



DEVELOPING AN ACTION PLAN FOR THE KENYA DROUGHT WATCH SYSTEM AND REVIEWING TRIGGERS AND THRESHOLDS FOR DROUGHT ANTICIPATORY ACTION



Review of activities, challenges and opportunities

Workshop Report

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December 2024

To cite this report

Okoth, V., Ouma, J., Kinyua, J., Amdihun, A., Demissie, T. 2024. AICCRA Workshop Report: Developing an Action Plan for the Kenya Drought Watch System and Reviewing Triggers and Thresholds for Drought Anticipatory Action. Accelerating Impacts of CGIAR Climate Research for Africa (AICCRA).

Acknowledgments

Accelerating Impacts of CGIAR Climate Research for Africa (AICCRA) is a project that helps deliver a climate-smart African future driven by science and innovation in agriculture. It is led by the Alliance of Bioversity International and CIAT and supported by a grant from the International Development Association (IDA) of the World Bank.

The authors would like to thank for the financial support of German Humanitarian Assistance through implementation by GIZ.

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Titles in this series aim to disseminate interim research on scaling climate services and climate-smart agriculture in Africa and stimulate feedback from the scientific community.

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Accelerating Impacts of CGIAR Climate Research for Africa (AICCRA) is a project that helps deliver a climate-smart African future driven by science and innovation in agriculture. It is led by the Alliance of Bioversity International and CIAT and supported by a grant from the International Development Association (IDA) of the World Bank. Explore our work at aicra.cgiar.org



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CONTENTS

Introduction.....	1
Background Information.....	1
Objectives	1
Workshop Participants	1
Opening remarks	2
setting the context and review of the current status	3
Overview Of the Kenya Drought Early Warning System(S): Achievements and Lessons Learned (KMD And NDMA)	3
Overview of Drought Early Warning System(S) at the County Level (Kilifi, Marsabit, And Wajir).....	5
Overview of Drought Early Warning System(S) from Other Partners	6
The Kenya Red Cross.....	6
World Food Programme	7
Food and Agriculture Organization.....	8
The East African Drought Watch System	8
Review of the Drought Trigger and Thresholds	9
ForPac Approach by KMD	9
Proposed IGAD Trigger Development.....	11
Presentation of the Kenya Roadmap for Anticipatory Action	13
Action Plan Development	15
Technology	15
Data Integration	16
Coordination	16
Capacity Building	17
APPENDICES	18
Appendix 1. Workshop Agenda	18
Appendix 2. Developing an Action Plan for the Kenya Drought Watch System Workshop Facilitators	19
Appendix 3. Photos during the workshop proceedings	19



ACRONYMS

AA	Anticipatory Action
AICCRA	Accelerating Impacts of CGIAR Climate Research for Africa
ASALs	Arid and Semi-Arid Lands
CDI	Combined Drought Indicator
CHIRPS	Climate Hazards Group InfraRed Precipitation with Station data
CSG	County Steering Group
DRM	Disaster Risk Management
EADW	East Africa Drought Watch
EWS	Early Warning Systems
FAO	Food and Agriculture Organization
FbF	Forecast-based Financing
FNSWG	Food Security and Nutrition Working Group
ForPac	Forecast-Based Preparedness Action
IGAD	Intergovernmental Authority on Development
ILRI	International Livestock Research Institute
INFORM	Index for Risk Management
IARP	Integrated Agricultural Risk Platform
ICPAC	IGAD Climate Prediction and Applications Centre
JJA	June-July-August (seasonal forecast period)
JRC	Joint Research Centre
KDWS	Kenya Drought Watch System
KMD	Kenya Meteorological Department
KRC	Kenya Red Cross
M&E	Monitoring and Evaluation
MAM	March-April-May (seasonal forecast period)
NDMA	National Drought Management Authority
NDOC	National Disaster Operations Centre
NDVI	Normalized Difference Vegetation Index
NDEF	National Drought Emergency Fund
OND	October-November-December (seasonal forecast period)
PSP	Participatory Scenario Planning
ROC	Receiver Operating Characteristic
SPI	Standardized Precipitation Index
SSTC	South-South and Triangular Cooperation
TWG	Technical Working Group
WFP	World Food Programme



INTRODUCTION

Background Information

Droughts have become more frequent and severe in Kenya and across East Africa, exacerbating food insecurity, water scarcity, and economic instability. To address these challenges, robust drought monitoring and early warning systems must be developed, as well as anticipatory actions that can mitigate the impact of droughts before they occur.

ICPAC, in collaboration with key partners such as AICCRA and the Kenyan government, planned to support the development of a National Drought Watch System, which will provide real-time data and analysis on drought conditions and early warning systems. Initiatives such as ForPac, INFORM, AstroCAST, IARP, and FbF for food security (F4S) have led to the development of drought forecasts and triggers and thresholds to support the co-development of AA in Kenya and the region. The Kenya National Drought Watch System is envisioned as a foundational model for other IGAD member states, showcasing the best drought monitoring and response practices. It also leverages protocols for drought triggers and thresholds developed by organizations such as ICPAC, WFP, FAO, the Red Cross, NDOC, KMD, and NDMA. By reviewing and refining these protocols, the system aims to enhance resilience to climate variability nationally and regionally.

The workshop aimed to create a comprehensive action plan for the Kenya Drought Watch System (KDWS), ensuring consistency with the regional East Africa Drought Watch systems and a detailed review of the national triggers and thresholds for Anticipatory Action (AA).

Objectives

To create a comprehensive action plan for the implementation of KDWS, the workshop came up with four objectives, including:

- To review and assess the current state of the Kenya drought early warning system, including its integration with triggers and thresholds.
- To identify key challenges and opportunities for implementing the drought early warning system, including technological and logistical factors.
- To create a detailed action plan outlining the steps, responsibilities, and timelines for the complete development and implementation of the Kenya Drought Watch System (KDWS).
- To review drought triggers and thresholds approaches and establish mechanisms for coordination and collaboration among national and regional stakeholders while ensuring alignment with all drought AA initiatives.

Workshop Participants

The attendance covered representatives from national, regional, and technical organizations to ensure that the workshop benefited from a broad range of expertise and perspectives, facilitating a holistic approach to drought monitoring, triggers, and anticipatory action. These include representatives from:



- National Drought Management Authority (NDMA)
- National Disaster Operations Centre (NDOC)
- Marsabit and Wajir county NDMA
- Kenya Meteorological Department (KMD)
- WFP – country and regional office
- FAO – regional office
- ICPAC technical experts in climate modeling, data analysis, and early warning systems
- RedCross
- DRM program staff for quarterly review/planning meeting

Opening remarks

The workshop commenced with opening remarks from ICPAC, AICCRA, and NDMA, setting the stage for the collaborative discussions. Jully Ouma, the Early Warning Systems Thematic Lead from ICPAC, welcomed participants, highlighting the significance of advancing the creation of a nationalized drought watch system for Kenya alongside strengthening anticipatory actions. He emphasized the importance of the three-day collaboration, which aimed to produce a clear action plan for the development of the system. The ultimate goal is to reduce the adverse effects of drought and support vulnerable communities by improving early warning and preparedness measures.

Dr. Teferi, Climate Scientist at AICCRA, commended the progress made in developing seasonal forecasts while pointing out a critical gap: the availability of drought predictions has not always translated into concrete actions. He stressed that stakeholders could strengthen the capacity for anticipatory action through collaboration and a concerted effort to link forecasts to practical interventions. Dr. Teferi highlighted that this workshop provides an essential platform for aligning efforts and bridging the gap between predictions and actionable measures to safeguard lives and livelihoods.

Following a round of introductions from all participants present, the session then provided participants with an overview of the broader vision for drought monitoring and early warning systems, emphasizing the integration of the regional East Africa Drought Watch System with national and continental systems. Participants were presented with the overall framework that positions the East Africa Drought Watch as a critical regional tool for monitoring droughts, supporting decision-making, and facilitating anticipatory action. The system's alignment with continental initiatives, such as the African Drought Watch, ensures consistency in drought data collection, analysis, and dissemination across IGAD member states and the wider continent. This integration aims to enhance regional collaboration while allowing countries like Kenya to develop tailored national systems that address specific local needs.

The introductory session also highlighted the importance of ensuring that the KDWS serves as a foundational model for other IGAD member states. By linking it to regional and continental platforms, Kenya's system will benefit from shared resources and expertise and contribute critical data and insights to the broader network. Participants were encouraged to recognize the value of harmonizing protocols, triggers, and thresholds to ensure interoperability across the systems.



response. This comprehensive system has significantly reduced the time between early warnings and actionable interventions, directly addressing the needs of vulnerable communities in ASALs.

One of the key achievements of the system presented during the workshop is its successful linkage between early warning data and pre-disaster risk actions, including financial mechanisms such as the NDEF. Notably, the system received recognition in 2023 as the most digitized early warning system within the South-South and Triangular Cooperation (SSTC) region. Stakeholders rely on this data-driven system for decision-making, which has enhanced coordination among government agencies, development partners, and community institutions.

Despite these achievements, the system faces several challenges. Resource constraints continue to limit operational efficiency, while delays between triggers and early action hinder optimal impact. Additionally, political interference sometimes undermines evidence-based reporting, and emerging threats, such as compounding risks during drought periods, exacerbate vulnerabilities. Disseminating early warning information at the community level remains a challenge, particularly in remote areas, and capacity gaps among field officers further limit the system's reach and effectiveness.

Several pertinent questions arose from the presentation, highlighting areas for further improvement and clarity. Participants raised concerns about how drought information can effectively reach communities on the ground and the need for comprehensive impact assessments. They questioned the specific thresholds used in drought prediction and the role of NDMA's contributions to Disaster Risk Management (DRM). Additionally, concerns were raised about how drought early warning information is being utilized by pastoralist communities, who are often on the move, and the challenges posed by illiteracy in these areas. Participants emphasized that while early warning systems have improved, there is still a gap in translating this information into timely anticipatory actions by decision-makers and resource holders. This highlights the urgent need for stakeholders to prioritize actionable interventions that align with early warning outputs.

Complementing NDMA's work, the Kenya Meteorological Department (KMD) presented its contributions to drought monitoring through climate and weather forecasting. KMD produces daily, five-day, weekly, monthly, and seasonal forecasts at both county and national levels. These forecasts include advisories and alerts for impending extreme weather events, ensuring relevant sectors are informed and prepared. KMD further supports decision-making through its seasonal forecasts, which focus on Kenya's three key rainfall periods—March-April-May (MAM), June-July-August (JJA), and October-November-December (OND). These forecasts include a detailed review of past weather patterns and the associated impacts, which are used to guide sector-specific plans, particularly for agriculture and food security.

Additionally, KMD also mentioned that they issue agrometeorological bulletins every 10 days. These bulletins provide timely updates tailored to key sectors such as agriculture, livestock, and water management, helping stakeholders plan activities to mitigate drought impacts. One of KMD's notable achievements is its provision of forecast skill scores, such as the Receiver Operating Characteristic (ROC) scores, which measure forecast reliability and accuracy. Moreover,



probability-based SPI forecasts are provided at 1-month, 2-month, and 3-month lead times, enabling anticipatory actions to be taken well in advance.

Apart from the achievements, KMD highlighted several ongoing challenges. For instance, the low predictability of the (March-April-May) MAM season limits the accuracy of early warning forecasts during this critical period. Dissemination of forecasts remains a challenge, particularly in remote areas, where information does not always reach the mobile pastoralist communities who need it most. Additionally, KMD lacks access to sub-seasonal data from key global modeling centers, which constrains its ability to produce detailed SPI forecasts. The department also emphasized its resource limitations, citing staffing challenges due to natural attrition and competition for skilled personnel. Furthermore, the absence of a comprehensive impact database makes it difficult to align forecasts with real-world socio-economic drought impacts and produce impact-based forecasting.

Several key questions arose from the presentation, further illuminating areas that require attention. Participants sought clarity on the thresholds used for drought predictions and their practical implementation. They also raised concerns about how impact data from vulnerable communities, particularly nomadic and pastoralist groups, could be made more accessible to improve forecast accuracy. Additionally, discussions focused on strategies to bridge the forecast-action gap, ensuring that forecast information translates into timely, effective anticipatory actions. Participants also inquired about the progress of flood forecasts, recognizing their complementary role in holistic climate risk management.

Overview of Drought Early Warning System(S) at the County Level (Kilifi, Marsabit, And Wajir)

The counties of Kilifi, Marsabit, and Wajir presented their approaches to drought EWS, showcasing a combination of scientific and traditional knowledge to monitor and anticipate drought risks. These systems are validated through the County Steering Group (CSG), which serves as a coordination platform to ensure that drought information is contextualized and actionable for local communities.

The counties emphasized the integration of scientific forecasts provided by KMD and NDMA with traditional early warning methods, ensuring that forecasts are analyzed and adapted to the local context. This process involves county meteorological officers working alongside local traditional forecasters to interpret drought information, which is then disseminated to the local population. By validating the information through the Participatory Scenario Planning (PSP) outcomes, the CSG ensures accuracy and builds trust among stakeholders.

Given the realities of extreme climate changes, counties have advocated for significant livelihood adaptations. These include advising communities to adopt livestock insurance and encouraging the sale of livestock while prices are still favorable to avoid losses during prolonged drought periods. Strategies such as phased implementation of anticipatory actions based on EWS results are promoted to improve preparedness and response at the community level.

The presentations also highlighted the need for county disaster management policies and Acts to serve as legal frameworks for drought preparedness and



response. Once forecasts are released, the counties analyze the information with the support of technical experts and develop coordinated action plans to guide interventions. A unified action plan, implemented across the counties, ensures consistency, avoids duplication of roles, and maximizes the effectiveness of anticipatory actions.

The counties further stressed the importance of cross-border coordination in drought early warning and anticipatory action, particularly for pastoralist communities whose movements often span county and national borders. Developing cross-border forecasts and harmonized triggers for anticipatory actions is seen as critical for addressing shared vulnerabilities in neighboring regions.

Despite these advancements, challenges remain, including low government involvement at the county level. Stakeholders emphasized the need for improved coordination between government actors, development partners, and local organizations to streamline activities and avoid overlap. Additionally, counties highlighted the importance of having access to both county-level and regional forecasts to better plan and implement anticipatory actions.

Overview of Drought Early Warning System(S) from Other Partners

In addition to the presentations by NDMA and KMD, the workshop featured submissions from other international partners, including the Red Cross, FAO (Food and Agriculture Organization), and the World Food Programme (WFP). These organizations shared their contributions to drought early warning systems, highlighting their role in enhancing anticipatory action, building resilience, and improving response mechanisms for drought-affected communities.

The Kenya Red Cross

The Kenya Red Cross (KRC) presented their role in supporting both national and county governments in drought preparedness and response. They operate under a clear mandate to develop and implement multi-hazard contingency plans using data from key institutions such as KMD, NDMA, and ICPAC. These contingency plans help map out hazards and design anticipatory actions to address drought and other related risks. Currently, the Red Cross has successfully mapped hazards in five counties and projected the associated impacts into the coming years, emphasizing their commitment to forward planning.

Also highlighted was that the organization also maps out epidemic hazards that are directly or indirectly linked to droughts and floods, ensuring that the impacts of such hazards are well anticipated. In addition, non-cyclic emergencies such as wildfire outbreaks and incidents in schools are also included in their hazard preparedness plans. By fostering preparedness for both anticipated and emerging risks, KRC provides a clear roadmap to support both national and county-level governments. This roadmap includes downscaling of information to ensure that partners at the local level have access to actionable insights for drought mitigation and response.

One of the key strategies highlighted during the presentation is livestock management to mitigate drought impacts on pastoralist communities. KRC



promotes strategic and commercial destocking as proactive measures when drought is anticipated. Strategic destocking involves selling off older animals, which are most vulnerable to drought stress, while commercial destocking encourages the sale of livestock when market prices are still favourable. Another critical intervention is animal offtake, a program where livestock are bought from pastoralists, slaughtered, and the meat returned to the community, ensuring food security while providing financial support to affected households.

During the discussion, key questions were raised regarding the preparedness for livestock offtake programs in light of the upcoming anticipated drought. Additionally, concerns about the presence of cyclones and intense oceanic winds, particularly in counties like Kilifi, were highlighted as challenges that affect agricultural productivity and increase vulnerability in coastal areas.

World Food Programme

World Food Programme (WFP) presented their utilization of drought early warning systems and food security monitoring, highlighting their extensive programs and initiatives to support vulnerable populations and strengthen institutional capacity. For instance, their largest program operates in the refugee camps of Kakuma and Dadaab, which collectively host over 700,000 refugees. These programs focus on food assistance and ensuring the resilience of refugees to food insecurity during drought periods. Additionally using early warning information provided at both the regional and national level, WFP supports school meal programs as a critical intervention to address food needs among children, particularly during climate-induced shocks like droughts.

A significant focus of WFP's work is on capacity strengthening at both individual and institutional levels. At the individual level, they provide training to officers on data collection, analysis, and interpretation of food security indicators. At the institutional level, WFP supports the development of software systems and platforms to strengthen disaster management and food security monitoring. This includes helping counties produce bills for disaster management, ensuring legislative support for preparedness and response mechanisms.

To enhance early warning systems, WFP integrates food security outcome indicators into their monitoring frameworks, enabling a robust approach to tracking and analyzing drought impacts. WFP has conducted training on the methodologies for collecting and analyzing these indicators, ensuring data consistency and reliability. Leveraging CHIRPS (Climate Hazards Group InfraRed Precipitation with Station data) and NDVI (Normalized Difference Vegetation Index) pre-processed datasets, WFP integrates these climate indicators into their reporting processes and bulletins. Thus, by combining food security data with early warning information, WFP ensures that actionable insights are generated and disseminated to stakeholders.

A key achievement highlighted was WFP's tailored approach to information dissemination, ensuring that early warning outputs reach the appropriate stakeholders at the county and ward levels. WFP adapts its reporting to meet specific stakeholder requirements, making the information more accessible and actionable for decision-makers, humanitarian actors, and communities.



Food and Agriculture Organization

Food and Agriculture Organization (FAO) highlighted their pivotal role in supporting drought early warning systems and anticipatory action (AA) across Kenya and the region. In collaboration with IGAD, FAO co-leads the Food Security and Nutrition Working Group (FSNWG), which serves as a technical platform for coordinating food security interventions and monitoring across the region.

They provide technical support to countries to strengthen anticipatory action frameworks and offer regional assistance to develop roadmaps for drought preparedness and response. A key insight shared during the presentation was the emphasis on trigger development, noting that actions can be initiated before the trigger itself is reached. This proactive approach ensures that early warning systems translate into timely interventions, reducing the adverse impacts of drought on livelihoods and food security.

The East African Drought Watch System

After getting an overview of Kenya’s drought EWS, participants were introduced to the East Africa Drought Watch System (EADW), a regional platform designed for drought monitoring and early warning. Developed jointly by ICPAC and the Joint Research Centre (JRC) of the European Commission, this public online system provides automatic 10-day warnings for drought onset, progression, and recovery. Hosted at the IGAD Disaster Operations Centre (IDOC), the system leverages Earth Observation data and weather information to improve regional preparedness and response to drought risks.

At the heart of the East Africa Drought Watch System is the Combined Drought Indicator (CDI), a tool that identifies areas experiencing drought and recovery phases. The CDI categorizes drought conditions into three levels—Watch, Warning, and Alert—based on precipitation deficits, soil moisture anomalies, and vegetation anomalies. Additionally, the system incorporates two recovery categories: Partial Recovery and Full Recovery of Vegetation, enabling users to monitor the evolution of drought phases and identify trends.

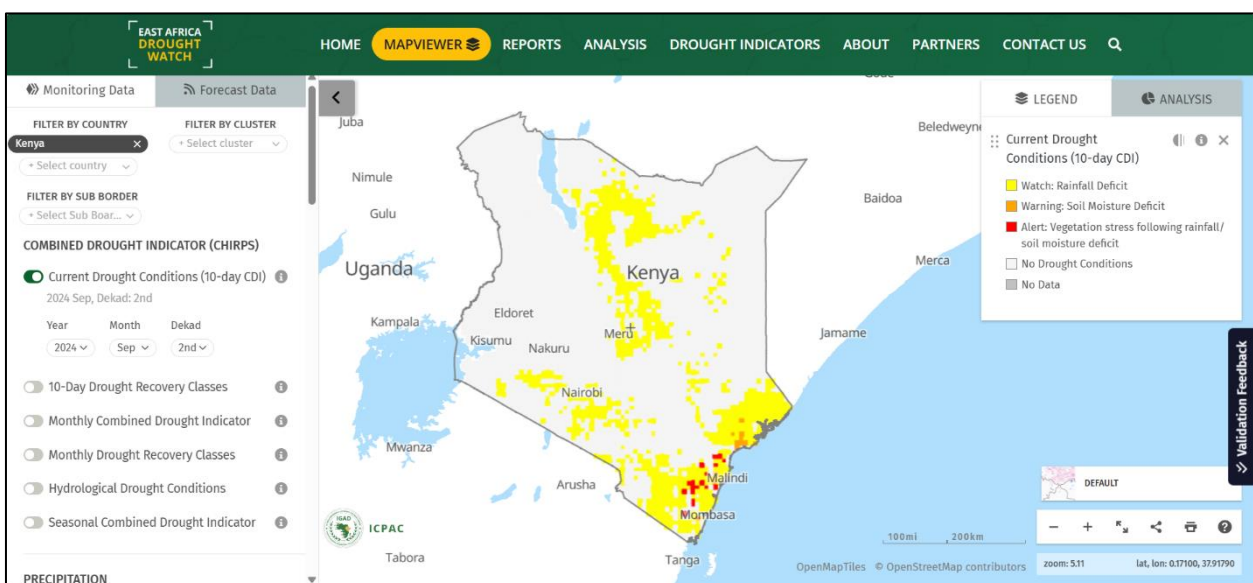


Figure 2. The EADW System Map viewer



The participants were introduced to the platform's functionality includes a user-friendly Mapviewer, allowing visualization of key drought indicators such as Standardized Precipitation Index (SPI), soil moisture anomalies, and fAPAR vegetation anomalies over various timescales. Users were shown how to filter data by country, time (decade, month, season, and year), and specific administrative levels. They were also made aware of how the system further enables boundary-based analysis through user-drawn regions or uploaded shapefiles, allowing tailored reporting for specific areas of interest.

Participants explored how the system supports in-depth drought evolution analysis, offering insights into changing conditions over time. The ability to generate sharable reports on current drought conditions and predictions enhances stakeholder collaboration and data-driven decision-making. The system's comprehensive approach equips policymakers, humanitarian agencies, and local authorities with actionable information to strengthen anticipatory actions and minimize the impacts of drought across the region.

Several questions arose during the presentation, highlighting areas of interest and clarification for participants. Concerns were raised regarding the system's performance with historical data, with emphasis on how it can be used to understand drought patterns over time. Participants inquired about suggested actions provided by the system during drought occurrences, to which it was noted that the system provides actionable insights to guide early warning and response mechanisms. Additionally, the question of success stories was addressed, with an example of Somalia cited, where the system successfully justified actions to mitigate the impacts of drought hazards. This highlighted the platform's practical application in influencing decision-making and response.

REVIEW OF THE DROUGHT TRIGGER AND THRESHOLDS

The review of drought triggers and thresholds was conducted through presentations by various participants, each contributing insights into the current protocols, indicators, and methodologies used to monitor drought conditions. These presentations provided an opportunity to evaluate the effectiveness of existing thresholds in identifying drought onset, severity, and recovery phases. Participants discussed key indicators, including precipitation deficits, soil moisture anomalies, and vegetation stress, and explored how these triggers are applied to inform early warning systems and anticipatory actions.

ForPac Approach by KMD

The ForPac (Forecast-Based Preparedness Action) approach, presented by KMD, is designed to improve drought and flood forecasting and ensure systematic anticipatory actions through existing early warning systems (EWS) and institutions. Running from 2016 to 2020, ForPac focused on delivering seamless forecasts at multiple lead times—long lead forecasts (July), seasonal forecasts (September), and month-ahead forecasts—by leveraging the predictability of specific seasons, particularly the October-November-December (OND) rainfall period.

The presentation outlined key challenges that have hindered effective drought management and the use of forecasts. Historically, Kenya’s drought management process has been largely reactive, with limited reliance on forecast information for preemptive actions. This reactive approach has resulted in delays in initiating anticipatory measures, leaving communities vulnerable to the impacts of drought. A major challenge has been the lack of technical skills to interpret climate information, which prompted capacity-building initiatives such as a climate training program conducted in September 2018. Trust in forecasts has also been a significant issue, as users’ confidence has been shaped by the performance of forecasts over the past three seasons.

Additional constraints include forecast uncertainty and the lack of alignment between forecast information and local needs, especially for agricultural purposes where the temporal distribution of forecasts is critical. Furthermore, communication bureaucracy has been identified as a major hurdle, as delays in disseminating forecasts prevent timely access by county-level users. The absence of policy frameworks and Standard Operating Procedures (SOPs) to guide the use of forecast-based triggers has also limited the effectiveness of early warning systems.

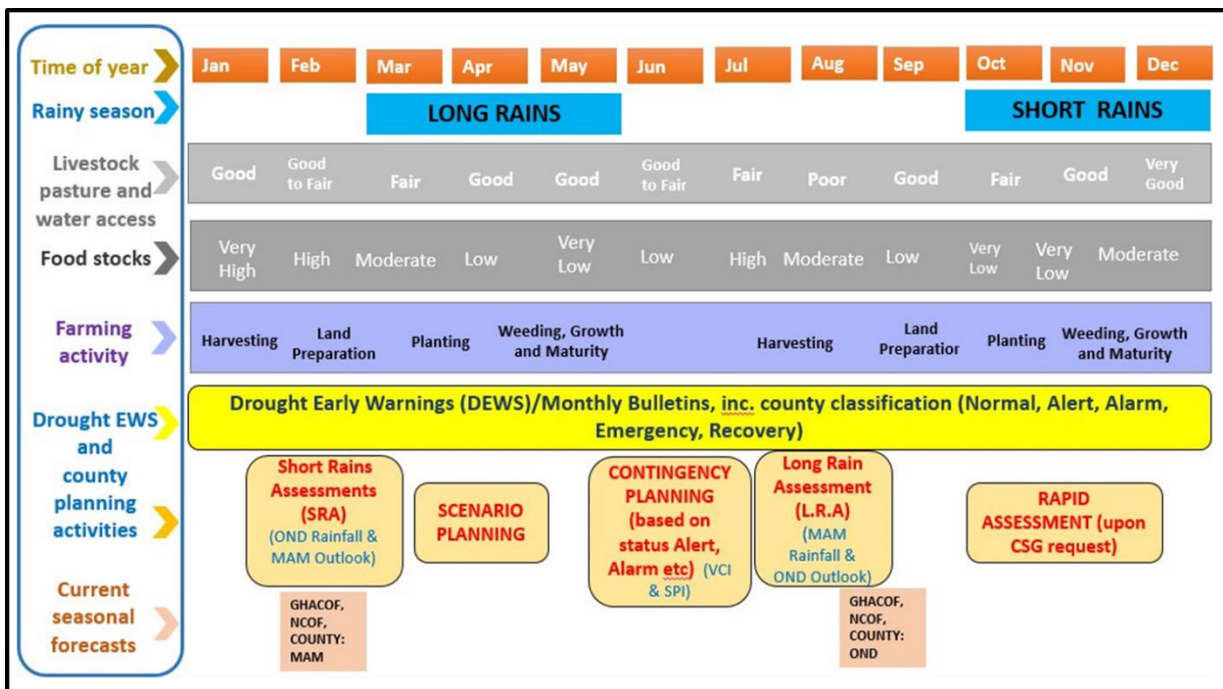


Figure 3. Forecasts not in Sync with User Needs

To address these challenges, ForPac focused on providing actionable forecasts based on SPI. Forecasts are developed using Global Climate Models (GCMs) such as the Met Office GloSea5 and the ECMWF System 5, which combine calibrated and raw probabilistic precipitation forecasts. These forecasts are tested and analyzed for their reliability and skill scores to ensure accuracy and applicability. Through this approach, ForPac has refined trigger thresholds that are expressed in probabilities to account for uncertainties, ensuring that actions are initiated only when forecasts meet reliability criteria.

The development of trigger thresholds is a critical component of the ForPac approach. Derived from the National Drought Early Warning System (NDEWS),

these thresholds are set based on probability levels to minimize missed drought events while balancing the risk of false alarms. For example, optimum action thresholds were identified between 20% and 25% probability, providing a reliable benchmark for initiating anticipatory actions. The presentation showcased ROC (Receiver Operating Characteristic) scores and contingency analyses for areas like Marsabit, which demonstrated the system’s ability to distinguish between accurate forecasts and false alarms.

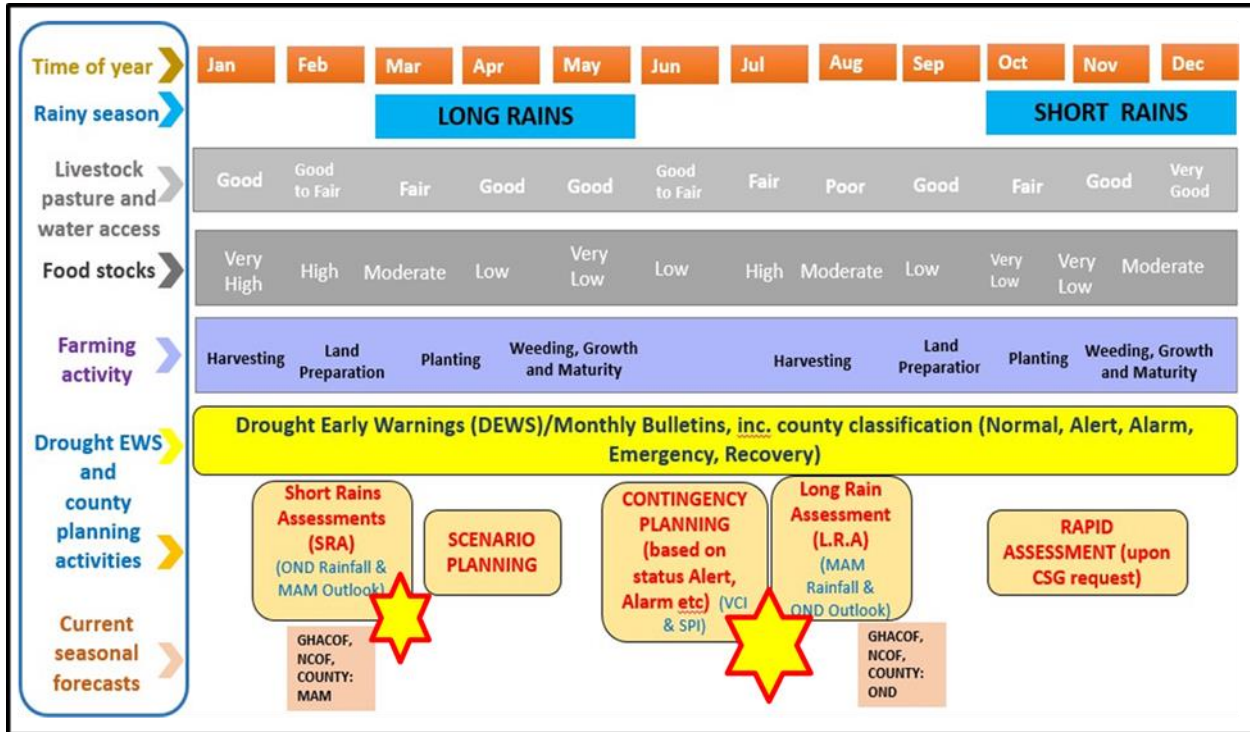


Figure 4. ForPac’s Pilot on Forecasts in Sync with user Needs

Proposed IGAD Trigger Development

The IGAD Trigger Development approach presented during the workshop provides a harmonized methodology for identifying and validating drought triggers and thresholds for effective anticipatory action. This proposed system integrates both historical observation data and forecast outputs to identify the onset, progression, and severity of drought conditions. The primary data sources include CHIRPS monthly rainfall datasets for historical observations, spanning 1979-2023 at a 5 km spatial resolution, and SEAS51 ECMWF precipitation forecasts with a six-month lead time, available from 1981 to 2023 at 1-degree (~100 km) spatial resolution.

The methodology follows a stepwise procedure for developing drought triggers. The first step involves calculating the SPI3 using the xclim Python library, with a calibration period of 1981-2018. This allows for identifying drought conditions based on precipitation deficits across specific timescales. Next, observation and forecast datasets are aligned in terms of temporal and spatial resolution. Tools like climpred and xESMF are used for regridding, ensuring both datasets are standardized to a 25 km resolution for comparison and analysis.



Participants were taken through the threshold development process that utilizes the tercile approach, which divides data into three equal parts (percentiles): 33%, 66%, and 99%. Each tercile corresponds to specific drought phases (e.g., moderate, severe, extreme), with thresholds identified based on negative SPI-3 values. To enhance the robustness of these thresholds, triangulation between SPI, socio-economic impact indicators, and local community perceptions is performed to identify optimal impact trigger values.

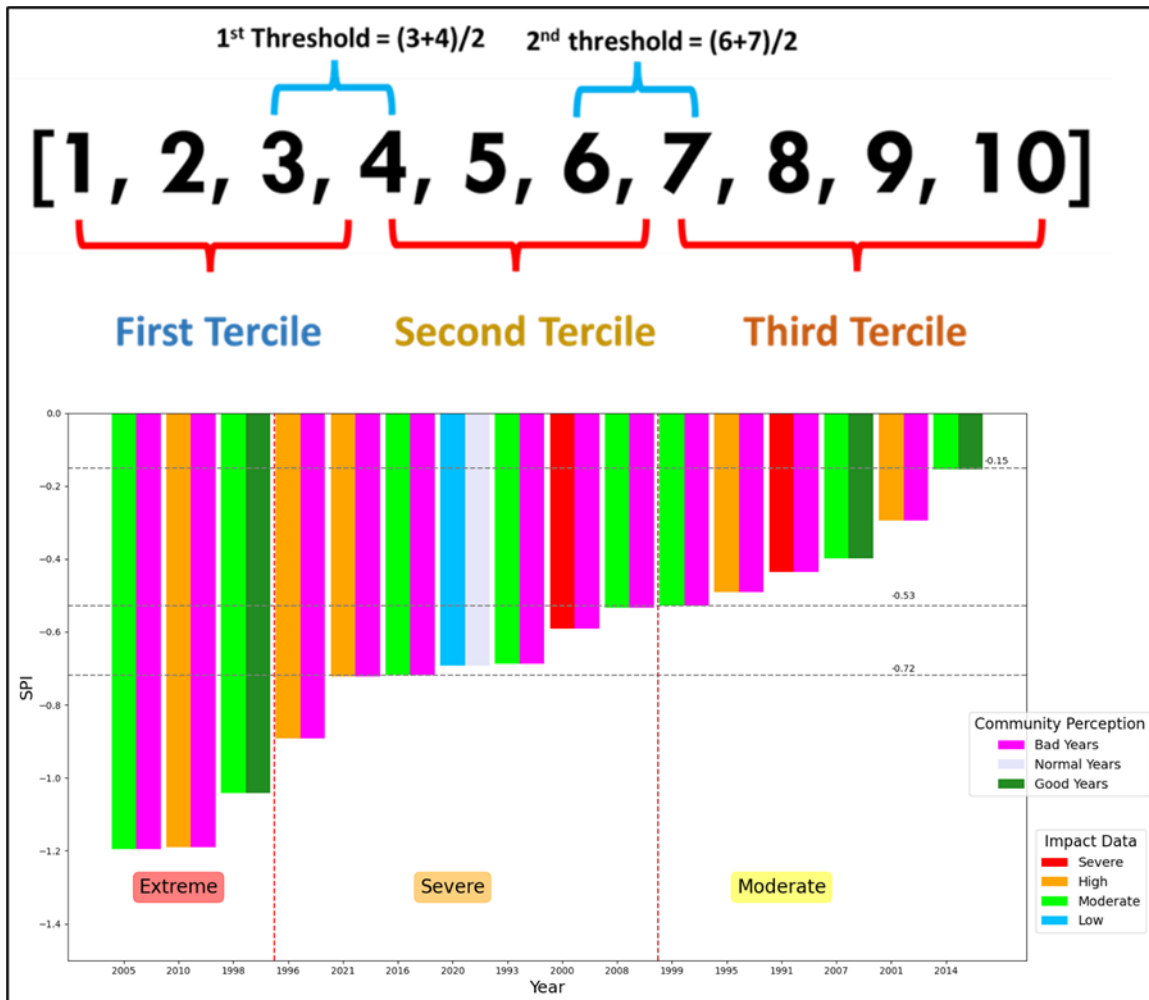


Figure 5. The Tercile Approach

Empirical probabilities are then calculated by summarizing SEAS51 ensemble predictions, which measure the likelihood of exceeding SPI thresholds for various drought severity levels. Contingency tables are generated to compare observed and forecasted data, allowing for the evaluation of metrics like Hit Rate (HR), False Alarm Ratio (FAR), and Area Under the Receiver Operating Characteristic Curve (AUROC). These metrics help validate the reliability of the proposed thresholds. For example, triggers are selected where AUROC exceeds 0.5, HR is greater than 65%, and FAR remains below 35%. Visual outputs, such as heatmaps and data tables, highlight the performance of the triggers.

To balance sensitivity and reliability, the system proposes optimal triggers, which avoid excessive false alarms while ensuring critical drought events are not missed. Lower thresholds are suited for fragile contexts requiring non-regret



actions, while higher thresholds are ideal where resources are limited and prioritized anticipatory actions are necessary. An optimal trigger seeks to strike a balance between these two extremes.

Examples from counties like Marsabit and Wajir demonstrated the application of this methodology. Forecast probabilities for moderate, severe, and extreme droughts during the OND season 2022 showed varying levels of reliability, with probabilities as high as 83% for moderate drought in some regions. These results underscore the practical applicability of the proposed triggers in guiding anticipatory actions.

PRESENTATION OF THE KENYA ROADMAP FOR ANTICIPATORY ACTION

The Kenya Anticipatory Action Roadmap, presented by the National Disaster Operations Centre (NDOC), outlined a strategic and structured approach to enhancing Kenya's capacity for anticipatory disaster management. The roadmap was developed under the leadership of the Technical Working Group on Early Action Protocols (TWG-EAPs), through extensive consultations and workshops since 2023. This initiative aims to shift Kenya's disaster response from a reactive approach to a proactive, anticipatory framework, ensuring a coordinated response to disasters such as droughts, floods, epidemics, locust invasions, and structural collapses.

The roadmap envisions a resilient nation where anticipatory action is fully integrated into national disaster risk management policies, strategies, and systems. The approach focuses on empowering communities to proactively manage and mitigate the impacts of disasters. The mission emphasizes a harmonized, multi-agency framework, involving both humanitarian actors and government agencies, to reduce disaster risks through collaborative anticipatory actions.

During the presentation, it was emphasized that the roadmap aligns with global, regional, and national frameworks, including the Sendai Framework for Disaster Risk Reduction 2015-2030, Africa Agenda 2063, and the IGAD Regional Roadmap for Anticipatory Action (2023-2027). At the national level, it is anchored in the Constitution of Kenya (2010), the National Drought Management Act (2016), and the Disaster Risk Management Policy (2017).

The roadmap is structured around six key pillars:

- **Early Warning (Data, Triggers, and Thresholds):** A focus on developing synchronized frameworks to identify hazards, define triggers, and set thresholds to activate timely responses. Reliable data systems will ensure the early detection of risks before they escalate.
- **Early Action (Planning and Operations):** Establishing clear operational protocols and creating a National Catalog for Anticipatory Action to guide and streamline preemptive interventions across various sectors.
- **Coordination and Governance:** Strengthening collaboration among stakeholders at national and county levels through a structured national



coordination mechanism. This will ensure all actors work cohesively to deliver anticipatory actions.

- **Research, Innovation, and Learning:** Prioritizing evidence-based approaches and continuous learning to enhance innovation and technical capacity for anticipatory action.
- **Policy and Advocacy:** Promoting policies and frameworks that integrate anticipatory action into disaster management systems, ensuring political will and resource allocation for proactive planning.
- **Financing:** Mobilizing sustainable funding mechanisms through partnerships and forecast-based financing, ensuring the roadmap’s long-term implementation and success.

The roadmap also includes a Monitoring and Evaluation (M&E) pillar, which will support the development of a comprehensive framework to track progress, measure impact, and refine anticipatory strategies based on evidence and feedback.

Pillar	Milestone	Year
Early Warning (Data, Triggers, Thresholds)	Developed synchronized National Framework for developing hazards triggers & thresholds	2024 - 2029
Early Action (Planning and Operations)	Developed National catalog for Anticipatory Action	2024 - 2029
Coordination and Governance	Establishment of structured National Coordination mechanism for AA	2024 - 2029
Research, Innovation, and Learning (Capacity Building)	Published evidence based National Anticipatory Action status	2024 - 2029
Policy and Advocacy	Adopted policy framework on national AA mainstreaming	2024 - 2029
Financing	Established partnerships for AA resource pooling	2024 - 2029
Monitoring and Evaluation	Developed a comprehensive M&E Framework	2024 - 2029

Figure 6. Implementation of Kenya Anticipatory Action by Milestones & Timelines

To ensure a phased and structured implementation, the roadmap outlines clear milestones spanning 2024 to 2029. Key deliverables include the development of a synchronized national framework for hazard triggers, establishment of a National Catalog for Anticipatory Action, and the creation of a robust coordination mechanism. The roadmap also focuses on enhancing evidence-based reporting to



monitor the status of anticipatory actions and ensuring policy adoption to mainstream anticipatory action across government systems. Sustainable partnerships will be pursued to pool resources and finance these efforts effectively.

ACTION PLAN DEVELOPMENT

The Action Plan Development session was a critical component of the workshop, structured into breakout sessions and a subsequent reporting back phase. The objective of this exercise was to collaboratively identify and outline the key components necessary for the successful development and implementation of the Kenya Drought Watch System. Participants were divided into breakout groups to foster focused discussions and ensure representation of diverse perspectives, expertise, and experiences.

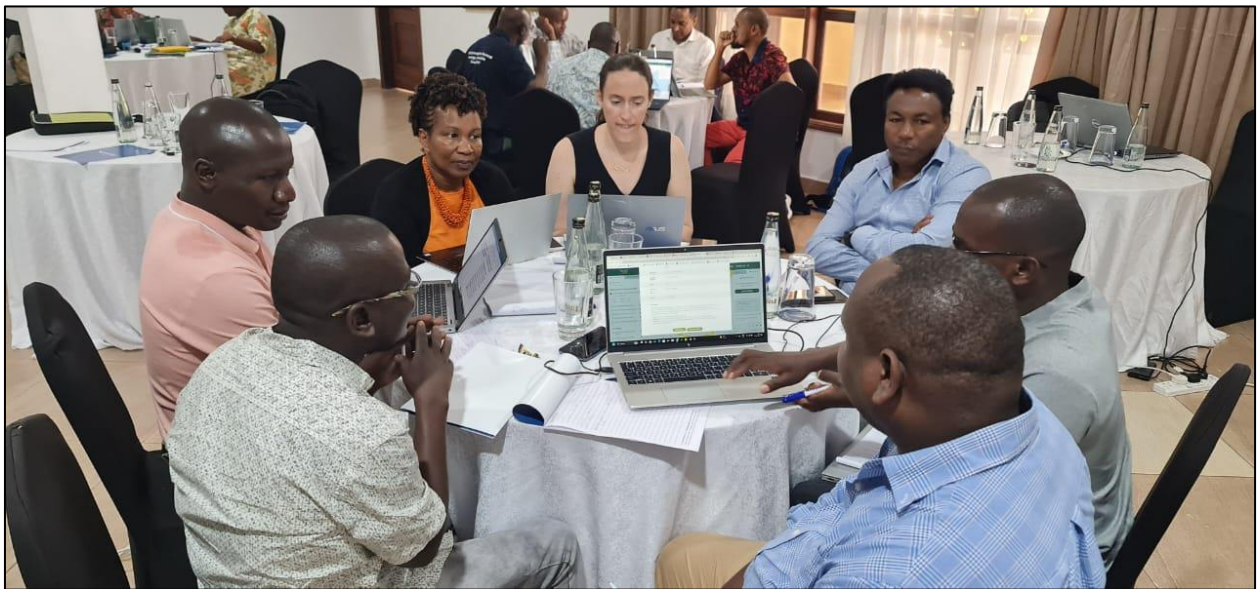


Figure 7. Participants in breakout groups

This participatory exercise aimed to identify key components necessary for the successful implementation of the system, focusing on technology, data integration, coordination mechanisms, and capacity building. Stakeholders identified the system's key components across four thematic areas: Technology, Data Integration, Coordination, and Capacity Building. This was followed by a reporting back session, where the key outcomes were presented and consolidated into a cohesive roadmap as follows.

Technology

Participants proposed several critical technological components to enhance the Kenya Drought Watch System's functionality and usability. These included:

- Incorporation of additional indicators such as cumulative rainfall (monthly and seasonal) and foliage cover index to improve drought monitoring accuracy.
- Integration of groundwater recharge data and Land Surface Temperature (LST) indicators.



- Enhancing data visualization tools by adding line graphs for trend and extreme event analysis alongside bar graphs.
- Incorporating advanced data export capabilities to allow users to extract data in CSV format for further analysis.
- Introduction of Artificial Intelligence (AI) and Machine Learning (ML) for data validation and triangulation, ensuring the reliability of datasets.
- Providing the option to mask out areas with invasive species and map migration routes for conflicts, disease spread, and preparedness for action.
- The development of frequency distribution curves to highlight the frequency of extremes and their magnitudes.
- Ensuring system APIs are exposed for integration into other platforms.

Data Integration

A comprehensive set of datasets was proposed to strengthen the system's analytical capacity. These include:

- Hydrological data, such as groundwater datasets and recharge data.
- Exposure, vulnerability, and resilience datasets, with a focus on four pillars of resilience to support holistic drought impact analysis.
- Incorporation of social-economic datasets to link impacts with livelihoods.
- Outcome indicators to assess drought response and link results to the Map viewer
- Validation of existing products like the CDI through ground truthing exercises.
- Integration of soil moisture data with the SPEI (Standardized Precipitation Evapotranspiration Index) and exploration of other data sources like TAMSAT.
- Harmonization of drought analysis by incorporating ecological, climatological, and livelihood zones for localized impacts.

Coordination

The breakout groups recommended a phased approach for developing and operationalizing the Kenya Drought Watch System:

- Phase 1: Formation of a Technical Working Group (TWG), including key institutions such as ICPAC, NDMA, KMD, FAO, WFP, Red Cross, NDOC, and ILRI.
- Phase 2: Multi-agency data collection and co-planning, facilitated by ICPAC, to align stakeholder needs and resources.
- Phase 3: Requirement analysis, led by KMD, NDMA, and NDOC.
- Phase 4: Co-design of the system by ICPAC and the TWG.
- Phase 5: Pilot implementation in three counties representing diverse ecological and climatological zones.
- Phase 6: System testing, deployment, and maintenance, with continuous stakeholder engagement for updates and improvements.

It was also proposed that the TWG monitor progress at each development stage, addressing variations and ensuring transparency. NDMA was suggested to take the lead in coordinating communication between technical teams, data providers, and other stakeholders.



Capacity Building

To ensure effective utilization of the system, participants highlighted the need for extensive capacity building targeting different stakeholders. Some of the suggestions that were put forth include:

- Training will be delivered through Training of Trainers (TOT) workshops, with identified staff cascading knowledge to county-level actors through workshops, on-the-job training, and online modules.
- The TWG will develop training manuals tailored to users' needs, with modules focusing on GIS, remote sensing, drought analysis, and food security reporting.
- Primary users include NDMA, KMD, humanitarian organizations, NDOC, and national and county-level stakeholders.
- Training effectiveness will be evaluated based on the number of trained participants and their ability to access, interpret, and utilize the system outputs.



APPENDICES

Appendix 1. Workshop Agenda

PERIOD	PLANNED ACTIVITY	RESPONSIBILITY
<i>Day 1: Setting the Context and Review of the Current Status</i>		
<i>Morning</i>	<ul style="list-style-type: none"> ▪ Opening remarks [ICPAC, AICCRA, NDMA] ▪ Workshop Objectives [ICPAC] ▪ Overview of the Kenya drought early warning system(s): Achievements and Lessons Learned [KMD & NDMA] ▪ Discussions 	Mark Arango
<i>Afternoon</i>	<ul style="list-style-type: none"> ▪ The East Africa Drought Watch System [Jason] ▪ Practical interaction with the system with a focus on Kenya [Jason and Vincent] ▪ Discussions 	Jully Ouma
<i>Day 2: Action Plan Development</i>		
<i>Morning</i>	<ul style="list-style-type: none"> ▪ Breakout Sessions: Identifying Key Components of the Drought Development Action Plan (e.g. Technology, Data, Coordination, Capacity Building) [Two Groups] ▪ Reporting Back: Key Outcomes Group representatives. ▪ Discussions 	Masilin Gudoshava
<i>Afternoon</i>	<ul style="list-style-type: none"> ▪ Drafting the Action Plan: Roles, Responsibilities, and Timelines [Jason and Vincent] ▪ Presentation of the Kenya roadmap for Anticipatory Action [David Nanyende] ▪ Discussions 	Mark Arango
<i>Day 3: Review of the Drought Triggers and Thresholds</i>		
<i>Morning</i>	<ul style="list-style-type: none"> ▪ Over-view of various approaches to Triggerthresholds development [Mark and George] ▪ NDMA based trigger-thresholds (NDMA) ▪ ForPac approach (KMD) ▪ Proposed IGAD Trigger development (ICPAC)Discussions 	George Otieno



<i>Afternoon</i>	<ul style="list-style-type: none"> ▪ Breakout Sessions: Harmonizing of the two approaches [Two Groups] ▪ Reporting back [Group representative] ▪ Discussions and Way-forward 	George Otieno
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Appendix 2. Developing an Action Plan for the Kenya Drought Watch System Workshop Facilitators

No.	NAME OF PARTICIPANT	ORGANIZATION
1	Dr. Ahmed Amdihun	DRM Programme Coordinator
2	Jully Ouma	EWS Thematic Lead
3	Dr. George Otieno	AA Thematic Lead
4	Mark Arango	AA Expert
5	Jason Kinyua	Drought Watch System Developer
6	Vincent Okoth	Socio-economic Vulnerability System Developer

Appendix 3. Photos during the workshop proceedings











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