Using Climate and Weather Information for Humanitarian Preparedness

- A case-study of forecast use in Kenya and the Philippines and its linkage to the online Preparedness platform ‘ALERT’

by: Angelica Johansson for the University of Sussex and HelpAge International
Executive Summary

Climate and weather forecasts are increasingly perceived as useful in preparing for and responding to climate and weather related hazards such as drought, floods and tropical storms and cyclones. This paper investigates how forecast information is used by non-governmental organisations in Kenya and the Philippines when preparing to avoid and respond to climate and weather hazard impacts. The study is based on data from key-informant interviews, focus-group discussions and an online survey.

Key Findings

Although climate and weather forecasts are used in both Kenya and the Philippines, it seems that actors in Kenya are using forecasts in a circular process, allowing them to prepare for avoiding negative impacts. In the Philippines forecast-based action follows a more linear structure where forecasts are mainly used as a measure of preparing to respond to negative impacts. However, the findings are inconclusive on whether this is because of a larger gap between the meteorological department and users in the Philippines compared to Kenya, or if it is due to the difference in hazard profile where Kenya is focusing more on drought (which is a slow-onset hazard) and the Philippines users mainly focus on cyclones (which is a rapid-onset hazard).

The study identified challenges with linking forecasts to preparedness and suggests solutions to overcome them. The key challenges are connected to accessing and understanding forecast information; communicating forecast information; and accessing resources to act on forecast information.

The study also provides recommendations on how climate and weather information can be linked to the online preparedness platform ALERT. The recommendations are:

1) National meteorological services need to be linked to the platform;
2) Hazard monitoring needs to become more efficient and comparable between users while remaining tailored to user needs; and
3) There should be a function that allows national and local government to use the platform so other users can better tailor their preparedness and response.

Acknowledgements

This report was funded by HelpAge International and produced for HelpAge International (as leader of the ALERT consortium) - and Sussex University’s ‘Forecast for Preparedness Action’-research team. I would like to acknowledge and send thanks to all the stakeholders that took time out of their day to participate in this study. Also to Kenya Red Cross Society and ForPAC for hosting and helping facilitate the Kenyan case study and to Coalition of Service of the Elderly and HelpAge International for hosting and helping facilitate the Philippines case study. Finally, to Professor Martin Todd, Olivia Taylor and Tiphaine Valois for their supervision and guidance.
Acronyms and Abbreviations

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Full Form</th>
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<tr>
<td>APAs</td>
<td>Advanced Preparedness Actions</td>
</tr>
<tr>
<td>DRR</td>
<td>Disaster Risk Reduction</td>
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<tr>
<td>ENSO</td>
<td>El Niño Southern Oscillation</td>
</tr>
<tr>
<td>FbA</td>
<td>Forecast-based Action</td>
</tr>
<tr>
<td>FbF</td>
<td>Forecast-based Financing</td>
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<tr>
<td>FEWSNet</td>
<td>Famine Early Warning Systems Network</td>
</tr>
<tr>
<td>ForPAc</td>
<td>Forecast-based Preparedness Action</td>
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<tr>
<td>GHACOF</td>
<td>Greater Horn of Africa Climate Outlook Forum</td>
</tr>
<tr>
<td>GDACS</td>
<td>Global Disaster Alert and Coordination System</td>
</tr>
<tr>
<td>ICPAC</td>
<td>IGAD Climate Prediction and Application Centre</td>
</tr>
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<td>INFORM</td>
<td>Index for Risk Management</td>
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<tr>
<td>INGOs</td>
<td>International Non-Governmental Organisations</td>
</tr>
<tr>
<td>KMD</td>
<td>Kenya Meteorological Department</td>
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<tr>
<td>MPAs</td>
<td>Minimum Preparedness Actions</td>
</tr>
<tr>
<td>MoU</td>
<td>Memorandum of Understanding</td>
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<tr>
<td>NDMA</td>
<td>National Drought Management Authority</td>
</tr>
<tr>
<td>NDRRMC</td>
<td>National Disaster Risk Reduction and ManagementCouncil</td>
</tr>
<tr>
<td>NERC</td>
<td>Natural Environment Research Council</td>
</tr>
<tr>
<td>PAGASA</td>
<td>Philippine Atmospheric, Geophysical and Astronomical Service Administration</td>
</tr>
<tr>
<td>TSR</td>
<td>Tropical Storm Risk</td>
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1. Introduction

In the field of Disaster Risk Reduction (DRR) most funding is directed to emergency response rather than preparedness or rehabilitation (1). Climate related disasters such as drought, floods or cyclones often have devastating impacts on society that activates a humanitarian response. However, it is estimated that for every dollar spent on DRR activities 2-7 USD are returned for avoiding or reducing negative disaster impacts (2); (3); (4).

In this context, there is growing evidence of the benefits of connecting climate and weather information to decision-making (5); (6). This evidence has led to an increasing demand for linking climate and weather information to decision-making. As climate forecasts become more accurate, practitioners and scholars see the potential of acting based on anticipated weather and climate extremes (6). Innovations such as ‘Forecast-based Action (FbA) and ‘Forecast-based Financing’ (FbF) are examples of action strategies aimed at reducing negative impacts of specific disaster events. They are considered suitable to improve preparedness and early action for climate and weather related disasters (5) by allowing actions to be implemented and funds to be released based on climate forecasts (7); (8); (9); (5).

ALERT is an online information management platform aimed at improving disaster preparedness by creating a faster, more efficient and effective response. This is done by allowing users to create and share scenario-based response plans, allocate resources and assign responsibilities to staff based on different scenarios (10). ‘Towards Forecast-based Preparedness Action’ (ForPAc) is a NERC (Natural Environment Research Council) and DFID funded programme through the ‘Science for Humanitarian Emergencies and Resilience (SHEAR) Research Programme’. It aims at improving the credibility and relevance of probabilistic forecasts for weather hazards. ForPAc is working to overcome barriers to forecast-based decision-making for preparedness action in Kenya, and by improving climate and weather forecasts (11); (12). On the ALERT platform, users can link the source of their indicators, e.g. for a climate and weather related hazard, the source of the indicator may be a meteorological institution. However, it is unclear how accessible or useful ALERT-users find climate and weather information and to what extent it is used. This report is investigating this.

The first chapter outlines the research aims. The second chapter outlines opportunities and barriers identified in literature in linking climate information with decision-making. Chapter three provides an overview of the research methodology. Chapter four includes the findings from Kenya and Philippines. It outlines which sources of information are used in each country and which types of information are used. This section also includes a table that illustrates which forecasts are used for which hazard and what kind of actions are currently being implemented based on that information. This is followed by a discussion of identified challenges with using forecasts for preparedness and provides suggestions of how to overcome them. The

\[1\] Grant number: NE/P000673/1
final section provides recommendations of how climate and weather information can be linked to the online preparedness platform ALERT.

1.1 Research Aims
This study aims to 1) assess the demand for climate and weather forecast information for preparedness amongst agencies on the ALERT platform; and 2) see how climate and forecast information can be better linked to the platform. The results will be used to further define priorities for ForPAC-ALERT engagement and provide a guidance for ALERT users on how to access and use forecasts in preparedness (See Appendix 5 for terms of reference).

The following questions guided the research:
1) To what extent do humanitarian actors on the ALERT platform use climate and weather forecasts in their preparedness work?
2) To what extend do actors perceive forecasts as usable?
3) What are the perceived challenges with using climate and weather forecasts and what can be done to overcome them?

The geographical focus of this research is Kenya and the Philippines. This study is limited to hydro meteorological hazards, mainly flood, drought and cyclone. The scope of this research does not include an investigation of forecast reliability and skill nor does it quantify the value of acting in advance.
2. Background

This chapter outlines what previous research has found on the topic of linking climate and weather information to decision-making for improved DRR. It also identifies some of the challenges associated with these linkages.

2.1. Linking climate and weather information to preparedness and early action: opportunities and challenges

In the last few decades there have been major advances in the observation, analysis and prediction of high-impact weather and climate events. There have also been improvements in monitoring and predicting short-term high-impact weather and weather hazards, and seasonal climate variability (13). These improvements have increased institutions’ desire to integrate forecasts into decision making (14). Evidence shows that disaster managers have been successful in using weather forecasts in cyclone prone areas of the world, and actions based on early warning systems are estimated to have saved millions of lives and avoided negative economic impacts (5); (13); (3). However, despite recent improvements linking climate and weather forecasts to preparedness, the system still has gaps that result in deadly outcomes. For example, the 2010/2011 drought on the Greater Horn of Africa was forecasted yet it is estimated that over 13 million people were affected and between 50 000-100 000 people died (15). Moreover, in December 2017 a tropical storm made landfall in the Philippines. Despite being forecasted it caused severe flooding and left over 100 people dead (16).

Most humanitarian aid funding is directed towards response activities (1). Through FbA and FbF, agencies promote preparedness activities aimed at reducing negative impacts to climate and weather hazards. Using probabilistic climate and weather information as a basis for decision-making, practitioners create different scenarios for the upcoming season or anticipated weather event (7); (5). Different levels of forecast probability should automatically trigger contingency plans designed for the different scenarios. In relation to each trigger, a protocol that provides a step-by-step procedure for an action to be implemented, also known as Standard Operations Procedures, should be activated to ensure that the pre-decided tasks in the scenario’s contingency plan are carried out at the right time and in a planned way (17). For FbF, each scenario should have associated funding to enable agencies to decrease their preparedness and response time, as well as enable them to act before the event has occurred. This would ultimately result in negative impacts of the hazard being avoided completely (7).

To reach the goal of FbA and FbF, a number of challenges need to be addressed:

- **The forecast skill**, i.e. the number of times a forecast is right in its prediction, need to be better communicated and understood by users. Knowing how often a forecast is right in its prediction, agencies should be able to improve their preparedness for different scenarios, know when to trigger actions, and know what type of action would be relevant to implement based on the anticipated hazard impact (18); (5).
• **Communication of climate information:** Although climate information such as forecasts often are available, the connection between climate information providers and users is often weak or non-existent. Even in situations when the links between users and producers do exist, producers may not fully understand the context in which decisions are being made. At the same time, users might not fully understand the format or the implications of the forecast information. Thus, climate information providers might perceive their product as useful while users might perceive it as unusable. This can lead to a gap in how forecasts are used in decision-making (14); (19); (20). It appears that the users’ perception of the climate information matters, especially in how credible, salient and legitimate it is perceived to be (21). Credibility refers to the perceived technical quality of information, i.e. whether the system provides information that is perceived as valid, accurate or tested. Salience refers to the perceived relevance of climate and weather information, i.e. if the system provides information that users think they need, in a form and at a time that they can use it. Legitimacy refers to the perception that the system is in the interests of users and not pushing for agendas or interests of other actors (21).

• **Funding:** There is often a lack of available funding for when a disaster is anticipated but not certain. Donors can be reluctant to fund preparedness activities for anticipated events fearing to ‘act in vain’. ‘Acting in vain’, refers to actions that are implemented based on a forecast of an event which does not occur to the anticipated magnitude. ‘Acting in vain’ can result in negative impacts for the implementing agency such as lost credibility and reputation, as well as wasted resources of implementing the actions. To overcome this challenge of uncertainty in forecasts, agencies often aim at implementing no or low regret actions, i.e. actions that are cheap to implement or have a long-life span, compared to high-regret actions, i.e. actions that are costly or risk the organisation’s reputation in the event the forecast is wrong. The fear of ‘acting in vain’ often results in donors waiting until an emergency is declared before releasing funds, leading to many International Non-Governmental Organisations (INGOS), and national NGOs being unable to act in advance to mitigate actions (22); (5); (18); (7).

To overcome some of these challenges, and to make climate information more useful for humanitarian action, users and producers are to an increasing degree starting to co-produce climate information (6); (20). Hydrological and meteorological services are encouraged to increasingly interact with decision-makers and share climate information in ways that makes it relevant and useful for them. The aim is to create a positive experience of using climate information, improve the understanding of hazard risk and overall to better identify what type of information is perceived as usable. Moreover, to enable the usefulness of climate information, users need a flexible decision-making system, the right expertise, sufficient resources and enhanced collaboration across systems and scales (20); (6). The ALERT platform has been identified as a tool that could meet some of the above requirements (12); (10).
2.2 ALERT

Climate services that provide timely, tailored information and knowledge to decision-makers through websites or bulletins have been recognised as an important part of improving our capacity to manage climate-related risk (14); (23). The ALERT online platform is designed to help organisations better prepare for and coordinate disaster preparedness response by creating a system where information is accessible, open and shared amongst users. This would also enable users to maintain a constant level of preparedness. ALERT has been rolled out in 5 pilot countries, including Kenya and the Philippines. Through ALERT, agencies can upload and share documents and information regarding their level of preparedness and preparedness system, coordinate and collaborate with partners and other humanitarian actors. The ALERT platform also enables to draft scenario based response plans and share them with donors and allows users to indicate the budget needed for the implementation of each preparedness action (10); (24); (25).

ALERT has four key features:

1) **Risk Analysis**: Currently, the ALERT platform incorporates data from the ‘Index for Risk Management’ (INFORM). INFORM provides country profiles with calculated hazard-risks for each country that is updated on an annual basis (26). By connecting the hazard data from INFORM to ALERT, users can add hazards for each country. The more hazards users chose to monitor, the more indicators need monitoring (25).

2) **Early Warning – Hazard Indicator Monitoring**: In ALERT, users individually choose hazard specific indicators. By monitoring them, agencies can track changes happening in the selected country and receive early warnings about emerging risks and impacts. This feature enables users to start preparing their response accordingly (e.g. escalating their preparedness activities or reviewing their scenario-based response plans).

In ALERT, users are advised to monitor at least one indicator per hazard on a regular basis to better understand the hazard’s danger level. However, for a holistic early warning of the hazard’s risk and its expected impact, additional indicators should be monitored (25). Users determine which hazard and how many indicators they want to monitor. Potential indicators are added manually to the platform; however, users can see what hazards other users monitor in the same country. To monitor the indicators, users must determine the frequency of monitoring, as well as the trigger value. This refers to when indicators move from green, to amber to red. The colours represent different levels of risk for the specific indicator monitored. If the status of the indicator moves from green to amber, users should monitor the indicators more frequently to ensure that there is sufficient warning to prepare for and react to potential changes of the indicator (25). Also, monitoring more than one

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2 An indicator’s trigger is the specific value of a pre-decided danger level. When the danger level is reached, the user triggers the appropriate action (e.g. activate preparedness or response actions, refine response or contingency plans, contact partners, alert headquarters or apply for additional funding) (ALERT, 2017b).
indicator per hazard helps the user understand the hazard profile and anticipate hazard impacts better.

By analysing the chosen indicators, users will decide whether the level of risk for the hazard should stay in green ‘alert’ or move to amber or red ‘alert’. The alert status represents the overall alert level the user’s country office is on. Being in ‘green alert’ means that there is no imminent threat or emergency anticipated. During this period, normal day-to-day activities occur and agencies complete their ‘Minimum Preparedness Actions’ (MPAs) and monitor risk indicators. Being in ‘amber alert’ indicates an increased risk of disaster. When the amber alert is triggered, it is likely that most indicators are either amber or red. Therefore the frequency of monitoring should increase. During this phase, agencies are recommended to ensure that all MPAs are completed and relevant scenario-based response plans are updated and approved. The ‘red alert’ should be activated when there is a high likelihood of an imminent disaster or a disaster has already occurred. The red alert will not be triggered automatically, instead it will be raised only if the organisation’s management decides to do so. During the red alert phase, the platform activates the ‘Advanced Preparedness Actions’ (APAs) associated with the specific hazard.

The risk indicator status will not automatically trigger an alert, however it enables users to analyse the situation and anticipate impacts. Based on that information users can make a decision on whether to raise or de-escalate the overall alert status.

3) Minimum and Advance Preparedness Actions:
The MPAs are a set of predetermined activities that the user should implement to ensure a minimum level of emergency preparedness. MPAs should be a part of the agency’s everyday operations. The MPAs should be reviewed on a regular basis to ensure that the preparedness action plans are up to date. APAs are actions implemented when a disaster is imminent. APAs are activated automatically when a user is moving from amber to red alert in the risk monitoring function. The preparedness actions function allows users to assign specific tasks to staff members and allows users to record accountability to deadlines and actions assigned. This helps users to track the achieved preparedness level and which tasks are yet to be done. The information is stored at a single location of the country office and can be shared with registered users within the agency. Each task has an agreed expiry time to ensure that they are reviewed regularly and the supporting evidence is still up-to-date (25).

4) Scenario-based response plan:
The scenario-based response plan function enables users to draft their scenario-based response plans in advance. Storing it in ALERT ensures that

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3 See section ‘3) Minimum and Advance Preparedness Actions’ for explanation of MPAs and APAs.
any staff member can update it. This function enables users to develop a response plan which can be exported directly to a donor.
3. Methods

This study was requested and funded by ForPAc and the ALERT consortium through HelpAge International. The study is based on data collected from international, national and local NGOs in Kenya and Philippines through:

- Semi-structured key-informant interviews;
- Focus-group discussions;
- An online survey.

To capture the perspective from both users and producers of climate information, representatives from the national meteorological department in Kenya and the Philippines participated in the focus group discussions. The interviews were conducted in person and over Skype. They were recorded with the permission of the informants. The survey generated a total of 16 responses. Considering the small number of responses, the sample cannot be considered representative. Therefore, it was impossible to realise a quantitative analysis of the data. However, the responses were analysed and were consistent with the responses from the key informant interviews and the focus-group discussions. Therefore, is has been used to give more weight to the qualitative analysis. The survey questions, interview-guide and focus-group discussion guide can be found in Appendix 2, 3, and 4.

Presented in table 1, the Kenya case is based on eight interviews with ten respondents, a focus-group discussion with four representatives from INGOs and one representative from the Kenyan Meteorological Department (KMD). The online survey generated seven responses.

<table>
<thead>
<tr>
<th>USER</th>
<th>KEY INFORMANTS</th>
<th>FOCUS-GROUP DISCUSSION</th>
<th>ONLINE SURVEY</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRODUCER</td>
<td>KMD</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Action Aid</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HelpAge International</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Christian Aid</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Norwegian Refugee Council</td>
<td></td>
<td>1</td>
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<tr>
<td></td>
<td>WeltHungerHilfe</td>
<td></td>
<td></td>
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<td></td>
<td>Kenya Red Cross Society</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>CARE International</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Oxfam</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Save the Children</td>
<td></td>
<td>1</td>
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<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td>10</td>
</tr>
</tbody>
</table>

Table 1: Overview of actors contributing to the data collection in Kenya.

Presented in table 2, the Philippines case study is based on eleven interviews with fourteen key informants of which two were conducted over Skype. In the focus-group discussion, eight representatives from international, national and local NGOs and one representative from the Philippine Atmospheric, Geophysical and Astronomical
Service Administration (PAGASA) participated. The online survey generated nine responses.

**Table 2**: Overview of actors contributing to the data collection in the Philippines.

<table>
<thead>
<tr>
<th>PRODUCER USER</th>
<th>KEY INFORMANTS</th>
<th>FOCUS-GROUP DISCUSSION</th>
<th>ONLINE SURVEY</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAGASA</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Citizens’ Disaster Response Center (CDRC)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Assistance and Cooperation for Resilience and Development (ACCORD)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Adventist Development and Relief Agency (ADRA)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Action Against Hunger</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>A Single Drop for Safe Water (ASDSW)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Christian Aid</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Humanitarian Response Consortium (HRC)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>CARE International</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>World Vision Development Foundation Inc.</td>
<td>1</td>
<td>1</td>
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<td></td>
<td>Simon of Cyrene</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>CordAid</td>
<td>1</td>
<td>1</td>
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<tr>
<td></td>
<td>Agri-Aqua Development Coalition (AADC)</td>
<td>1</td>
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<td></td>
<td>Philippine Disaster Risk Reduction Network (PDRRN)</td>
<td>1</td>
<td></td>
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<tr>
<td></td>
<td>Coalition of Service of the Elderly (COSE)</td>
<td>2</td>
<td>1</td>
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<tr>
<td></td>
<td>Humanity &amp; Inclusion</td>
<td>1</td>
<td></td>
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<tr>
<td></td>
<td>Islamic Relief</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Undefined NGO</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL:** | **14** | **9** | **9** |
4. Results
This chapter follows the structure of the guiding research questions. First it presents the country specific findings of actors' current use of climate information and how useful this information is perceived. Secondly, this chapter outlines challenges with forecast use and recommends solutions of how to overcome them. Finally, a set of recommendations of how climate information can be linked to the ALERT platform is provided.

4.1 The extent to which humanitarian actors on the ALERT platform find climate and weather forecasts useful and how much they use it in their preparedness work
In both Kenya and the Philippines climate and weather information was used for preparedness and response to weather and climate related hazards. In Kenya, the main hazards INGOs prepared for were droughts, floods and drought related conflict (27); (28); (29); (30); (31). The Philippines has many micro-climates and thus a more diverse hazard profile, however, the main climate and weather related hazards actors prepare for and respond to are tropical cyclones, flooding and to some extent landslides (32); (33); (34); (35); (36); (37); (38); (39); (40); (41); (42); (43); (44).

4.1.1. Kenya
Some INGOs rely on the seasonal calendar when planning their programmes for the coming season (22); (45). However, climate and weather forecasts are increasingly being incorporated and used in users' preparedness work. This usage is perceived to keep increasing. As summarised below in Table 3, KMD is the primary producer of climate information. KMD provides seasonal, monthly, weekly and daily forecasts. Users also get monitoring information from the National Drought Management Authority (NDMA) through monthly bulletins. The NDMA publishes: 1) county-specific bulletins containing socio-economic impact-oriented indicators based on the past month and 2) a national early warning bulletin containing drought scenarios based on KMDs forecasts.

KMD’s scientific nature means they are perceived as an ‘expert institution’ and thus also trustworthy. NDMA, being a government body is also perceived as a reliable source of information. Information received from KMD and NDMA are triangulated with other sources such as Famine Early Warning Systems Network (FEWSNet), IGAD Climate Prediction and Application Centre (ICPAC), Greater Horn of Africa Climate Outlook Forum (GHACOF) and users’ internal climate experts. Forecasts are also triangulated with impact-oriented situation reports from UN-organisations such as UNHCR and WFP. Local partners on the ground are also perceived as a good source of accessing impact monitoring information (29); (46); (47); (22); (45); (30); (48).
Table 3: Overview of the main sources of information used in Kenya by INGOs preparedness and response process.

<table>
<thead>
<tr>
<th>Forecasting / monitoring source</th>
<th>Type of information</th>
<th>Usage and perceived usefulness</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KMD</td>
<td>Seasonal Forecasts</td>
<td>Seasonal and monthly forecasts are mainly used for drought preparedness and for updating development programmes.</td>
</tr>
<tr>
<td></td>
<td>- Monthly forecasts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Weekly forecasts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Daily forecasts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Agrometeorological bulletins that predict how the weather is likely to affect their crops/pasture</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Severe weather alerts and advisories</td>
<td></td>
</tr>
<tr>
<td><strong>Secondary</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NDMA</td>
<td>Monthly County Specific Bulletins</td>
<td>Perceived as complementary to KMD as the bulletins provide national drought scenarios and monitor socio-economic impact indicators on county level.</td>
</tr>
<tr>
<td></td>
<td>- Early Warning National Drought Bulletin</td>
<td></td>
</tr>
<tr>
<td>FEWSNet</td>
<td>6 months’ food security outlooks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Integrated Phase Classification of the current food security</td>
<td></td>
</tr>
<tr>
<td><strong>Other sources</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ICPAC</td>
<td>Regional forecasts</td>
<td>Used to triangulate information from KMD, NDMA and FEWSNet.</td>
</tr>
<tr>
<td>GHACOF</td>
<td>Greater Horn of Africa Climate Outlook Forum Bulletin</td>
<td></td>
</tr>
<tr>
<td><strong>Internal climate information experts</strong></td>
<td>Uses information from KMD, NDMA and other forecasting and monitoring centres and shares with NGO staff</td>
<td></td>
</tr>
<tr>
<td><strong>Local partners and communities</strong></td>
<td>Monitoring impacts on the ground</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Forecasting using traditional knowledge</td>
<td></td>
</tr>
<tr>
<td>Relief Web</td>
<td>Anticipated and current sector specific impact situation reports focusing on e.g. food security or migration</td>
<td>Used to measure anticipated and actual impact.</td>
</tr>
<tr>
<td>UNOCHA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UNHCR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WFP</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4 Primary refers to the source of information that most users would use as their first information source. Secondary are also frequently used but most often in addition to the primary source.
Different forecasts have different time scales and detail, resulting in them being used for different hazards and different stages of the preparedness process. Long to medium-term forecasts, such as seasonal and monthly forecasts, are found useful for planning and preparing to avoid and to respond to negative hazard impacts, mainly for slow-onset disasters such as drought. Medium to short-term forecasts, such as monthly to daily forecasts, are perceived as useful for preparing to react and reducing expected negative impacts of rapid-onset hazards such as floods. Medium to short-term forecasts are also used to adjust plans for slow-onset hazards. Although quite similar, there is a nuanced difference in which approach INGOs take and which forecasts they use when preparing to avoid and preparing to respond to hazards. This is illustrated in Table 5.

In short, 6 out of 7 respondents in the survey and 7 out of 10 of the key informants use seasonal forecasts when planning for the coming season. This involves creating forecast-based scenarios of anticipated impacts and estimation of which activities should be implemented to avoid or reduce negative impacts. This stage often involves actions such as creating contingency plans specific to each scenario, updating current ongoing development/resilience programmes and disseminating the information to partner organisations or beneficiaries.

Monthly forecasts are perceived as more detailed and more accurate compared to the seasonal forecasts. Therefore, monthly forecasts are used to review and update scenario plans and potentially change some aspects of the NGOs ongoing programmes, e.g. starting to promote a specific crop over another for farmer livelihood programmes (see (49) for more examples). Monthly forecasts are often used for anticipating floods. Based on monthly forecasts, organisations start to prepare for avoiding potential flooding impacts.

Weekly and daily forecasts are perceived as more detailed; however, their lead-time is perceived as too short to implement actions that avoid negative hazard impacts. At this stage, it is likely that impacts cannot be avoided and thus actors are mainly focusing on coordinating and planning the response. Therefore, short-term forecasts are mainly used for preparing to respond and limit anticipated negative impacts. The process is then repeated as new seasonal forecasts are published (46); (47); (48); (45); (27). This circular process flow is illustrated in Figure 1.
**Seasonal forecasts**

Used for drought and conflict by:
- Updating hazard monitoring indicators
- **Internal Minimum Preparedness Actions (MPAs)** such as: scenario planning, designing/reviewing scenario contingency plans, redesigning/updating ongoing development programmes and prepare funding applications or apply for funding
- **External Minimum Preparedness Plans** such as: disseminate information to partners and communities, recommend local governments to allocate funds for preparedness

**Monthly forecasts**

Used for drought, flooding and conflict by:
- Monitoring hazard indicators to track changes
- **Internal MPAs** such as: review/update scenario plans, update scenario contingency plans, apply for preparedness funding or re-allocate funds from other programmes and estimate potential impacts
- **External MPAs** such as: Disseminate information to local partners and communities, recommend local governments to allocate funds for preparedness
- Implement early response actions

**Daily - hourly forecasts**

Used for flooding and conflict by:
- Monitor expected hazard magnitude to anticipate impacts
- Activate APAs
- Implement response actions

**5-10 Day forecasts**

Used for flooding and conflict by:
- Monitor hazard indicators to track changes
- **Internal Advanced Preparedness Actions (APAs)** such as: activating response plans and apply for funds
- **External APAs** such as: clear drainage or fix water catchment to avoid flooding, alert communities to get prepared
- Implement early response actions

*Figure 1: Illustration of forecast products used in the monitoring and implementation cycle for hazard monitoring, MPAs and APAs and early response actions in Kenya.*
4.1.2 Philippines

In the Philippines, 5 of 9 respondents of the survey and 9 out of 14 key informants indicated that their preparedness work is based on ‘known cycles’ or hazard maps, which are based on historical climate data. These maps outline the level of risk of specific hazards in a specific season or month (44); (40); (32); (34); (50); (37); (38); (42). During the data collection, the seasonal hazard maps were often mistaken for seasonal forecasts. The hazard maps are often used along with short-term forecasts in preparedness for tropical cyclones, and their associated impacts, e.g. flooding and landslides (32); (34); (33); (35); (40). However, 12 out of 14 key informants indicated that weather and climate forecasts are increasingly being used or planned to be in their preparedness work. As summarised in table 4, the main forecast information source is PAGASA. PAGASA is, like KMD in Kenya, considered the scientific experts and thus perceived as a credible information source. However, long and medium range forecasts are considered somewhat uncertain, and there perceived as unreliable to prepare for rapid-onset hazards such as tropical cyclones and thus, actors mainly rely on short-term forecasts for cyclone and storm alerts. This information is often triangulated with impact reports and short-term bulletins from the National Disaster Risk Reduction and Management Council (NDDRMC), Tropical Storm Risk (TSR), and GDACS. Various weather sites, UNOCHA, local government and other local partners, in-house climate experts as well as the PAGASA led ‘Project Noah’ are also used to triangulate forecasts and observe impact on the ground (32); (34); (35); (36); (37); (38); (39); (40); (42); (41).
<table>
<thead>
<tr>
<th>Forecasting/monitoring source</th>
<th>Type of information</th>
<th>Usage and perceived usefulness</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| PAGASA®                      | Seasonal forecasts incl. ENSO (El Niño-Southern Oscillation) advisory - Monthly forecasts - Weekly forecasts - Daily and hourly forecasts - Weather bulletins and weather advisory for tropical cyclones, storms and floods  
**Warning alerts:**  
- Heavy rainfall  
- Flood bulletins  
- Storm surge bulletins  
- Gale warnings | Seasonal forecasts, ENSO advisories and monthly forecasts are in some cases used for drought preparedness. Otherwise rarely used by actors since preparedness work is mainly based on hazard maps. Weekly and daily forecasts along with the warning alerts are the main services used by the respondents. Forecasts and alerts are shared through PAGASA's website, through traditional media such as TV and radio, through Social Media (Facebook and Twitter) and through SMS alerts. Warning alerts are to some extent accompanied by action recommendations. |
| NDRRMC                        | Weather advisory for low-pressure areas - Flood bulletins and advisories - Tropical cyclone bulletins - Severe weather bulletins on tropical storms - Situation Reports on ongoing disasters including impacts and action recommendations | Used for monitoring ongoing events and shows updates on anticipated event impacts. Provides information on estimated impacts and actions taken by different government bodies. |
| TSR                           | Seasonal forecasts - Short-term forecasts | TSR is a global tool, focusing on tropical storms. Users mainly use their short-term forecasts as the seasonal storm forecasts historically have low skill and large uncertainties (51) |
| GDACS                         | Short-term forecasts | Anticipates magnitudes, |

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5 PAGASA are currently undergoing internal changes and moving towards impact-oriented indicators of early warning information, i.e. not only providing the estimated wind speed but the estimated impact of the wind-speed (FGD#2, 2018).
Table 4: Overview of the main sources of information used in the Philippines by NGOs in their preparedness and response process.

PAGASA has many services and products accessible on their website, however, not all actors are aware of the existing products and services. This risks leaving the products and services unused despite being useful for (I)NGOs’ preparedness work (39); (43). The respondents use short-term weather forecasts and short-term weather bulletins that include flooding, rainfall and storm surge alerts. Seasonal forecasts were used occasionally, and only by actors working in drought-prone areas, (2 out of 9 respondents in the online survey and 6 out of 14 of the key informants focused on drought). There is a perception that drought is a less prioritised hazard by PAGASA, resulting in ENSO and drought forecasts not being shared widely (34); (33); (39); (42); (41).

Monthly forecasts were not perceived as useful since their uncertainty was considered high (43). This means that most actors use hazard maps and ‘known-cycles’ for their general preparedness, e.g. conducting scenario-based response planning for each hazard and having emergency response drills within their organisation and in communities.

Short-term forecasts and warnings are used in actors’ preparedness work as they contain information of expected event magnitude and impacts (e.g. estimated affected number of people). Short-term forecasts and extreme weather warning alerts are shared through media channels and triggers organisations’ contingency
plans. The contingency plans can involve activities such as conducting rapid assessments where actors assess estimated and current impact. Based on that information users evaluate their response capacity. This means that they rarely act until impacts start showing. Action is decided on a case-to-case basis rather than systematically (34); (35); (36); (39); (42); (41); (43). Examples of actions taken based on specific forecasts are outlined in table 5.

There is a trade-off between lead-time and detail as organisations mainly monitor forecasts until an event is imminent. The short lead-time limits actors’ preparedness work to mainly focus on preparedness to respond rather than avoid negative impacts (32); (34); (35); (36); (37); (38); (39). This current use limits the potential of FbA and FbF. Limited human and financial capacity could be a reason to why organisations wait to act. For example, in some instances actors’ needed to wait for the disaster to get media coverage before being able to access funding from donors (32); (34); (38); (41). Perceived high forecast uncertainty could be another reason. This could be caused by actors not fully understanding the difference between hazards, e.g. tropical cyclone (wind) and tropical storm (rain), resulting in anticipated event impacts being different from actual impacts (43). The perceived uncertainty could lead to actors prefer to wait with implementing mitigating or early response actions to avoid damaging their reputation if forecasts were wrong.

The action-flow for tropical storms and typhoons for the Philippines can be described as a linear process and is illustrated in figure 2. Organisations receive forecasts of low-pressures in the Pacific anticipated to turn into a tropical storm or cycle around a week-36h in advance. At this stage, the storm/cyclone often have a signal from 1-2, which generally triggers monitoring and putting organisations on standby (43). By monitoring, actors anticipate the storm/cyclone path and magnitude and share the information with partners and local governments. When the storm/cyclone is upgraded to a signal 3, organisations get ready to respond by finalising their MPAs. When the storm/cyclone reaches a signal of 3-5, (often about 24h in advance) organisations trigger their APAs (36); (42); (41); (43). At this stage actors monitor and measure impacts and conduct assessments of observed impacts to identify and fill potential gaps in local government response. Thereafter, if organisations decide to respond, then they often implement actions such as providing shelter or distributing food and non-food items (43).
<table>
<thead>
<tr>
<th>Seasonal Forecasts</th>
<th>Monthly Forecasts</th>
<th>Weekly Forecasts</th>
<th>Daily Forecasts</th>
<th>Hourly Forecasts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Currently not used by many of the respondents and occasionally mixed up with seasonal hazard maps based on historical data. When used, it is mainly used for drought preparedness by:</td>
<td>Currently not used by many of the respondents. When used, it is mainly used for drought preparedness by:</td>
<td>Used for tropical storms and cyclones by:</td>
<td>Forecasts and alerts are often communicated by PAGASA through traditional and social media alerts. Used for preparing to respond and for response to tropical storms and cyclones by:</td>
<td>Used for tropical storm and cyclone response by:</td>
</tr>
<tr>
<td>- Adjustment in DRR and agricultural livelihood development programmes</td>
<td>- Internal MPAs such as: Monitoring hazard information</td>
<td>- Internal MPAs such as: Monitoring hazard risks (magnitude and direction) and anticipated impacts</td>
<td>- Monitoring magnitude and landfall</td>
<td>- Measuring impacts and evaluating where to best direct their response</td>
</tr>
<tr>
<td>- Internal MPAs such as: Monitoring hazard information</td>
<td>- External MPAs such as: Disseminate information to local partners and communities; get ground observation for triangulation</td>
<td>- Internal MPAs and APAs such as: Hazard monitoring (magnitude, landfall area and impacts); prepare response scenarios; review and update internal preparedness documents; review evacuation plans and finalise Memorandum of Understanding with suppliers</td>
<td>- Internal MPAs and APAs such as: prepositioning stock, apply for emergency response funding, conduct rapid assessment of impacts and activate response plans</td>
<td>- Measuring impacts and evaluating where to best direct their response</td>
</tr>
<tr>
<td>- External MPAs such as: Disseminate information to local partners and communities; get observation from the ground for triangulation</td>
<td></td>
<td>- External MPAs and APAs such as: share information to local partners and communities of estimated and observed impacts; start evacuations and distribute food aid and non-food items to affected or soon-to-be affected households</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 2 Illustration of forecast products used in the monitoring and implementation process for hazard monitoring, MPAs and APAs and early response.
## Forecast suitability for different types of hazards

<table>
<thead>
<tr>
<th>Forecast type</th>
<th>Hazard type</th>
<th>Examples of preparedness actions activated in Kenya 6</th>
</tr>
</thead>
</table>
| Seasonal      | Drought     | - Perceived as useful for planning. Seasonal gives a review of the past season and predicts the coming season. - Mainly used for implementing No/Low Regret actions:  
**Internal actions**  
- Plan for the season by making scenarios  
- Decide indicators to monitor during the season  
- Create or review scenario based response plans  
- Revise and potentially make changes in ongoing development programmes and programme budgets (e.g. school feeding programmes or livelihood programmes)  
- Prepare funding applications and apply for funding  
**External actions**  
- Disseminate information to local partner organisations through e.g. county climate forums.  
- Recommend county governments to allocate funds for preparedness  
- Disseminate the seasonal forecast to communities  
- Provide sector specific recommendations on how to best prepare for the season, e.g. recommend specific crops for a season |
|               | (Flooding)  |                                                      |
|               | Conflict    |                                                      |
| Monthly       | Drought     | - Perceived as useful for planning, and as more detailed than seasonal forecasts. - Mainly used for implementing No/Low Regret actions:  
**Internal** |
|               | Flooding    |                                                      |
|               | Conflict    |                                                      |

---

6 The examples of preparedness actions activated in Kenya and the Philippines are derived from the survey, focus-group discussion and key informant interviews.
| Weekly Or 10-5 days | | Understanding (MoUs) with suppliers and review available stock.  
- When used, it is mainly used for implementing No/Low Regret actions:  
  **Internal**  
  • Review and update MPAs  
  • Keep monitoring hazard indicators  
  • Although not commonly used for this purpose, but perceived as potentially useful to apply for early preparedness funding  
  **External actions**  
  • Disseminate information to local partners and ask for ground observation for triangulation  
  • Disseminate information to communities |
|---|---|---|
| (Drought) - Flooding - Conflict - Cyclone - Tropical Storm | Perceived as not so useful for preparing to avoid due to a short lead-time. Instead it is perceived as useful for preparing to respond to expected impacts.  
- Used for both No/Low and High Regret actions:  
  **Internal**  
  • Activate response plans  
  • Apply for response funds  
  • Monitoring indicators to track changes  
  **External**  
  • Clear drainages to avoid flooding  
  • Fix water catchments to avoid flooding  
  • Alert communities of estimated flood impacts  
  - **Potentially High regret actions:**  
  • Drought action: De-stocking animals  
  • Flood action: Evacuate population from anticipated flood prone area  
  • Flood action: Hand out sanitation kits to avoid waterborne diseases and put on fog machines in refugee camps to avoid malaria outbreaks |
| - | Disseminate updated information to local partners  
- Disseminate updated forecast to communities  
- **Potentially High Regret action:**  
- Drought specific action: De-stocking animals  
- Distribute food items or do cash transfers |
| - | Disseminate information to communities |
| - | Perceived as useful for preparing for tropical storms and typhoons  
- Used for both No/Low and High Regret actions:  
  **Internal**  
  • Monitoring hazard to anticipate effects such as landslides or flooding as well as anticipate impacts on affected population and local governments capacity to respond  
  • Make rapid assessments and create scenario plans  
  • Review internal MPAs such as security back up plans.  
  • Finalise MoUs with suppliers  
  • Finalise evacuation plans  
  • Assign response tasks to staff  
  • Apply for emergency preparedness funding  
  **External**  
  • Disseminate information to partners and local communities  
  - **Potentially High regret actions:** |
<table>
<thead>
<tr>
<th>Daily to hourly</th>
<th>Distribution of food items or do cash transfers</th>
<th>Early evacuations, reinforce houses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- Perceived as useful for response due to its short lead-time.</td>
<td>- Actions depend on storm/cyclone signal:</td>
</tr>
<tr>
<td></td>
<td>- Perceived as useful for preparing to respond to tropical storms and cyclones</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Used for both No/Low and High regret actions (although the distinction between low and high regret is less clear at this level):</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Internal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Monitor expected magnitudes of impacts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Activate response plans</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>External</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Alert community of estimated impacts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Hand out sanitation kits to avoid waterborne diseases and deploy fog machines in refugee camps to avoid malaria outbreaks</td>
<td>- Forecasts are often communicated through PAGASA as alerts. Therefore, they are perceived to have high certainty and thus no actions are perceived as High Regret as impacts are likely showing and the line between preparing to respond and responding is less clear:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Health</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Internal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Monitor magnitude and impacts</td>
<td>- Monitor magnitude and impacts</td>
</tr>
<tr>
<td></td>
<td>- Preposition stock and sort out logistics</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Apply for emergency funding</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Conduct rapid assessment of impacts</td>
<td>- Preposition stock and sort out logistics</td>
</tr>
<tr>
<td></td>
<td>- Activate response plans</td>
<td>- Conduct rapid assessment of impacts</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>External</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Alert local partners and community of estimated and observed impacts</td>
<td>- Alert local partners and community of estimated and observed impacts</td>
</tr>
<tr>
<td></td>
<td>- Start evacuations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Distribute food aid and non-food items to affected or soon-to-be-affected households</td>
<td>- Start evacuations</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hourly</td>
<td>Cyclone Tropical Storms</td>
<td>Used for tropical storm and cyclone response.</td>
</tr>
<tr>
<td></td>
<td>- Perceived as not so useful for response due to its short lead-time.</td>
<td>- Measuring impacts and evaluate which aid can be distributed to which communities</td>
</tr>
</tbody>
</table>

Table 5: Overview of usage for different time-scale forecasts.
4.1.3 Summary

The data shows that Kenya has a more circular and systematic approach to using forecasts for preparedness. Respondents in Kenya indicated they prepare to avoid impacts rather than only preparing to respond. In the Philippines, forecast use can be described as a linear process where users mainly rely on short-term forecasts in their preparedness work. They use forecast more for preparing to respond rather than to avoid negative impacts. This difference could be explained by two factors:

1. The hazard profiles for the countries are quite different. Kenya is mainly focusing on two hazards: drought and flood. Drought (slow-onset) is significantly prominent and is therefore prioritised. This increases the use of seasonal and monthly forecasts. In the Philippines, drought is considered a hazard; however, rapid-onset hazards such as tropical storms and cyclones receive priority in organisations preparedness work. This results in greater use of short-term forecasts such as weekly-hourly. Thus, there is a limit to the time in which organisations can implement mitigating actions, resulting in the preparedness flow being more impact-oriented and linear.

2. The second factor is related to users’ relation to the national meteorological department and how climate and weather information is disseminated. Both meteorological departments have all forecasting information available on their websites. However, in Kenya, KMD take an active role in sharing seasonal and monthly forecasts with users and communities. This is often done through local climate outlook forums or through networks. In the Philippines, this direct communication channel is not as clear, leading to users mainly accessing weather and climate information through traditional and social media alerts. However, PAGASA is currently moving towards promoting strategic and tactical planning based on seasonal and monthly forecasts and by providing impact-oriented indicators of early warning information (43).

4.2 Perceived challenges of using climate and weather forecasts for preparedness and solutions overcome them

There are many opportunities for linking forecasts to humanitarian preparedness actions7. Ultimately acting in advance can avoid negative impacts of a hazard event. In Kenya, one INGO used forecast information to predict flooding in one of the refugee camps. Based on the scenario, they handed out hygiene kits to minimise the risk of waterborne diseases. They also distributed fog machines to minimise a malaria outbreak (45). Another example is an INGO that acted on a drought forecast. They disseminated the forecast information to leaders in the community that was likely to be affected. By doing this, the community could prepare and plan for an increased migration of pastoralists from other communities. This led to different community leaders meeting up and assigning grazing plots for their livestock in advance. This example illustrated how a forecast was used to minimise the risk of drought-related conflict (29). NGOs in Kenya increasingly perceive climate information as a key information source when preparing and responding to climate and weather-related hazards. This perception was also noticeable in the Philippines, although to a slightly lesser extent (32); (33); (34); (35); (36). However, during the data collection it became clear that there are several barriers that limit the forecasts’

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7 Including mitigation actions as well as early response actions.
usefulness for users in the two case countries. This section addresses the key barriers of linking climate and weather information to preparedness. It also provides some ideas of how to overcome them.

4.2.1 Challenge #1: Understanding and accessing forecast information
A) NGOs perceived challenges related to understanding and accessing the technical aspects of forecasts. The forecast language can be perceived as too technical to fully understand the forecast implications. Terminology like 'below average rainfall' is difficult for some to grasp as the forecast information can lack a baseline of what 'average' is. Another example is knowing the difference between hazards e.g. tropical storm and tropical cyclone. Not knowing the difference can lead to an increased perceived uncertainty in forecasts, as anticipated impacts of cyclones are not the same as for tropical storms. Moreover, if local or regional vulnerabilities are not taken into consideration in the forecasts, it becomes difficult for users to anticipate hazard impacts (29); (30); (31); (32); (33); (35); (36); (38); (39); (41); (42); (43); (46); (47); (48).

Recommended solution: To make forecasts more accessible, some users have hired climate experts and meteorologists that act as 'knowledge brokers'. They translate forecasts to a more accessible language for staff within the organisation. Other users do internal capacity training on terminology. However, not all users have the human or financial capacity to implement such actions. Therefore, it could be appropriate to create a direct communication channel between the meteorological department and the users. Also, forecasts issued by KMD and PAGASA could come with a glossary of definitions of key-terminology and information of what to expect from different hazards (e.g. the different impacts between tropical storms and cyclones). Forecasts could also increasingly provide impact-oriented indicators that enable users to better understand anticipated impacts. Moreover, terminology such as 'below average rainfall' could be supplemented by the probability percentage and the baseline value of what 'average' means. Finally, forecasts could allow users to 'zoom-in' on forecast maps to see anticipated impacts on a county level (31); (36); (30); (48); (38); (43); (33); (32).

B) Forecasts were also perceived as too general and not detailed enough to anticipate impacts on a county, sub-county and community level. This results in a trade-off between forecast detail and lead-time. For example, in Kenya, seasonal forecasts provide a lead-time of up to three months, but are perceived as too general to use as a basis to prepare properly and implement external or high risk actions. Monthly forecasts on the other hand are perceived as more detailed but often as having too short a lead-time. For both Kenya and the Philippines, users deal with a lack of lead-time or detail by creating preparedness scenarios based on the forecasts. Then contingency plans are designed based on the different scenarios. However, some respondents argue that anticipated impacts were not always communicated, resulting in difficulties in creating realistic scenarios. At this stage, many users prefer to monitor the hazard rather than implementing actions or sharing the information to communities and thereby risk losing credibility if the forecast is inaccurate. In Kenya, this resulted in forecast information mainly being used as an indicator of the coming season and helping organisations decide what to monitor, instead of fully activating actions to avoid impacts. In the Philippines, the lack of
detail was dealt with by mainly using short-term forecasts, when the certainty level was considered higher. This led to forecasts being used for preparedness to respond rather than avoid negative impacts. Additionally, forecast skill was rarely taken into consideration when analysing forecast information (29); (46); (47); (31); (30); (48); (39); (33); (38); (40); (42); (41); (43); (36); (22); (50); (37); (32); (35).

**Recommended solution**: To overcome issues of uncertainty, users base scenarios on forecast information. In Kenya, the decentralisation of KMD together with the presence of NDMA in drought-prone counties is a step to develop and share more detailed forecast information. Also, in both Kenya and the Philippines, respondents wanted an increased number of weather observation stations. This could help improve the measurement of local impacts and to access improved localised data. For example, weather stations cover a 20km radius in the Philippines, however, due to many microclimates, the data observed at these stations is unlikely to be representative for the whole area. Moreover, some users expressed that variables such as predicted temperature and soil moisture should be included in all forecasts and not only short-term forecasts. Additionally, to save resources and increase the sharing of information on a local level, users could use their existing local/regional networks, to hold ‘local climate outlook forums’ where local users and producers of climate and weather information discuss and reach a consensus on the forecast and which actions should be implemented. Furthermore, to maximise the window of opportunity from when the forecast is released until the anticipated event occurs, trigger levels could be pre-decided which would allow users to activate a scenario plant automatically instead of deciding on a case-to-case basis. Currently only one of all respondents has pre-decided trigger levels in place (29); (47); (50); (48); (31); (30); (43); (35); (38).

**C)** One respondent that only uses short-term forecasts expressed concern of not being able to access forecasted information through media or over the internet. This could be due to factors such as power cuts or not having access to TV or Radio. This can limit the reach of forecasting information and alerts to users which could lead to a delayed preparedness and response (36).

**Recommended solution**: One solution to this challenge could be to move from only relying on short-term forecasts to follow medium and long-term forecasts. This is already being done by KMD. PAGASA is also increasingly starting to promote strategic and tactical planning based on seasonal and monthly forecasts (31) (43). If long to medium term forecasts have a credible skill-level, a more circular flow of hazard use could potentially provide indicators of anticipated rapid-onset hazards such as tropical cyclones.

**D)** One respondent argues that forecast information is not evaluated enough, i.e. that actual impacts are perceived as not being cross-checked for the prediction accuracy on a systematic level. This makes it hard for users to confirm whether the forecast was right in its prediction and if the preparedness actions taken were accurate in relation to the magnitude of the hazard impact (30).

**Recommended solution**: Users could systematically revisit past forecasts at the end of each season/month/week to evaluate if the forecast corresponded
to the real impact. This could help measure if the preparedness plans implemented or scenarios created based on the forecast corresponded with reality. For short-term forecasts, particularly for tropical storms and cyclones, users wanted to incorporate traditional knowledge e.g. analysis of animal behaviour, to cross-check forecasted information. This information could also potentially be used to identify a common ground between traditional and scientific forecasting knowledge to increase trust (32); (30); (35); (38).

4.2.2 Challenge #2: Communicating forecast information with others

A) Climate information is produced by the national metrological department, based on models and observations. Therefore, it can be perceived as top-down which causes several issues of trust in local communities:

1) Its scientific nature is not taking traditional knowledge into consideration, often leaving communities somewhat sceptical of climate information disseminated by NGOs. This was particularly perceived as a challenge in Kenya.

2) Also, forecasts could be physically inaccessible to communities in cases where there is limited access to internet, radio and TV.

3) Moreover, forecasts are often not accessible in local languages, which risks compromising the forecast message to end-receivers. These barriers risk causing a perception of forecasts as uncertain and untrustworthy. Therefore, it poses a challenge for users to make preparedness plans that local communities feel ownership over (29); (46); (47); (22); (30); (48); (31); (43); (33); (35); (36).

Recommended solution: To overcome the issue of trust in local communities, respondents try and find a common ground between scientific forecasting and traditional forecasting knowledge. In Kenya, some organisations host ‘county climate outlook forums’. In these forums, communities receive forecasted information and together with the organisations they make a scenario using both the forecast and traditional knowledge. Then, a consensus is reached for what the coming season is likely to look like (50); (48). However, the dissemination of climate forecasts is considered a service that should increasingly be provided by the government. Therefore, some local KMD and NDMA officers work together with the NGOs to disseminate climate information to communities and translate them into local languages to avoid diluting the information (50); (30).

Some of KMDs decentralised offices are rolling out county ‘climate resource centres’ which communities can visit to access climate information. They could potentially be used for finding a common ground between the forecast and traditional knowledge as well as to identify ways in which one can increase communities’ trust in forecasts (31); (30); (48).

B) Users identified cultural, behavioural and financial barriers as challenges to share forecasts with communities. For example, market forces can influence farmers to ignore information of anticipated drought and recommendations to plant drought-resistant crops. Instead they might follow a ‘business as usual’ scenario and choose to plant cash crops, hoping to boost their livelihoods (48). Or pastoralist communities anticipating a drought might know it could be beneficial to de-stock their
livestock to protect their long-term livelihood. However, as having livestock is perceived as a part of the culture and the community tradition, they might still choose to keep it. Another example is deciding to ignore evacuation orders in order to protect livelihoods (22); (30); (43).

**Recommended solution:** The above barriers could potentially be overcome through education and by increasing the awareness of the perceived benefits of using forecasts for preparedness to avoid and respond to negative hazard impacts (33); (43); (48).

### 4.2.3 Challenge #3: Accessing funding and other resources to act based on forecast information

**A**) Difficulties in accessing funding is a challenge for acting in advance and preparing for disasters. *In some instances, users use forecasts to anticipate impacts but are unable to access funds before negative impacts are showing, or until the government declares an emergency.* Some users perceived they could only access funding after a disaster gained significant media coverage. The inability to access preparedness funds leaves users limited to monitor hazards, update their scenario and contingency plans, and disseminate information to communities and partners. This causes a frustration amongst users since they can anticipate disasters without being able to prepare in the way they would like. For short-term forecasts this challenge is even more significant since it is perceived as harder to access preparedness funds on a short-term basis, i.e. writing and sending funding applications, receiving and allocating funds (32); (33); (47); (46); (22); (30); (48); (37); (36); (34).

**Recommended solution:** By systematically monitoring anticipated hazard impacts and comparing them to actual impacts users could cross-check and quantify the value of early action. This information could then be used to lobby for more accessible preparedness funding. Currently, some respondents work to overcome the funding gap by having their own flexible preparedness contingency fund that can be used to implement early actions. Other INGOs have access to international preparedness funds, through which they can get funds in anticipation of disaster (22); (50); (30); (37); (38); (39); (32); (36).

**B**) Agencies may lack technical and human resources to prepare to avoid or respond to anticipated disasters on a county level. This means that even if the national office receives a forecast, the organisation may not have the human or technical capacity to implement actions in the anticipated affected area (22); (36); (32); (38).

**Recommended Solution:** By creating a shared pool of Emergency Response Human Resource team, ready to be employed where needed in anticipation of disaster this challenge could potentially be overcome (22). In the Philippines, this could potentially be linked with the ‘On Call Collaborative Roster’ that is a part of the ‘Transforming Surge Capacity’-project aimed at creating a more efficient humanitarian response by linking local, national and international responders more efficiently (see (52) for more information).
This section provides recommendations of how climate and weather information can be linked to the ALERT platform and what is needed to make it happen. ALERT is perceived as an opportunity to increase the use of climate information in its users’ preparedness. Through the ‘Risk Monitoring’ function, users are required to systematically monitor climate, weather and socio-economic indicators (36). Additionally, by uploading MPAs and APAs, users are required to plan their internal preparedness to respond to different hazard scenarios. However, the key informants stressed a need to anchor ALERT with senior management for it to be successfully used within the organisation (45); (37); (35); (42).

### 4.3.1. Linking meteorological departments to the platform

Most respondents wanted to better link climate and weather information to ALERT. Currently users individually choose hazard indicators for monitoring and manually update them. However, this approach is for many considered labour intense and time-consuming. By linking national meteorological departments (and in the Kenyan case also FEWSNet) to the platform, forecasted information could become more accessible for users. The national meteorological departments could provide information on standard indicators that are agreed and decided upon by both user and producer of information. The information could be available on the central country dashboard where general risks are presented. This could enable users to cross-check or automatically update their indicators based on the information provided by PAGASA and KMD (29); (46); (47); (31); (43); (50); (30); (48); (37); (34); (33). Moreover, allowing meteorological departments to have a profile on ALERT could enable increased sharing of early warning information that otherwise would not be openly shared. This could improve the coordination of humanitarian preparedness and response (43).

KMD and PAGASA are both perceived as climate and weather experts and a credible source of information. That KMD and PAGASA should have their own profiles on ALERT is motivated by them being considered scientific institutions that are somewhat independent from the national government (47); (31). However, there is a risk that users overly rely on science and seeing it as ‘truth’, without properly understanding issues of skills in forecasting models or the uncertainty with probabilistic information. Moreover, scientific institutions cannot be fully detached from political interests as they operate as a part of a greater system, affected by worldviews and political interests from other institutions (See (53) for politics’ impact on science and the creation of knowledge). This does not necessarily mean that science production is negatively impacted, however it is necessary to understand these systems and actors’ interests before linking national meteorological institutions to the platform. This could be done by conducting a political-economic analysis.

### 4.3.2. Triggers and indicators

In ALERT, the dashboard shows the organisations level of preparedness, i.e. minimum preparedness on a daily basis and advanced preparedness when the organisation is under a red alert. For the level of minimum preparedness to appear in ‘green’, i.e. the organisation is prepared, a minimum of 65% of the MPAs must have been completed and up to date. If the MPAs are not completed or not up to date the
level of preparedness goes into amber and then red, i.e. less than 40% of the MPAs are completed. It works the same way for APAs, when the country office (or the network) is on red alert. This means that if MPAs and APAs are updated, the preparedness level will stay green even if a hazard moves from green to amber to red in certain indicators. The risk monitoring indicators are also moving across a scale of green-amber-red. **Having a green level of preparedness means that the organisation is considered ready to respond and has all plans put in place and tasks assigned to staff.** The APAs are activated when a user raises a red ALERT (i.e. when the indicators show that there is a high probability for an imminent disaster). In the Philippines, users want APAs to be activated based on an internal decision within the organisation, i.e. based on the organisations’ capacity to respond to a specific event. This is the current ALERT function. In Kenya, many users would prefer if the process was automated. Pre-deciding hazard danger levels and automatically connecting the danger levels to the risk indicators could make it possible to automatically activate APAs if the danger level is surpassed. This function could be used to automatically de-escalate a response once the indicator goes below the danger level. Therefore, it would be useful if ALERT had an option where users could choose to automatically trigger actions based on the indicators pre-decided danger-level.

Climate, weather and socio-economic indicators are chosen individually by users. This allows them to tailor their monitoring according to their focus area and capacity. Users would like to use ALERT to monitor indicators that are impact-oriented, both related to climate, weather and socio-economic impacts (suggestions of indicators found in the data can be found in Appendix 1). **Having impact-based indicators could help take local vulnerabilities into consideration and thus help users to better prepare for an anticipated impact rather than only measuring anticipated effects (38).** Therefore, when users choose indicators for monitoring, they could be advised to choose impact-oriented indicators before other types of indicators.

Indicators are currently not automatically updated in ALERT, which means that the more indicators an organisation has, the more time it will take to monitor them. Moreover, the process of going into red alert and triggering the APAs is based on an internal decision made by the county office and the country director. This means that users still must decide whether to move to a red alert - activating the APAs - on a case-to-case basis. However, the data shows that respondents want to make the monitoring process more efficient without needing to decrease the number of indicators. Therefore, **it could be useful if users agree on some standard climate and weather indicators that are automatically updated based on information from the national meteorological department.** The socio-economic indicators could still be manually updated to avoid automatically triggering the APAs if the hazard indicators move to a red level. Despite monitoring indicators, users have no pre-decided triggers levels that activate APAs. **To improve the**

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8 Currently, APAs are not automatically activated even if all risk indicators are in red. However, if the facilitation of automatically updated risk indicators can be met, then some users may want to be able to link the indicators to the activation of the APAs, using pre-decided trigger levels. In this scenario, the socio-economic indicators could still be updated manually to allow users to choose whether to link the risk monitoring function to the alert level or not.
preparedness process using climate and weather information, the data suggests that it would be useful to pre-decide a hazard’s danger levels where it would recommend users to activate their APAs. This would make the preparedness process more systematic. This process could look like: 1) all users have the same climate and weather indicators (but localised for the region the user wants to monitor) that are automatically updated and individual socio-economic indicators that are updated manually; 2) each user has pre-decided triggers, based on their funding levels and at what stage of the hazard they want to start acting. This means that not all users need to have the same trigger levels even though they monitor the same indicators. However, to ensure an accurate response, it is required that the trigger-levels are set so users can prepare to avoid or respond in time of the anticipated event. Otherwise the pre-decided triggers risk leading to a delayed response (46); (47); (30); (48); (32); (33); (31).

Furthermore, with users to some extent monitoring the same indicators, the cross-checking amongst users can be improved as well as enable an understanding as to why some users might move into red alert whereas others might not. By sharing indicators, users could together evaluate how useful specific indicators are for preparing to respond to disasters (31); (43); (50); (30); (39); (34); (33); (35). Lastly, systematically monitoring the same weather and climate indicators could provide evidence and help quantify the value of early action and be used when applying for funding (29); (30); (48); (36); (31).

4.3.3. Sharing information with government and local partners
Being able to share information is considered an important aspect of ensuring an efficient preparedness and response. Therefore, the ability to gather all information in one online place is considered a major benefit with ALERT. Plans that have been developed in HQ can be shared with local offices or other partners in the field (30); (37); (42). This provides an opportunity to make planning based on forecasts more participatory amongst ALERT users and their local partners and networks. To some extent this already occurs in the Philippines where local NGOs and humanitarian networks registered on the platform aim at sharing their plans with each other (29); (47); (50); (30); (39); (32); (33); (36); (31). However, while some users wanted to encourage sharing of data by enforcing a minimum level of sharing, other users feared that information sharing could increase the competition of available funding (30); (22); (48).

A final recommendation is to allow national and local government or relevant disaster management departments (e.g. NDMA, NDRRMC) to have profiles on ALERT – in the same way that it was recommended to involve the meteorological departments. This could increase the transparency of disaster preparedness and response by enabling NGOs to see where local governments are active and identify gaps in government preparedness and response which could be filled by the NGOs. Moreover, allowing the government to access and use ALERT could potentially help sustain the platform in a long-term perspective. However, four respondents mentioned a hesitation to share their internal preparedness plans with government institutions since they are monitoring hazards considered politically sensitive (e.g. conflict). This could potentially be
overcome by allowing NGOs to make some information private to the government profiles (22); (39); (40); (41); (34); (33); (35); (36).
5. Conclusion

This study investigated the current use of climate and weather forecast information in humanitarian preparedness. To reach the aim of the study, the following research questions guided the research: ‘1) To what extent do humanitarian actors on the ALERT platform use climate and weather forecasts in their preparedness work?; 2) To what extent do actors perceive forecasts as usable?; and 3) What are the perceived challenges with using climate and weather forecasts and what can be done to overcome them?’. The study is based on qualitative data from Kenya and the Philippines. The findings provide recommendations on how climate and weather forecast information could be linked to the online preparedness platform ALERT. The key findings are summarised below.

Current use and usefulness: Users rely on climate and weather forecasts to various extent in the case studies.

- **In Kenya**, users mainly prepare for drought and floods, often related to ENSO. They mainly rely on information from KMD, NDMA and FEWSNet. As drought is a slow-onset disaster, seasonal and monthly forecasts are used to review scenarios and contingency plans as well as ensuring that information is shared with local partners and communities. Monthly and weekly forecasts are used for flood preparedness. Forecasts with a shorter lead-time than a week are not perceived as useful. Instead users plan based on the season and adjust programmes and budgets accordingly based on monthly and weekly forecasts. When a new seasonal forecast is released the process starts over. Thus, the Kenyan forecast use in humanitarian preparedness can be described as a circular process.

- **In the Philippines**, users prepare for a diverse number of hazards depending on where they are active. However, in general users prepare for tropical cyclones, storms and floods, and to some extent landslides and drought. The forecast information comes mainly from PAGASA. Short-term forecasts are used to a larger extent than medium and long-term forecasts. The few respondents preparing for drought use seasonal forecasts and ENSO bulletins. For the other hazards, respondents mainly use short-term forecasts, i.e. from weekly to hourly. This means that in many instances users wait to receive early warning alerts from PAGASA before acting. This process can be described as more linear compared to Kenya and forecasts are used mainly to prepare to respond to impacts rather than to avoid them. However, PAGASA is starting to move towards encouraging the use of seasonal and monthly forecasts to enable a more strategic and tactical approach to preparedness planning.

Challenges and opportunities: The data revealed challenges currently limiting the usefulness of using forecasts in decision-making.

- Firstly, the forecasts’ technical character might not be accessible for all users. For example, users may not be aware of differences in hazard terminology or fully understand forecasts’ probabilistic nature. Moreover, forecasts are also not considered as detailed/localised enough. This often results in users
choosing to monitor a hazard rather than implementing preparedness actions. Better linking the forecast producer with users could help co-create forecasts and increase the understanding of how producers could make forecast information more useable for users, as well as increase users’ technical knowledge of forecasts.

- Secondly, communicating forecast information with others was identified as a barrier. Forecast information is perceived as top-down and not taking traditional forecasting knowledge into consideration. Moreover, the information is often not translated into local languages. This can make communities discard the forecasts. Furthermore, cultural and economic barriers can limit the trust in forecasts. To overcome these challenges forecast producers and users could create local ‘climate outlook forums’ aimed at increasing the understanding of scientific forecast information. By making a consensus-based forecast using both traditional and scientific knowledge, forecast-based action could become more participatory.

- Thirdly, a lack of sufficient human, technical and financial resources are considered a main challenge in using forecasts for preparedness action. The financial barrier could be overcome by having a flexible fund through which users could access early preparedness funding. The lack of human and technical resources could be overcome by creating a pool of technical staff, ready to be deployed in anticipation of disasters.

**Linking climate and weather information to ALERT:** The following recommendations were made to ensure an improved linkage of climate and weather information to the ALERT platform.

- Linking national meteorological institutions to ALERT is the first recommendation. This would enable users to better access hazard-relevant forecast information and provide an opportunity for the PAGASA and KMD to directly share additional early warning information to users.

- Secondly, users could, together with PAGASA and KMD, agree on standard climate and weather indicators that could be monitored and automatically updated. This would make hazard monitoring less time-consuming. Users would also have a selection of socio-economic indicators that are manually monitored. This would also help in anticipating impacts. In Kenya, some users want the risk monitoring indicators to automatically trigger the APAs when crossing a certain threshold, i.e. going into red alert, while in the Philippines users still want to activate their APAs on a case-to-case basis. Therefore, the option to automatically link the risk monitoring function to the alert level should be available but not mandatory for users.

- Local partners and networks should have access to the platform. In the Philippines, ALERT has already linked many local NGOs and networks enabling them to collaborate with each other in their disaster preparedness and response. Adjusted to the local Kenyan context, this could be replicated.
• Finally, permitting the local and national government to access and use the platform could help actors identify potential response gaps and improve national response coordination. However, since some users monitor hazards that could be considered politically sensitive, there should be an option for users to limit the visibility of certain hazards to other users. However, as this study has a limited scope, it has not focused on politics and political interests of actors in the case-study. Therefore, a political economic analysis should be conducted to identify potential risks of this final recommendation.


https://www.forpac.org/.


22. **INGO#3.** Interview #4. 23 January 2018.


http://portal.alertpreparedness.org/key-features.


29. **INGO#1.** Interview #1. 22 January 2018.

30. **INGO#6.** Interview #7. 25 January 2018.


32. **NGO#1.** Interview#9. 12 February 2018.

33. **NGO#3.** Interview #10. 12 February 2018.

34. **NGO#2.** Interview #13. 13 February 2018.

35. **NGO#4.** Interview #15. 14th Feb February 2018.

36. **NGO#5.** Interview #17. 15 February 2018.

37. **INGO#9.** Interview #11. 13 February 2018.

38. **INGO#10.** Interview #12. 13 February 2018.


40. **INGO#13.** Interview #16. 14 February 2018.

41. **INGO#15.** Interview #19. 16 February 2018.

42. **INGO#14.** Interview #18. 16 February 2018.

45. **INGO#4.** Interview #5. 24 January 2018.
46. **INGO#2a.** Interview #2. 22 January 2018.
47. **INGO#2b.** Interview #3. 22 January 2018.
48. **INGO#7.** Interview #8. 26 January 2018.
50. **INGO#5.** Interview #6. 25 January 2018.
Appendix 1: Examples of indicators users suggested to be included in ALERT

Indicators directly derived from the data collection divided by hazard:

**Drought:**
- Availability of water
- Water access
- Vegetation cover
- Temperature
- Livestock food and body conditions
- Household food security
- Level of malnutrition for vulnerable groups

**Flooding:**
- Number of households affected
- Water levels
- Vulnerability to flooding

**Health hazards, e.g. Cholera:**
- Sanitation coverage
- Latrine coverage
- Access to health facilities
- Drainage of local area

**Tropical storm or cyclone:**
- Rainfall
- Wind speed (signal 1-3 = green, signal 3= amber and signal 4-5 = red alert)
- Number of affected people
Appendix 2: Survey questions
Expected to take 10-15 min.

ALERT – User Needs
This survey has been designed to 1) better understand humanitarian actors’ current demand for climate information and how this information is used in their preparedness planning, and 2) how climate information can be better tailored, packaged and communicated to users through the online platform ALERT to enable a more efficient, accurate and coordinated preparedness response.

The results from this survey will be used in a study on how ALERT users can better access and use climate information such as forecasts in their preparedness phase.

Background Questions
1. Which organisation do you represent*?
   Short answer text:________________

2. What is your professional title*?
   Short answer text:________________

3. Gender*
   □ M
   □ F
   □ Prefer not to say
   □ Other:________

4. Age*:
   □ 18-29
   □ 30-39
   □ 40-49
   □ 50-59
   □ 60-69
   □ Over 70

Thematic area 1: what is the demand for weather and climate information?
This section aims at understanding humanitarian actors’ current use and future demand for climate and weather information, and what role this information play in the organisations decision-making.

5. What are the top 3 hazards your organisation is working with*?
   (tick maximum 3 options)
   □ Floods
   □ Drought
   □ Tropical cyclone/typhoon
   □ Earthquakes
   □ Tsunami
6. How does your organisation currently plan preparedness activities for flooding, drought or cyclone impacts*? 
Long-answer text:__________________________________________________________________________

7. What type of information do you normally base your preparedness plans on**?
☐ Climate or weather forecasts
☐ Known natural cycles
☐ Government guidelines/contingency plans
☐ Organisational internal guidelines
☐ Donor requirement
☐ Monitoring information
☐ Other:_____________________________________________________

8. From where do you primarily get your current flood, drought or tropical cyclone information**?
☐ From media
☐ From national Meteorological Office
☐ From international forecasting centres
☐ From partner organisations
☐ From monitoring centres
☐ Other:_____________________________________________________

9. How do you reach information on forecast or monitoring regarding your hazards*?
☐ I receive email or phone calls with information
☐ Through the ALERT online preparedness platform
☐ Word of mouth
☐ I do online search through websites, etc.
☐ I send email or call known organisations/companies or people to get the information
☐ Other:__________________________________________________________________________

10. Are flood, drought and cyclone forecasts normally accompanied by advice, suggested actions or sector-specific warnings*?
☐ Yes, always
☐ Yes, most of the time
☐ Sometimes
☐ No
☐ Do not know

10a. If yes, can you provide examples of what the recommendations were?
Long-text answer:__________________________________________________________________________
10b. Did your organisation find them useful?
   ☐ Yes, all the time
   ☐ Yes, most of the time
   ☐ Sometimes
   ☐ No
   ☐ Do Not Know

10ba. Explain why or why not your organisation found them useful:
   Long text answer: ______________________________________________________

11. Rank how important you think climate and weather forecasts are for decision-making*?
   1= not at all, 10=the most important factor
   1 2 3 4 5 6 7 8 9 10

12. How accurate do you think that the information you use is*?
   1= not at all, 10=it is 100% accurate
   1 2 3 4 5 6 7 8 9 10

13. How useful do you think the forecast information currently available for your organisation is for your preparedness planning*?
   1=not at all, 10=they are very useful
   1 2 3 4 5 6 7 8 9 10

13a. Please elaborate on why.
   Long text answer: ______________________________________________________

14. Which type of forecasts do you usually use*?
   ☐ a) Seasonal (forecasts for 3-6 months)
   ☐ b) Sub-seasonal (forecasts for 20-40 days)
   ☐ c) Short term (forecasts for less than 10 days)
   ☐ Do not know
   ☐ We do not use forecasts

14a. If using SEASONAL forecasts, how much do you trust seasonal forecasts (forecasts for 3-6 months)?
   1= not at all, 10=I trust them 100%
   1 2 3 4 5 6 7 8 9 10

14aa. If using SEASONAL forecasts, how much do you rely on seasonal forecasts (forecasts for 3-6 months) in your preparedness planning?
   1= not at all, 10=I rely on it 100%
14b. If using SUB-SEASONAL forecasts, how much do you trust sub-seasonal forecasts (forecasts for 20-40 days)?
1= not at all, 10= I trust them 100%

1 2 3 4 5 6 7 8 9 10

14ba. If using SUB-SEASONAL forecasts, how much do you rely on sub-seasonal forecasts (forecasts for 20-40 days) in your preparedness planning?
1= not at all, 10= I rely on it 100%

1 2 3 4 5 6 7 8 9 10

14c. If using SHORT-TERM forecasts, how much do you trust short-term forecasts (forecasts for less than 10 days)?
1= not at all, 10= I trust them 100%

1 2 3 4 5 6 7 8 9 10

14ca. If using SHORT-TERM forecasts, how much do you rely on short-term forecasts (forecasts for less than 10 days) in your preparedness planning?
1= not at all, 10= I rely on it 100%

1 2 3 4 5 6 7 8 9 10

15. Does forecasts automatically trigger any form of action within the organisation*?
☐ Yes
☐ No
☐ Do not know

15a. If yes, at what level of forecast probability do you generally decide to trigger preparedness actions? (Checking if uncertainty in forecasts are considered)
☐ Below 30% probability
☐ Between 30-50% probability
☐ Between 50-60% probability
☐ Between 60-70% probability
☐ Between 70-80% probability
☐ Between 80-90% probability
☐ Between 90-100% probability
☐ Do not know
☐ Other: ________________________________

15b. If yes to 15, please elaborate on what type of preparedness actions are triggered at which level of probability for your prioritised hazards (e.g. floods,
Thematic area 2: what specific requirements of climate and weather information is needed?
This section is designed to identify which type of information organisations want in their preparedness planning, and how this information should be presented.

16. How long in advance do you need to plan and implement actions to avoid negative hazard impacts*? *(looking for lead-times)*
Long-text answer: __________________________________________________________

17. What kind of preparedness actions would you want to be able to do based on forecasts*?
☐ Accessing funding before impacts are shown
☐ Accessing emergency response funds
☐ Update Security Management Plans
☐ Trigger disaster risk monitoring
☐ Design contingency plans for different hazard scenarios
☐ Decide roles and responsibilities of ‘who will do what’ in different scenarios
☐ Design Standard Operational Procedures for different scenarios (what will be done when)
☐ Revise Standard Operational Procedures for different scenarios (what will be done when)
☐ Sort out logistics, e.g. prepositioning/restocking of goods
☐ Implement early response, e.g. cleaning gutters or delivering goods to potential affected households, on a low-regret basis
☐ Other: __________________________________________________________

18. What are the barriers to use forecasting and monitoring climate information*?
☐ The language is too technical
☐ Forecast and monitor information are not translated into local languages
☐ The timing to access information
☐ It is not enough time between accessing the monitor information and impacts
☐ It is not enough time between the release of forecast until impacts start showing
☐ The information is not accurate
☐ The forecasted information cannot be translated into actions
☐ Monitoring information cannot be translated into actions
☐ No funding based on forecasts for preparedness and early action
☐ The information is not tailored to my organisation’s needs, i.e. provide information relevant for my sector
☐ The information does not provide me with impact-orientated recommendations or impact scenarios
The information is not communicated directly to my organisation
- Forecast skill is not explained well enough to use it
- Forecast probability is not explained well enough for us to use the information
- Other: ______________________________

19. Have you heard of the ALERT online preparedness platform*?
- Yes
- No

19a. What functions would you like ALERT to have for improving access to climate and weather forecast information? (please list below)
Long-text answer: __________________________________________________________

19b. Which specific hazards would you like ALERT to link forecast and monitoring information to? (please list below)
- Floods
- Drought
- Tropical cyclone/typhoon
- Earthquakes
- Tsunami
- Other: ______________________________

19c. What type of weather and climate information indicators in the ALERT platform would you find useful for droughts?
- Seasonal forecast predictions of below normal rainfall
- Forecasts for late onset of rains
- Bi-weekly forecasts on dry-spells
- Indicators based on observations of delayed onset of rains
- Sub-national estimated malnutrition amongst children
- Global acute malnutrition rates
- Access to water for domestic use
- Other: __________________________________________________________

19d. What type of weather and climate information indicators in the ALERT platform would you find useful for floods?
- Seasonal forecasts predictions of above normal rainfall
- Monthly forecast predictions of above normal rainfall
- Weekly rainfall forecast
- Daily rainfall forecast
- Other: __________________________________________________________

19e. What type of weather and climate information indicators in the ALERT platform would you find useful for cyclones?
- Forecasted wind speeds ranging from 30-220kph
- Forecasted sub-national wind speeds
- Change of intensification of system and storm path
- Change in expected damage based on wind speed
- Typhoon signal strength
- Intensity of sub-national rainfall
- Estimated population affected
- Other: _______________________________

20. How do you think climate information would be best presented*?
☐ Through a power point presentation with a meteorologist present
☐ If the information was available in local languages
☐ Weekly report to INGOs
☐ Through the ALERT online preparedness platform
☐ If the information was presented through potential impacts that are relevant for the planning organisation
☐ If the information contained recommendations concerning planning and actions
☐ If the information contained sector-specific impacts
☐ If the information contained sector-specific recommendations
☐ Information explaining forecast uncertainty
☐ Other: _______________________________
Appendix 3: Interview-guide

This interview guide’s design is based on the themes of linking climate information to decision-making and the current use of climate information amongst ALERT users. The interviews are expected to take 30-60 minutes.

- Start interview by thanking the informants for taking their time to participate and introduce me and the aim of the study.

- Make sure that the respondent has received the information sheet and signed the consent form.

- Make sure that the respondent knows s/he has the right to stop the interview participation at any time. Double check that the respondent is OK with the interview is being recorded and transcribed?

Introduction questions:

1. What's your name/who are you?
2. What is your role in working for the XXX?

Context question:

3. Can you briefly tell me how your organisation prepares for and respond to climate hazards such as floods, droughts or cyclone?

Information

4. Does your organisation use climate information in your disaster preparedness?
   o If no, what information sources do you use and why?
   o If yes:
     ▪ From where do you get your information?
     ▪ What type of information do you use?
     ▪ How do you use it?

5. What factors determine if they should take action based on climate information?

6. Do you find the seasonal forecasts to be useful/usable when planning strategies to mitigate climate impacts such as floods, droughts or cyclones?
   o If yes, in what way?
   o If no, how could they become useful?
   o Is there any difference in forecasts for floods compared to droughts and cyclones?

7. Can you currently use forecasts to implement actions that has mitigating effects on an anticipated event or only for preparing response activates?
   o If no, why not?
8. Do you normally trust the climate information that you are given?
   o If not, how do you overcome issues of trust and how does it affect your
     DRR planning?
   o If yes, how do you normally take forecast uncertainty into consideration
     in the planning process?

9. Does your organisation take forecasting skill and forecast uncertainty into
   consideration when accessing and using climate information?
   o If yes, how?

10. How is the climate information that you receive packaged?
    o Do you receive information about early warnings or impacts in your
      region?
    o Is it different between different types of forecasts?
      ▪ If yes, what is the difference? And which ones do you prefer?

11. What are the challenges in forecasts that you as a user perceive exist in
    preparing for disaster?
    o What do you think is needed to overcome them?

12. Do you think that the usage of forecasts for DRR will increase in your
    organisation?
    o If yes, why?
    o If no, why?

Specific requirements

13. How do you select danger levels that trigger actions?

14. Do you currently have APAs (Advances Preparedness Actions) and MPAs
    (Minimum Preparedness Actions) uploaded on the platform?
    o If so, what kind of plans are they and what is the difference between
      them?

15. Can you explain the process of which you make a decision?

16. How far in advance do you perceive that you can act/prepare on a forecast?
    o What kind of actions do you implement based on a seasonal forecast
      (3-6 months)?
    o What kind of actions do you implement based on a monthly forecast?
      (sub-seasonal forecasts 20-40 days)
    o What kind of actions do you implement based on a short-term (less
      than 10 days) forecast?
      ▪ E.g. a weekly, 5-day, 72h and daily forecasts?
      ▪ Is there any difference between them?

17. Are you aware of situations where your organisation wanted to implement
    preparedness actions based on forecasts but could not?
18. What actions would you like to be able to implement using forecasts?
   o What would be the barriers to use forecasts to implement them?

19. Do you use the ALERT platform to access hazard information?
   o If yes, which functions do you use?
   o If no, why not?
     ▪ What do you think is needed to start using ALERT more?

20. Have you used ALERT's risk monitoring elements?
   o If yes, which hazards and indicators do you monitor?
     ▪ How useful are they / which actions can you implement based on them?
   o If no, how come?
     ▪ What would make you use it?

21. How would you like ALERT to be linked to forecasting services?

End questions

22. Is there anything you would like to add to the discussion we just had?

23. Do you have any documentation that you would like to share with me?
   (looking for internal studies, examples of forecasts, examples of recommendations, list of hazard indicators and potential impacts.)
Appendix 4: Focus group guidelines

The goal of the focus group is to 1) identify which information ALERT users currently use when making their preparedness planning, 2) enable a discussion amongst users and producers on what is needed for it to work better, and 3) how these ideas can be incorporated into the ALERT platform. The focus group will be limited to last between 1.5-2 hours.

Both climate information producers and ALERT users will be invited to participate in the focus group discussion. For Kenya, representatives from Kenya Meteorological Department (KMD) and ALERT users will be invited to participate. Kenya Red Cross (KRC) will also be invited to participate as they have some experience of working with forecast-based preparedness action (49). In the Philippines, representatives from Philippine Atmospheric, Geophysical and Astronomical Service Administration (PAGASA) and ALERT users will be invited. If suitable, other local/regional climate information producers might also be invited to participate in the focus-group discussion.

To enable a fruitful discussion, it is recommended that a focus-group consists of 8-12 people (54). In Kenya, there are currently 6 users registered to the ALERT platform and thus it would be suited to invite all of them, KRC and a representative from KMD. In the Philippines, there are currently 12 registered users, and therefore the selection of participants will be based on activity in the ALERT platform. A representative from PAGASA will also be contacted and invited to participate.

Areas of discussion

To reach the goal of the focus-group and to enable a good discussion, the focus-group is divided into three thematic areas.

1) Introduction and opening questions (20min): Getting an overview of for which forecast and monitoring information is used.
   - Start by outlining the structure of the focus-group, the overarching goal of the discussion and the topics that are going to be discussed.
   - Let everyone around the table briefly introduce themselves and their organisation.
   - Opening questions/ice breakers (aimed at getting an overview of their current usage of forecast information or monitoring information or something else):
     - What type of forecast and monitor information does your organisation use for making preparedness plans?
     - What works and what does not?
     - Do you see an increasing role of climate and weather information in DRR for the future?

2) The nitty-gritty of linking climate information to decision-making (30 min)
   - Continuing from the opening question, this session is aimed at going in depth of the practical details of what users and producers perceive as challenging to

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9 ForPAc, Action Aid, Norwegian Refugee Council, WeltHungerHilfe, HelpAge International and Christian Aid.
linking climate forecast information and decision-making. This is hazard specific and will focus on drought, intense rain leading to floods, and tropical cyclones.

- Questions for discussion:
  - How can we make what does not currently work to start working?
  - What is needed?
  - What is available?
  - Discuss uncertainty: How does users understand the probabilistic aspects of forecasts
  - What are the lead-times to each prioritised hazard (esp. flooding, drought and tropical cyclone)?
  - Do the orgs have different danger—levels and triggers?
    - If so, what are they?
    - Why are they chosen?

3) Incorporating climate information in ALERT (30 min)
- This sub-session aims at fennel down the general practical challenges and opportunities to see what role ALERT can play in addressing some challenges that have been identified in the discussion.
- Areas of discussion:
  - Explain that FbA/FbF is aimed at ultimately mitigate the effect of climate hazards by acting in advance while ALERT is a tool for orgs to do minimum and advanced preparedness for anticipated disasters. Based on this:
    - What role does ALERT have in FbA/FbF for users and producer? (What do they want to use it for?)
    - What type of information can producers share on ALERT?
    - What type of information do users want to access? (e.g. Impacts, recommended actions)
    - In what format is the information best digested?
    - On what basis is it likely that action should/will be triggered? (perspectives from both producer and user)
    - What information will trigger green, amber and red alerts respectively?
    - Should any of the alerts be triggered automatically?

4) Concluding remarks (10 min)
- This section aims at summarising the main points that come out of the discussion.
  - Let participants rate or mention/reflect on the most important discussion/lesson learned from the conversation.
  - Provide a summary.
  - See if anyone would like to add any final comments to any of the discussed areas.
  - See if anything was missed.

Group exercises:
- Session2:
- Allow participants to make lists of challenges and opportunities that they see in linking climate information with decision-making. The write out the list, rate them after top challenges.
- Make a scenario-play of barriers. E.g. One participant complains about why it is hard to act in advance and another participant is acting as the ‘expert’ trying to find solutions to the complaints. This scene will be used to open discussions for all the participants.

- Session 3:
  - Make a scenario-play where one of the ALERT users pretend to use the platform for a selected hazard (either flooding, drought or tropical cyclone). Let the participant go through the process of triggering action to identify where the gaps are and where the process is working well. Then this scene will be discussed by the rest of the group.
  - Allow participants to make lists of requirements desired in the ALERT platform that they perceive would better facilitate their decision-making preparedness process. Write out the list, rate them after top challenges, and discuss how these requirements could be formed.
Appendix 5: Terms of Reference

Terms of references - Research Assistant Position

Needs assessment for specific forecast information in ALERT

The ALERT consortium has designed technology for improving the way humanitarian agencies prepare for and respond to disasters. We are looking for a consultant or group of consultants to produce a research and analysis to explore the demand for and specific requirements of weather and climate information in two case study countries of the START ALERT project and also complement research on the NERC-DfID SHEAR consortium project ‘ForPAc’.

Context and project objectives

Being prepared to respond to an emergency is essential to reducing disaster related deaths and suffering. Whilst humanitarian agencies have made significant progress in their approaches to emergency preparedness, evidence suggests that they continue to be inadequately prepared to respond within the first hours of a disaster striking.

The ALERT project is a START Network project led by HelpAge International and supported by a consortium of humanitarian agencies and academic institutions (Islamic Relief, Handicap International, Care International, Concern Worldwide, Oxfam, Coventry University). With support from the Department for International Development (DFID), the ALERT project is part of an ambitious suite of projects joined together as the Disasters and Emergency Preparedness Programme (DEPP) which is designed to develop decentralized initiatives to capacity building and to improve the quality and speed of humanitarian response in countries at risk of natural disaster or conflict related emergencies.

The ALERT software platform aims to ease the burden of emergency preparedness by providing an information management system for the entire preparedness process. As a transparent system, humanitarian agencies (including international NGOs, national NGOs, local actors and donors) will have the capability to see and collaborate on the preparedness planning information of their country offices, partners and other agencies.

The ForPAc project is a complete end-to-end project on early warning and humanitarian action. The ForPAc consortium brings together world-renowned researchers in the UK and the East Africa with expertise in (i) forecasting science (KMD, ICPAC, MO, Ox, UoS), (ii) hazard impact analysis (KCL, UoS, APHRC, KMD) (iii) the socio-economic dimensions of vulnerability and resilience (APHRC, KCL, UoS), with the appropriate agencies mandated for operating Early Warning Systems (KMD, NDMA, ICPAC) and humanitarian preparedness action (NDMA, RC-K, plus NGO partners).

The overall aim of ForPAc is to improve risk preparedness by developing decision-relevant drought and flood risk information, and linking this with FbA methods that will be used to trigger risk reduction actions. ForPAc’s focus will be on the Greater Horn of Africa (GHA) and Kenya in particular, where the ForPAc consortium has
deep and long-term partnerships. Through understanding the risk preparedness decision-making processes and risk cultures at different levels and building on existing partnerships and systems it is possible to make significant advances.

**ALERT Research Assistant Position**

The consultant is requested to undertake a package of research and analysis to explore the demand for and specific requirements of weather and climate information in two case study countries of the START ALERT project and also complement research on the NERC-DfID SHEAR consortium project 'ForPAc'.

**Objectives**

To assess the demand for, and specific requirements, of weather/climate forecast information within the humanitarian agencies involved in the ALERT system. Work provides (i) the basis to define further priorities for ForPAc-ALERT engagement and (ii) evidence to inform guidance for ALERT users on using forecasts.

**Tasks**

The contract includes delivery of:

2) A survey of a sample START ALERT humanitarian agency partners regarding the role of hazard forecast information in their operations. Possible lines of enquiry:
   a. Current use of hazard monitoring information
   b. Current awareness and use of hazard forecast information, including the perceived limitations of forecast information and the barriers to its use
   c. Potential demand for forecast information
   d. Specification of the characteristics and features of information to make this usable in the ALERT system.

3) Focus group activities with ALERT members and representatives of climate information providers to explore in greater depth (a) the preparedness decision-making processes (b) the utility of various forecasts products

4) Key informant interviews with representatives of selected agencies to explore further the themes in 2) and 3) above

5) A 15 - 20 page / 10,000-word (maximum) report summarising the results and providing recommendations to both the ALERT and ForPAc projects on the opportunities for, and barriers to, the uptake for hazard forecasts by ALERT system users.
Methods

- (Task 1) Review on the use of forecast information disaster risk management by humanitarian agencies in Kenya and the Philippines, written in an easy to read note / policy brief style with figures, and with outcomes that should be easily transferable to the ALERT platform and bringing out best practices.
- (Task 2) Surveying using a free survey tool such as Survey Monkey, with questions and sample size to be agreed with HelpAge to minimise survey requests for ALERT members.
- (Task 3) Leading focus group discussions with key stakeholders from NGOs in question (most likely to be arranged in London). Focus group methodology will be mindful of the characteristics and approaches outlined in the Qualitative Research Guidelines Project - http://www.qualres.org/HomeFocus-3647.html.
- Key informant interviews to further explore points to emerge from literature review.

Surveys and focus groups following a semi-structured methodology to follow up on points to emerge from focus group discussions or deepen discussions with particular stakeholders.

Budget

- 50 days at £150 per day = £7500
- £2500 travel budget
- Total contract budget = £10,000

Schedule of milestones/deliverables

Task 1. 31/12/17
Task 2. 31/12/17
Task 3. 31/12/17
Task 4. 26/1/18
Task 5. 9/2/18