliance on subjective judgment.

Threshold-Setting Principle

The threshold-setting approach follows a structured process designed to establish operationally meaningful and scientifically defensible readiness thresholds for each rainfall season.

- The first step involves compiling a comprehensive record of historical flood events occurring between 1991 and 2024. All available information on riverine flooding events related to impacts is assembled and categorized according to season.

- The second step consists of identifying the corresponding seasonal forecast probabilities associated with each flood year. Historical EMI forecast records are examined to determine whether the flood event occurred during a season that was forecasted as Above Normal, and within the combined Normal-to-Above-Normal category.
- The third step involves evaluating the range of forecast probabilities linked to flood occurrences and identifying the most frequent probability associated with any documented flood event. This value serves as a critical indicator of the most frequent level of forecast certainty at which damaging floods have historically occurred. For this mode calculation, only data for those basins benefiting rainfall in that particular season are considered.
- The fourth step establishes the operational trigger threshold by adopting this mode historical probability value as the activation benchmark for general readiness. Whenever a future seasonal forecast exceeds this threshold, general readiness actions are initiated.
- The fifth step requires the application of separate thresholds for the FMAM, JJAS, and OND rainfall seasons. This seasonal approach ensures that triggers reflect the differing climatological conditions, hydrological responses, and flood-generating mechanisms characteristic of each season.

No.	Season	Threshold Considering Mode during the season for Above Normal plus Normal Tercile probability	Threshold Considering Mode during the season for Above Normal Tercile Probability
1	Kiremt (June to September) Season	75	25
2	Belg (February to May) Season	75	25
3	Bega (October to November) Season	85	25

Activation Decision for Stage I (General Readiness): Based on the criteria, the stage I (General Readiness) activation for each season will be done when the following thresholds are met.

- **Kiremt (June to September) Season:** If the sum of Above Normal and Normal Tercile probability for the season is at least 75, and the Above Normal Tercile Probability for the season is at least 25.
- **Belg (February to May) Season:** If the sum of Above Normal and Normal Tercile probability for the season is at least 75, and the Above Normal Tercile Probability for the season is at least 25.
- **Bega (October to January) Season:** If the sum of Above Normal and Normal Tercile probability for the season is at least 85, and the Above Normal Tercile Probability for the season is at least 25.

❖ Since all woredas along each river basin are not equally vulnerable to riverine flooding, further vulnerable area identification is required. Accordingly, even though the above thresholds are met,

vulnerable woredas along each river basin will be identified by EDRMC using monitoring and historical flood event data. This will be released as part of the trigger statement.

The framework provides a transparent and evidence-driven mechanism for activating flood preparedness measures. By linking seasonal forecasts with historical flood occurrence patterns, the methodology strengthens the reliability of anticipatory action decision-making and enhances the ability of stakeholders to implement timely interventions that reduce risks and protect vulnerable communities before disaster impacts materialize.

4.1.2 Stage II: Activation Phase

The Activation Phase is the second stage of AA, where additional trigger criteria are applied to initiate the implementation of anticipatory actions. The activation of AA is triggered using a 7-day lead-time forecast of exceptional rainfall (greater than the 90th percentile or 99th percentile depending on the month for each season) at the river basin level. This second-level trigger helps refine the framework from a broad preparedness stage to a more targeted basin-level analysis. It enables stakeholders to identify and prioritize specific river basins that are at imminent risk of flooding and to undertake monitoring and further assessments using hydrological and impact forecasting models as outlined in the Standard Operating Procedures (SOPs) at the river basin level.

Methodology for Threshold Development

The development of second-level trigger thresholds is based on a systematic analysis of historical observed exceptional rainfall (>90th percentile or 99th percentile) and documented flood occurrences at the river basin level. The methodology seeks to establish an objective relationship between exceptional rainfall events and flood occurrences in Ethiopia over the last three decades.

The EMI generates observed exceptional rainfall (>90th percentile, and 99th percentile depending on the month) data for major river basins using available meteorological station datasets within each basin. These observational datasets capture the peak rainfall amounts either the ten highest values recorded or the single highest value, depending on the month of the season of the year, expressed in millimeters (mm).

Historical records of observed exceptional rainfall from 1991 to 2024 are used to conduct the analysis. For each basin and season, rainfall data are analyzed, separately on a monthly level in order to account for

the influence of antecedent moisture conditions, groundwater recharge, and catchment saturation on runoff generation and flood potential. This seasonal-stage approach helps incorporate the percolation effect of water and the resulting hydrological response that ultimately determines flood occurrence in seasonal difference. The observed exceptional rainfall records are then linked with documented flood events to establish a historical dataset that enables the identification of rainfall amounts associated with flood occurrence. The resulting analysis identifies the threshold level of exceptional rainfall required to trigger flood anticipatory action using a 7-day lead-time forecast.

Proposed Threshold-Setting Principle

For each basin and season analyzed separately on each month of the season:

- Identify observed exceptional rainfall using either the minimum 90^{th}, or the 99^{th} percentile values, depending on the month within each season. Accordingly, the 90^{th} percentile is applied to the peak rainfall months of each season, while the 99^{th} percentile is used for the months at the beginning and end of each season.
- Use these exceptional rainfall values as the thresholds for activating anticipatory action at the Activation Phase.
- Apply separate thresholds for each month of the FMAM, JJAS, and OND rainfall seasons and basin.

This methodology ensures that second-level trigger thresholds are evidence-based, basin-specific, season and month-specific, and sensitive to changing hydrological conditions throughout the rainy season. By linking historical flood occurrences with observed exceptional rainfall amounts, the framework provides a scientifically sound basis for triggering timely and targeted flood anticipatory actions in Ethiopia.

Annex 1 at the end of this framework presents the monthly exceptional rainfall thresholds (mm) at basin level to be used as the second-tier trigger for flood AA activation across the Belg, Kiremt, and Bega seasons. Exceptional rainfall is defined as rainfall amounts exceeding the 90^{th} percentile (P90) threshold, representing the wettest 10% of historical observations during the peak rainy months of each season, or exceeding the 99^{th} percentile (P99) threshold, the wettest 1% of historical observations during the months at the beginning and end of each season for a given basin. These thresholds represent unusually heavy rainfall (P90), and extreme rainfall (P99), respectively, and are associated with an increased likelihood of flooding. Accordingly, they can be used as basin-specific and month-specific triggers for activating flood AA when forecasted rainfall is expected to meet or exceed the corresponding threshold.

5 Activation Protocols and SOPs

Activation protocols ensure clear, predictable steps from early warnings to action implementation. SOPs define who does what, when, and how.

5.1 Activation Process

- The activation process begins with continuous monitoring of forecast products and risk indicators. Once predefined triggers are met, the AAsTWG will be called by EDRMC to validate the activation. Upon validation, EDRMC releases trigger statement to coordinate and lead activation of the AA. EDRMC leads the whole process and chairs the AAsTWG.

5.2 Roles & Decision Flow

- EMI issues the seasonal forecast and continuous exceptional rainfall forecast
- EDRMC translates the seasonal forecast into trigger statement based on the agreed threshold. EDRMC releases both Alert and trigger statement. The alert will be used for general readiness while the trigger statement will be used for AA activation.
- Technical agencies (e.g., EDRMC, EMI, MoWE, MOA, EPHI, MOH, MoE, ERCS, UN agencies, NGOs and others) validate forecast inputs and impact thresholds.
- The sub-national AATWGs will be activated based on the trigger statement and national AAsTWG guidance.
- Implementing agencies initiate preparatory actions, including alerting stakeholders, pre-positioning, and community engagement.

5.3 Timelines

Flood Anticipatory Action timelines are structured to ensure early intervention while optimizing lead time for coordination, procurement, and field implementation. The activation window depends mainly on the accuracy and lead time of forecasts, typically ranging between **3 to 7 days** before the expected flood event. However, a well-functioning system considers a phased timeline as outlined below:

a) **Readiness phase (1 Month – Start of the season)**
   - Resource mapping to avoid duplication or for complementarity
   - Framework agreement with service providers

- Prepositioning required items at strategic location
- Pre-identification of implementing partners and surge rosters

b) Monitoring Phase (Start of the season –7 days before flood incident)

- Continuous monitoring of seasonal, Monthly, and short-term forecasts begins well before the potential event.
- Monitor river levels and convergence zones using available models
- The AAsTWG begins coordination, reviewing model trends and potential triggers.
- Pre-activation information is shared among EDRMC, technical agencies, and clusters to begin early readiness without triggering official action
- Implementing agencies verify stock levels, alert regional bureaus, and prepare communication materials for public dissemination.
- Conduct rapid assessment in the potential to be affected areas, beneficiary registration mapping of flood zone, evacuation roots…
- If thresholds are met, the AAsTWG convenes to validate triggers and approve action.
- EDRMC formally releases trigger statement to all relevant actors to initiate planned anticipatory interventions

c) Implementation Window (7–0 days before impact)

- Implementing agencies implement "no-regret" actions (e.g., distribution of key NFIs, site drainage, community messaging).
- Communication to at-risk populations is intensified, including evacuation guidance if necessary.
- Official forecasts are cross-checked with hydrological and ground observation data.
- Real-time monitoring rainfall, hydrological models and river level tracking and coordination
- Stop mechanism will be applied for high regret actions on the fourth day of implementation based on the real time monitoring. The monitoring then continues.

5.4 Deactivation

Deactivation is a formal process that occurs when forecasted flood risks subside or when a trigger does not materialize into an impact that requires anticipatory action. Clear deactivation procedures ensure accountability, minimize unnecessary use of resources, and support learning for future improvements.

Conditions for Deactivation:

- Updated forecasts show reduced probability or severity of flooding.
- Field validation indicates no major anticipated situation in high-risk zones.

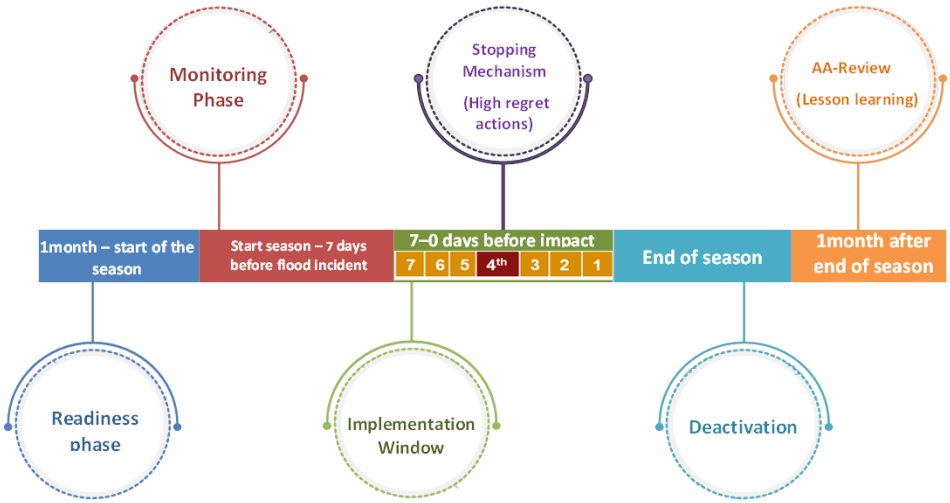
- If the planned Anticipatory action activities within the lead time completed.

Deactivation Responsibilities:

- The AAsTWG reviews updated forecast data and situational reports from field-level monitoring teams and technical agencies.
- Final deactivation decision is made by EDRMC, based on consensus from AAsTWG.
- Implementers are notified promptly to halt anticipatory actions not yet implemented or to transition resources to preparedness and recovery planning as appropriate.

Post-Deactivation Learning:

- After-Action Review (AAR) is conducted by each implementing agency with the coordination of government within 30 days of deactivation..
- AAR includes analysis of forecast accuracy, decision-making processes, partner coordination, and no-regret actions taken.
- Lessons learned feed into annual reviews of triggers, thresholds, and SOPs, improving the effectiveness and efficiency of future AA interventions.



6 Anticipatory Actions Implementation

AA is generally considered as no regret action, designed to reduce the impacts of anticipated hazards before they occur. Since forecasts are probabilistic in nature, there is always a possibility that a predicted event may not materialize or may occur with a different magnitude than expected. Therefore, AA interventions are often categorized as low-regret and high-regret actions based on the level of risk and consequences associated with acting on forecast information.

- **Low-regret actions** are typically implemented when forecast certainty is relatively low or when the lead time to the event is long. These actions generate benefits regardless of whether the hazard occurs,

strengthen community resilience, contribute to development outcomes, and do not adversely affect non-beneficiaries. They often focus on community assets, preparedness measures, and other interventions that provide broad societal benefits.

- **High-regret actions** are generally triggered when forecast confidence is high and the anticipated impacts are significant. These actions often involve larger investments or targeted assistance to specific households or communities. If the forecast does not materialize, such interventions may result in opportunity costs, inefficient use of resources, or perceptions of unfairness among non-beneficiaries.

Therefore, the selection of AA interventions should carefully balance forecast certainty, expected impacts, cost-effectiveness, and potential consequences for both beneficiaries and non-beneficiaries. The objective is to maximize early action benefits while minimizing the risks associated with acting on uncertain forecasts. Anticipatory actions are embedded within existing disaster risk management and humanitarian systems and complement early response mechanisms.

Sectoral anticipatory actions include:

a) Food

- Pre-position emergency food stocks in flood-prone areas.
- Support community food storage and grain protection.

b) Agriculture

- Support early harvesting where floods are forecasted.
- Provide cash, so farmers can protect tools, seeds, and inputs.
- Reinforce irrigation canals, riverbanks, and water diversion channels to protect crop lands.
- Preposition emergency Livestock vaccine and medicine, and fodder
- Support livestock evacuation
- Disseminate early warnings in local languages on early harvesting, crop protection and livestock disease

c) Shelter Land and Site Coordination

Shelter, Land and Site Coordination anticipatory actions aim to reduce the impact of forecasted floods on housing, displacement-affected populations and communities at risk of displacement. Actions combine shelter and NFI preparedness, site and area-based coordination, community engagement, HLP considerations, and preparedness for temporary displacement or relocation, based on forecast lead time, expected impacts and local capacities.

- **Community engagement and early warning**: Strengthen community-based early warning by combining official forecasts with indigenous and local knowledge, community observations and existing early-warning practices. Engage communities in identifying local

risk indicators and ensuring warnings are disseminated through trusted and accessible channels.

- **Community-led preparedness:** Work with communities to identify flood risks, safe areas, evacuation routes and priority anticipatory actions, including arrangements to support older people, persons with disabilities and others who may require additional assistance during evacuation.
- **Household-level shelter strengthening**: Support feasible measures to reinforce shelters, improve drainage, reduce water ingress and elevate or protect essential household belongings before flooding.
- **Shelter and NFI preparedness:** Pre-position essential shelter materials, NFIs, tools and basic repair materials in priority flood-risk areas for timely release when triggers are reached.
- **Protection of essential assets:** Support households to safely store or move important documents, household belongings and essential livelihood assets before flooding.
- **Displacement and site preparedness:** Identify populations and settlements at risk of displacement and pre-identify safe locations, evacuation routes and existing communal facilities that could temporarily accommodate displaced populations.
- **Site risk reduction and readiness:** Undertake feasible no-regret measures at existing or potential displacement locations, including drainage clearance, access improvements and identification of safe communal areas.
- **Area-based coordination and service mapping**: Map operational partners, available services and critical gaps in areas likely to be affected by or receive displaced populations, and establish coordination arrangements with local authorities and service providers ahead of potential displacement.
- **Community information, feedback and referrals**: Strengthen community structures to share information, identify emerging needs and service gaps, maintain accessible feedback channels and facilitate referrals during evacuation and displacement.
- **Basic HLP considerations**: Identify potential land or occupancy issues related to temporary relocation and coordinate with communities and local authorities to ensure that temporary sites and communal facilities can be used safely and appropriately.

d) Health

- Pre-position emergency health kits and essential medicines at woreda level to reduce health related risk during evacuation
- Strengthen cholera and malaria preparedness during evacuation (ORS, IV fluids, RDTs, ACTs).

- Support mobile health teams' readiness in flood-prone woredas.
- Train Rapid Response Team (RRT) members on integrated public health
- Protect health facilities with sandbags and elevation of equipment with community mobilization

e) Protection

- Identify high-risk populations (women-headed households, children, elderly, persons with disabilities).
- Pre-position and pre arrangement dignity kits, child-friendly spaces, and GBV referral pathways.
- Map safe evacuation sites and ensure accessibility.
- Train and deploy community volunteers on protection risks during displacement.
- Activate community alert and referral mechanisms.

f) WASH

- Pre-position water purification tablets, chlorine, and hygiene kits.
- Protect water points and latrines from flooding.
- Prepare water trucking contracts and standby agreements.
- Train and deploy volunteers and health extension workers to Conduct community hygiene promotion on safe water storage and sanitation during floods.
- Provide water and WASH items during evacuation

g) Education

- Provide life-saving, safeguarding including Lifesaving messaging/learning, child protection measures, referral pathways, for children, caregivers, teachers, and school communities.
- Implementing accelerated learning, make preparation for alternative learning modalities as relevant.
- Strengthen school preparedness through school-level contingency and continuity planning, evacuation procedures, identification of safe learning spaces, and flood mitigation measures such as sandbags, drainage improvements, and classroom reinforcement.

h) Logistics

- Pre-position relief supplies (food, NFIs, WASH kits) in flood-prone zones.
- Identify and prepare alternative routes in case of road cut-offs.
- Establish standby transport contracts (trucks, boats, air).
- Secure warehouses and storage sites above flood levels.
- Coordinate with the Logistics Cluster and EDRMC for pipeline readiness.

6.1 Targeting

Targeting for anticipatory action is conducted at a system-wide level, ensuring that early actions across all sectors are directed toward populations and locations facing the highest forecasted risk and vulnerability. Priority is given to:

- Communities and households located in recurrent flood hotspots
- Areas with high exposure and limited coping capacity
- Displacement Population
- Locations where early action can meaningfully reduce humanitarian impacts

Sector-specific actions (e.g. shelter, WASH, health…) are then implemented within these prioritized areas, ensuring complementarity, equity, and efficient use of resources. Targeting approaches remain flexible to account for changing risk patterns and emerging vulnerabilities.

6.2 Community Engagement

Effective anticipatory action against floods requires strong, sustained engagement with communities at risk. Community engagement ensures that early warnings are understood, trusted, and acted upon, while also strengthening accountability and local ownership of anticipatory actions.

7 Financing and Resource Mobilization

Predictable and timely financing is essential for effective anticipatory action. Pre-arranged financing mechanisms ensure that early actions can be implemented rapidly once flood triggers are activated, avoiding delays associated with ad hoc fundraising and enabling a shift from reactive response to proactive risk management.

7.1 Pre-financing Options

Anticipatory action relies on pre-financed arrangements that allow immediate release of funds upon trigger activation. These include humanitarian pooled funds, anticipatory action windows within global financing mechanisms, and national contingency financing instruments. Pre-financing arrangements are defined in advance and linked to agreed triggers, actions, and implementation responsibilities.

7.2 Funding Sources

Financing flood anticipatory action may draw from a combination of international and domestic sources.

International mechanisms include:

- **Central Emergency Response Fund (CERF):** a UN-managed pooled fund with an anticipatory action window that provides pre-arranged financing for early actions based on forecast triggers for disasters such as floods. CERF has supported anticipatory action frameworks for climate shocks across multiple countries.
- **IFRC Disaster Response Emergency Fund (DREF):** Anticipatory Pillar, which releases funding to Red Cross and Red Crescent National Societies when predefined forecast-based triggers are met, enabling rapid early action implementation.
- **Start Network Pooled Funds**, including the Start Fund and Start Ready, which provide flexible resources that can be deployed quickly for early actions.
- **Other Multilateral Humanitarian Pooled Funds** and anticipatory finance instruments that bridge humanitarian and climate risk financing are often coordinated through the Anticipation Hub and humanitarian donor partnerships.
- **World Bank and development financing**, such as flood management and disaster risk reduction projects that include components for strengthening institutional capacity, risk information systems, and preparedness (e.g., the Ethiopia Flood Management Project). While not anticipatory action funds per se, these investments support the underlying systems that enable effective early action and can be linked with forecast-based financing mechanisms.
- **Climate adaptation and resilience funds**, such as the Adaptation Fund and Green Climate Fund, which can finance long-term risk reduction and enable integration of anticipatory action into climate adaptation planning.
- **Internal Agency Funding, include sources solicited by agencies to implement AA.**
- **Other international funding sources**

Domestic mechanisms include:

Domestically, financing is mobilized through government disaster risk financing (DRF) frameworks and contingency allocations, which include:

- Disaster Risk Response Fund (DRRF)
- Disaster Risk Financing Strategy (DRFS)
- National disaster risk reduction budget lines
- Budget earmarked for early warning and preparedness by line ministries
- Religious Institutions, Private sectors and Civil Society Organizations

- Ethiopia Red Cross Society

Integrating these sources reinforces national ownership, sustainability, and alignment with broader DRM and climate adaptation strategies, while also enabling rapid activation of early actions when triggers are met.

7.3 Fund Allocation

Funds for flood anticipatory action are allocated based on pre-agreed priorities and activation protocols defined in the national flood AA framework. Allocation decisions are triggered by validated forecasts and approved thresholds and are guided by risk severity, and population exposure levels in identified hotspot areas.

Resources are apportioned across sectors and geographic areas according to:

- The magnitude of anticipated flood impacts;
- Predefined early action packages linked to forecast phases;
- Priority populations, including displacement-affected communities and other high-risk groups;
- Operational readiness and capacity to implement actions within the required lead time.

Resources are released in advance to enable pre-positioning and readiness actions, while maintaining flexibility to adjust allocations based on updated forecasts and evolving risk information.

7.4 Transparency

All financial flows related to AA are managed in accordance with pre-agreed governance arrangements, clear decision-making processes, and documented standard operating procedures.

Key transparency measures include:

- Clear documentation of trigger activation decisions, fund releases, and allocation criteria;
- Timely reporting on the use of anticipatory funds, actions implemented, and populations reached;
- Defined roles and responsibilities for financial oversight at national and sub-national levels;
- Post-activation reviews to assess the effectiveness, timeliness, and appropriateness of funded actions.

Where possible, reporting and accountability mechanisms are aligned with existing national DRM and humanitarian coordination systems to avoid duplication and strengthen government ownership. Transparent financial management supports learning, enables continuous improvement of the AA system, and reinforces confidence among government authorities, implementing partners, and funding entities.

8 Coordination and Communication Mechanisms

Strong coordination and effective communication are fundamental to ensuring that flood anticipatory action in Ethiopia is timely, predictable, and operationally actionable across all levels. These mechanisms ensure that early warning information is systematically translated into early action through clearly defined roles, structured decision-making processes, and efficient information flow. The section is aligned with global anticipatory action practice, which emphasizes that anticipatory action functions effectively only when coordination and communication are established before disaster impacts occur.

8.1 National Coordination Structure

Flood anticipatory action is coordinated at the national level under the leadership of the Ethiopian EDRMC. EDRMC convenes and chairs the AAsTWG, which serves as the central coordination and decision-making platform for flood anticipatory action. The AAsTWG brings together relevant government institutions, technical agencies, line ministries, humanitarian partners, and development actors to ensure a harmonized approach to anticipatory action. Within this structure, forecasts are jointly reviewed, trigger thresholds are validated, activation decisions are made, and implementation is coordinated across sectors.

Operational communication between national and sub-national levels is facilitated through the AAsTWG, which ensures timely dissemination of alerts, activation decisions, and situation updates.
Technical agencies provide analytical and scientific support to the AAsTWG by generating forecast interpretation, impact-based analysis, risk assessment, and trigger monitoring inputs that guide decision-making.

8.2 Coordination across Administrative Levels

Coordination under the framework operates across national, sub-national, and local levels to ensure vertical integration of decision-making and implementation. At the national level, coordination focuses on strategic direction, trigger validation, resource mobilization, and activation decisions. At the sub-national level, regional and local DRM structures focus on operational coordination, contextual interpretation of risk information, resource deployment, and coordination of implementing actors. At the local level, woreda and community structures are responsible for disseminating warnings, implementing early

actions, monitoring conditions on the ground, and reporting feedback upward to higher coordination levels. This layered structure ensures that national forecasts and activation decisions are effectively translated into local action while remaining responsive to local risk contexts.

Indicative Alert and Activation Framework

Alert Level	Status	Responsible Actor	Action
Advisory	Elevated risk	MOWE and EMI	Technical update and monitoring
Watch		AA Technical Group	Coordination and preparedness meeting
Activation	Trigger reached	EDRMC/RDRMCs	Activate anticipatory actions
Implementation	Trigger reached	Sub-national	Full operational of AA

8.3 Information Management and Data Sharing

Effective anticipatory action relies on timely and coordinated data sharing between key institutions, including the EMI, the Ministry of Water and Energy, EDRMC, and relevant ministries and partners. Data sharing is guided by agreed protocols that ensure accuracy, consistency, and interoperability of information. Information systems integrate meteorological forecasts, hydrological monitoring data, vulnerability assessments, and exposure information to support comprehensive risk analysis. Shared platforms and interoperable systems enable real-time information exchange and the production of standardized operational dashboards that support coordinated decision-making across institutions.

8.4 Accountability, Learning, and Continuous Improvement

The framework incorporates structured mechanisms for accountability, learning, and continuous improvement. After-action reviews/after event review and post-activation assessments are conducted to evaluate the effectiveness of coordination, communication, and implementation processes. Community feedback is systematically collected to assess the reach, clarity, and usefulness of early warning messages. Lessons learned from activations are documented and used to refine communication protocols, improve trigger systems, and strengthen institutional coordination arrangements. This ensures that the anticipatory action system evolves continuously based on operational experience and evidence.

9 Monitoring, Evaluation, and Learning

Monitoring, evaluation, and learning (MEL) are integral to strengthening flood anticipatory action over time. MEL systems support accountability, enable continuous improvement, and ensure that anticipatory action remains effective and cost-efficient.

9.1 Performance Indicators

A set of predefined indicators tracks key aspects of anticipatory action performance, including the timeliness of trigger activation, coverage of early actions, effectiveness in reducing impacts, and cost-efficiency compared to reactive response. Indicators are aligned with national DRM monitoring systems where possible.

9.2 Real-Time Monitoring

Monitoring begins at the point of trigger activation and continues throughout early action implementation and the flood event. Real-time monitoring supports adaptive management, enabling adjustments to actions based on evolving conditions and operational realities.

9.3 Post-Activation and Near-Miss Reviews

Following each activation or near-miss event, structured after-action reviews are conducted. These reviews assess forecast performance, trigger accuracy, coordination effectiveness, financing, and implementation outcomes. Findings are documented and shared to inform system-wide learning.

9.4 Continuous Improvement

Lessons identified through monitoring and reviews are used to update triggers, SOPs, and early action protocols. This iterative process ensures that the flood anticipatory action system evolves in response to improved data, changing risk patterns, and operational experience.

9.5 Knowledge Management

Learning products, analyses, and review findings are consolidated within EDRMC's knowledge management systems. This supports institutional memory, capacity building, and evidence-based planning across the DRM system.

10 Capacity Building and Institutional Strengthening

Effective and sustainable implementation of flood AA in Ethiopia depends on strong institutional capacity at national, sub-national, and community levels. Capacity building under this framework focuses on strengthening technical skills, coordination mechanisms, decision-making processes, and community preparedness to ensure that early warning information translates into timely and effective early action.

10.1 Capacity Assessment

A systematic capacity assessment will be undertaken as an initial step to identify gaps and strengths across institutions involved in flood anticipatory action. The assessment will focus on:

- Forecasting and hydrological modeling capacities
- Trigger analysis, validation, and decision-making processes
- Coordination and information-sharing mechanisms
- Community preparedness and last-mile early warning dissemination
- Operational readiness to implement early actions within limited lead times

Findings from the assessment will inform prioritized, targeted capacity-strengthening interventions at the federal, regional, and woreda levels.

10.2 Training and Simulation Exercises

Capacity strengthening will include structured training programmes and practical simulation exercises designed to enhance operational readiness. Key activities include:

- Training on forecast interpretation, trigger thresholds, and SOP implementation
- Scenario-based simulations and tabletop exercises to test coordination, timelines, and decision-making under different flood scenarios

- Training for sub-national DRM actors on localization of triggers, early actions, and coordination with communities
- Joint simulations involving government institutions, clusters, and partners to strengthen inter-agency collaboration

These exercises will support institutional learning and help identify procedural gaps before real-world activation.

10.3 Strengthening Decision-Making Capacity

A core objective of capacity building is to strengthen the ability of institutions to make timely, evidence-based decisions under uncertainty. This includes:

- Improving understanding of probabilistic forecasts and uncertainty management
- Applying no-regret principles in anticipatory decision-making
- Strengthening confidence in trigger-based activation to reduce delays
- Enhancing leadership and coordination skills within AA Technical Working Groups

Strengthened decision-making capacity ensures that early warning information leads to decisive action rather than a delayed response.

10.4 Knowledge Exchange and Learning

Knowledge exchange is a key pillar of institutional strengthening. Learning from global and regional experiences in flood anticipatory action, including countries with established AA systems, supports innovation and adaptation within the Ethiopian context.

- Structured exchanges, peer learning, and technical dialogues will be used to:
  - Share best practices in trigger design, forecasting integration, and early action delivery
  - Adapt proven approaches to Ethiopia's institutional, climatic, and socio-economic context
  - Strengthen national ownership while benefiting from global technical advancements

All learning will be systematically documented and integrated into framework revisions and operational guidance.

11 Implementation Roadmap

The implementation roadmap provides a phased, structured approach to operationalizing, scaling, and institutionalizing flood AA in Ethiopia. It balances immediate priorities with longer-term system strengthening to ensure sustainability and national ownership.

11.1 Phased Implementation Approach

Implementation will follow a phased pathway:

Short-Term: Establishment and Piloting

- Finalization of triggers, thresholds, and SOPs
- Pilot implementation of flood anticipatory actions in selected high-risk basins
- Strengthening coordination mechanisms and technical working groups
- Initial capacity-building and simulation exercises
- Alignment with Disaster Risk Response Fund (DRRF)

Medium-Term: Scaling and Consolidation

- Expansion of geographic coverage and sectoral early actions
- Refinement of triggers based on learning from pilots and near-misses
- Strengthening data systems, forecasting accuracy, and vulnerability integration
- Expansion of pre-arranged financing mechanisms

Long-Term: Institutionalization

- Full integration of flood AA into national DRM planning and budgeting processes
- Alignment with climate adaptation strategies
- Sustained government leadership and reduced reliance on ad hoc external funding

11.2 Roles and Responsibilities

EDRMC leads overall implementation and governance of the roadmap. Technical agencies such as EMI and MoWE co-lead forecasting, trigger development, and validation. Sector ministries, clusters, and partners support operationalization, implementation, and monitoring of early actions in line with agreed roles and SOPs.

11.3 Resource Requirements

Implementation of the framework requires adequate and predictable resources, including:

- Skilled human resources at national and sub-national levels
- Technical systems for forecasting, data integration, and information management
- Pre-arranged financial resources to enable timely activation and early action

Resource requirements will be reviewed periodically to support scaling and sustainability.

11.4 Risk Management

Key implementation risks include data gaps, forecast uncertainty, funding delays, and coordination challenges. Risk mitigation measures include:

- Strengthening data-sharing agreements and model calibration
- Maintaining flexible, phased triggers
- Establishing pre-financed funding mechanisms
- Reinforcing coordination platforms and SOPs

Proactive risk management supports system resilience and reliability.

11.5 Review and Update Mechanism

The Flood Anticipatory Action Framework and its implementation roadmap will be reviewed periodically under the leadership of EDRMC, with participation from technical agencies and partners. Reviews will incorporate lessons from activations, near-misses, simulations, and evolving flood risk patterns to ensure continued relevance and effectiveness.

Annexes

Annex 1: P90 and P99 Threshold Values for Tier 2 Activation

		P90 and P99 Threshold Values for Tier 2 Activation				
Basin Name	**Month**	**Min of P90 Threshold (Heavy rainfall)**	**Min of P99 Threshold (Extreme rainfall)**	**Kiremt Season (JJAS)**	**Belg (FMAM)**	**Bega (OND)**
ABAY	Jun		70.6	70.6		
	Jul	84.7		84.7		
	Aug	83.0		83.0		

		P90 and P99 Threshold Values for Tier 2 Activation				
Basin Name	**Month**	**Min of P90 Threshold (Heavy rainfall)**	**Min of P99 Threshold (Extreme rainfall)**	**Kiremt Season (JJAS)**	**Belg (FMAM)**	**Bega (OND)**
	Sep		76.0	76.0		
	Oct		67.0			67.0
AWASH	Jun		42.0			42.0
	Jul	66.0		66.0		
	Aug	69.0		69.0		
	Sep		68.0	68.0		
	Oct		65.0			65.0
BARO AKOBO	Jun		98.0	98.0		
	Jul	73.0		73.0		
	Aug	76.0		76.0		
	Sep		94.0	94.0		
	Oct		88.0			88.0
GENALE DAWA	Mar		102.0		102.0	
	Apr	69.0			69.0	
	May		111.0		111.0	
	Oct	58.0				58.0
	Nov		89.0			89.0
OMO GIBE	Mar		54.0		54.0	
	Apr	51.0			51.0	
	May		80.0		80.0	
	Jun		74.0	74.0		
	Jul	71.0		71.0		
	Aug	66.0		66.0		
	Sep		70.0	70.0		
	Oct	56.0				56.0
	Nov		65.0			65.0
RIFT VALLY	Mar		52.0		52.0	
	Apr	55.0			55.0	
	May		77.0		77.0	
	Jun		54.0	54.0		
	Jul	40.0		40.0		
	Aug	39.0		39.0		
	Sep		49.0	49.0		
	Oct	73.0				73.0
	Nov		69.0			69.0
TEKEZE	Jun		68.0	68.0		
	Jul	80.0		80.0		

		P90 and P99 Threshold Values for Tier 2 Activation				
Basin Name	**Month**	**Min of P90 Threshold (Heavy rainfall)**	**Min of P99 Threshold (Extreme rainfall)**	**Kiremt Season (JJAS)**	**Belg (FMAM)**	**Bega (OND)**
	Aug	86.0		86.0		
	Sep		78.0	78.0		
	Oct		61.0			61.0
WABI SHEBELE	Mar		59.0		59.0	
	Apr	48.0			48.0	
	May		72.0		72.0	
	Oct	40.0				40.0
	Nov		63.0			63.0