

Science for Humanitarian
Emergencies and
Resilience (SHEAR)
Scoping Study:
Notes from African Workshop



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SECTION 1

Introduction

1.1 Objectives and structure of this report

The objective of the Science for Humanitarian Emergencies and Resilience (SHEAR) scoping study is to provide the UK Government's Department for International Development (DFID) with evidence-based recommendations on future research priorities for risk assessments and early warning systems for weather-related hazards (e.g. cyclones, floods, droughts, landslides) for humanitarian and development purposes for low-income countries across Africa, South Asia and the Caribbean.

This report details the stakeholder engagement that was carried out via a visit to Kenya as part of the SHEAR scoping study. The objective was to ensure consultative engagement with stakeholders from Kenya who are representative of the target audience for the SHEAR programme, including end users, researchers and technical experts. The following meetings were attended and organized:

- A bespoke DFID SHEAR half day workshop was held on 29 January 2014 at the United Nations (UN). This workshop was attended by 25 participants working in the fields of early warning and risk assessments for weather-related hazards in Kenya and elsewhere in the Horn of Africa.

In collaboration with DFID, two additional meetings were identified for the consultation process which would enable representatives from as many African states as possible to be consulted. These meetings were as follows:

- A conference entitled "Strengthening technological capacities and information access for improving disaster risk reduction in the Horn of Africa" on 22 and 23 January 2014 organised by Wilton Park in Nairobi, Kenya. At this technical meeting there was 65 delegates from 14 countries
- A workshop entitled "Early Warning Early Action: Research at regional level and country case studies in Uganda, Kenya and Ethiopia - An evidence base to inform strategic investment in early action systems in the region" on 30 January 2014 in Nairobi, Kenya. This workshop was organised by the International Federation of the Red Cross and Red Crescent. This workshop was attended by some 50 delegates from countries in the Horn of Africa

This report provides a summary of the DFID workshop held at the UN. Separate reports have been produced by the organisers of the above two meetings. Appendix A provides a list of all the people who were engaged with as part of the workshop held on 29 January 2014.



SECTION 2

Summary of the workshop findings

2.1 Introduction

This objective of the workshop was to consult with a focused group of researchers and end users to map current research initiatives and to elicit views on priorities for future research. The half-day workshop was discussion based, with a small number of short presentations to stimulate dialogue. The workshop was organised into two sessions. The first session focused on the current situation and gaps in early warning systems and risk assessments for Africa. The second session concentrated on emerging research issues and ways in which these could be approached. Participants were split into four mixed groups based on their expertise (e.g. meteorology, disaster risk reduction, social science).

2.2 Session 1 – Current situation and gaps

The first session concentrated on the following two questions:

- What research areas are currently successful in reducing risks to people from weather-related hazards?
- What are the major gaps where more research is needed, especially in making a difference to those most vulnerable?

A summary of the four groups' responses to these questions is given below.

2.2.1 Current research areas that have been successful in reducing risks to people


Participants detailed the main research areas that they saw as being successful in reducing risks to people. These are summarised below.

Seasonal forecasts

The Horn of Africa is characterised by a high level of variability in rainfall. Climate change projections indicate that there is likely to be an increase in the already high rainfall variability across the region, which could result in an increase in the frequency of extreme weather events, including droughts and intense rainfall. Throughout Africa, the majority of smallholders are dependent on rainfall for agriculture. Changing rainfall patterns as a result of climate change can lead to a 'mismatch' in planting patterns and the farming calendar with respect to seasonal rainfall distribution.

Seasonal rainfall forecasts are one method of informing farmers of short-term weather dynamics such as 'below' or 'above normal' rainfall for the forthcoming season. Seasonal and sub-seasonal forecasts are important for the provision of early warning information and, if used by farmers, can enable them to adjust their planting seasons and farming calendar.

There was a consensus among workshop attendees that research into seasonal and sub-seasonal forecasting, coupled with recent technological developments, has increased the accuracy and reliability of the seasonal forecasts issued. However, there is still room for



improvement in the accuracy of forecasts and the ways in which warnings are communicated, particularly to the most vulnerable in society.

Vulnerability mapping

In Kenya there has been some vulnerability mapping of the country that was seen by some participants to have been successful. For example, mapping of livestock and agriculture can help with the allocation of humanitarian aid in periods of drought. However, it was also felt by many participants that there is a need to gather more information, especially in relation to the factors that have an impact on the vulnerability of the poorest members of society.

Flood early warning systems

With respect to early warning systems for floods, there has been successful work undertaken. In Kenya flash flood early warnings have been implemented based on the combination of a flash flood guidance method and a hydrological model. The research has developed a system that will be maintained and operated through a public-private partnership, including a mobile telephone operator, the national meteorological service, and an emergency relief service.

Participants also indicated that the research carried out as part of SERVIR-Africa was being used. SERVIR is a regional visualisation and monitoring system that applies earth observations and predictive models to support decision making in a range of application areas. SERVIR-Africa and the Kenyan Meteorological Department have carried out research to provide decision makers with flood forecasts with longer lead times than were previously available.

Use of mobile phones to disseminate warnings

Applications of mobile phones to provide cost-effective warnings were provided by many participants. Mobile phone technology has been used to develop a sustainable warning service that reduces the vulnerability of communities to weather-related hazards in the Lake Victoria Region. Mobile phones are also allowing Kenyan farmers and veterinarians to issue rapid alerts of possible disease outbreaks and to track vaccination campaigns.

2.2.2 The major gaps where more research is needed to make a difference for the most vulnerable members of society

A number of research gaps were identified by participants. These are detailed below.

Effective communication of warnings to the most vulnerable in society leading to early action

Many participants articulated that the uncertainty inherent in scientific information is one of the reasons for failing to act on disaster warnings. Information from forecasts is often in a language and format not easily understood by humanitarian workers or the local communities that need it. Participants indicated that there is a need for more research into the means and methods through which warnings can be communicated effectively and lead to early action. For some stakeholders there is a need to effectively communicate uncertainties, because, if these are not communicated, the results can sometimes be counterproductive.



Improving the accuracy and reducing the uncertainty in forecasts

It was widely recognised that there is a need to research how the accuracy of forecasts, especially seasonal and sub-seasonal forecasts, can be improved and the uncertainty in them reduced.

Assessment of the vulnerability at household level to weather related hazards

There was a consensus amongst participants that there was a dearth of information on the vulnerability of the poorest members of society to climatic extremes, such as droughts and floods. There is a requirement to improve research in this area, including on the factors that affect different stakeholders' resilience to natural disasters.

The assessment of risks using suitable vulnerability data

Risk assessments are often limited by a lack of suitable vulnerability data. There is more research to be done to develop 'fit-for-purpose' risk-assessment techniques using data and information that are currently available.

The assessment of risks for multiple and cascading hazards

Participants stated that multi-hazard risk assessments were often neglected in favour of single-hazard risk analyses. There is a need to take into account the interaction and cascading effects of natural hazards. Little research has been conducted in Africa into cascading hazards and risks – there is a gap in the research with respect to sequential consequences and the separation of the respective impact of each of the hazards in a cascading chain.

Cost-effective methods of disseminating warnings, including the use of mobile phones

Despite the fact that mobile phones are already being used to disseminate warnings, there is still more research to be carried out to improve the effectiveness of their use. Gaps that currently exist include:

- What is the capacity of current mobile phone infrastructure to facilitate communication with rural communities before, during, and after a natural disaster?
- How are mobile phones currently being used in disaster risk-management systems to mitigate the impacts of natural disasters?
- How will employing the use of mobile phones in disaster-management processes decrease the vulnerability of communities at risk to natural disasters?

Early warning systems for multiple hazards

There are few, if any, early warning systems in Africa that cover multiple hazards. There is a gap that needs to be filled by firstly looking at whether it is practicable and sustainable to set up early warning systems that cover multiple hazards.

Development of appropriate and affordable monitoring systems for weather-related hazards

There is a need to develop appropriate and affordable monitoring systems for weather-related hazards. The climate monitoring network in Africa is deteriorating and the density of the continent's weather stations is eight times lower than the minimum recommended level set by the World Meteorological Organisation. There is a need to adapt technology to local needs and to include local design and technologies to improve the coverage of monitoring networks.



Sustainability of early warning systems

The effectiveness of an early warning system is strongly determined by the extent to which it is people centred and whether it is 'end to end' so that it truly reflects and engages with the needs of those affected and most at risk at all stages in the early warning process. There has been limited progress in the development of 'end-to-end' early warning systems that are sustainable from a range of perspectives, including financially and technically.

Data collection and archiving

The collection, analysis and storage of relevant data (e.g. vulnerability data, hazard data) are often inadequate. The inadequacy of data can lead to poor planning, lack of institutional memory and improvement towards best practices. The lack of data can also result in a lack of effective monitoring and evaluation of disaster-risk trend analysis, as well as forecasts.

The use of crowd-sourced data is gaining momentum, with increasing internet connectivity and use of information and communication technologies (ICTs), such as mobile phones. Crowd sourcing can allow stakeholders to map and communicate what is happening on the ground, and to produce information that could be used by humanitarian workers.

Integrating indigenous early warning systems into scientific ones

It was noted that, while modern science provides reasonably accurate seasonal climate forecasts, many local communities still rely on indigenous knowledge to guide their planting, harvesting and other agricultural activities in order to minimise climate risk. Communities remain vulnerable, despite the availability of both indigenous knowledge and scientific forecasts. There is a further research need to address the integration of the two domains.

The role of ecosystems services in disaster risk reduction

There is a need to carry out further research into the multiple functions provided by ecosystems at different scales with respect to disaster-risk reduction. Ecosystems provide services that enable communities to cope with and recover from disasters. In some cases harnessing the adaptive forces of ecosystems is the most sustainable way to reduce risks to those most vulnerable. There has been little research carried out in this area in Africa.

Understanding of livelihood dynamics

The understanding of livelihood dynamics was seen as a gap by some participants. Livelihood systems and security within them need to encompass a broader range of factors than household food systems. There is a need to explain how and why people pursue particular mixes of strategies when confronting the risks posed by natural hazards.

There is also a need to understand what factors are really important for resilience of different communities including:

- Pastoralists
- Farmers
- Communities reliant on forests
- The urban poor

There is also a need for a more detailed understanding of specific livelihood zones. The point was made that there is a difference between drought and prolonged dry seasons. There are variable risks that result from socio-economic differences, and there is a need to understand how to respond to different crises before they strike.



2.3 Session 2 – Emerging future research priorities and research approaches that best meet user needs

The second session concentrated on the following two questions:

- In the light of the previous discussions detailed in Section 2.2, what are the future research priorities that are emerging?
- What types of research approaches would best meet user needs?

2.3.1 Emerging future research priorities

The participants detailed what they regarded as being the emerging research priorities. These are detailed below.

What factors influence decision making

Many participants felt that there was a need to further research the factors that influence decision making in order to ensure early action to early warnings. There is a need to research the following:

- The information needs of decision makers, as well as a range of other stakeholders;
- How sources of information influence decision making, including: the quality of the information; how consensus can be reached; the accessibility of information;
- Downscaling information that is available at the regional scale and how it can be communicated.

Link to technology and coping strategies

Natural hazards result in affected households which are trying to cope with their impacts. There are numerous coping strategies employed (e.g. from reducing current consumption to disposing of productive assets). There is a need to research how ICT technology, including the use of mobile phones, can improve coping capacities. One use of technology may be to make widespread micro-insurance products viable in future for the most vulnerable and poorest members of society (e.g. micro-agricultural insurance validated and paid for via mobile phones). Many of these products are relatively new; hence, more research is required into how these would improve coping capacities to natural disasters.

Inter-disciplinary and inter-sectoral research into risk assessments for weather-related hazards

There is a need for more inter-disciplinary and inter-sectoral research into risk assessments for weather-related hazards. This includes methods for improving both data availability and sharing, and the development of relevant methodologies.


Capacity to respond

There is a need to research how the capacity to respond can be improved. This should focus on various types of natural disasters in order to explore the gaps in current response capacities for a range of stakeholders.

Improvements in modelling

There is a need to further improve models that form the backbone of early warning systems. Participants stated that there is a need for more research to improve the accuracy of:

- Numerical weather prediction (NWP) models;

- 
- Global circulation models (GCMs);
 - Hydrological models.

There is a need to carry out capacity building activities and put the relevant infrastructure in place so that these tools can be used effectively. Many participants mentioned that research into improving the downscaling of climate model results was also required.

Political and institutional barriers

Further research is required on the institutional and political barriers to achieving effective disaster risk reduction and early warning systems, for example on how can strategies be developed that create incentives and encourage funding of these systems, and how policies can be implemented that create an enabling environment.

Coordination of early warning systems

There is a need to further research how to implement multi-hazard early warning systems based on best practice and the latest applicable research, and how warnings can be effectively coordinated.

Social-economic data for risk assessments

There is a paucity of socio-economic data on which credible risk assessments for weather-related hazards can be based. There is a need to research how these data can be collected and used in a cost-effective and sustainable manner.

Pastoral livelihood systems

Pastoral livelihood systems are based on the three following three pillars:

- Natural resources (i.e. water and pasture in drylands);
- People (i.e. family and institutions);
- Assets (i.e. livestock).

Further research is required to understand each of these pillars and the relationships between them in order to identify ways of increasing the resilience of pastoralists to weather-related hazards.

Downscaling risk and impact assessments

There is a need for further research into risk and impact assessments for natural hazards. Part of the problem is that the capacity to tailor information to decisions is limited. Stakeholders often require the risks or impacts posed by a weather-related hazard for a particular town or relatively small spatial areas, which are generally not available. More research is required to investigate pragmatic and useful ways of downscaling information so that is useful to a range of stakeholders, while simultaneously remaining accurate enough to provide credible information.

Improvements in the understanding of the main drivers of rainfall mechanisms

There is a requirement to carry out research to improve the large-scale drivers of rainfall variability over Africa. Comparatively, research in certain regions has been neglected primarily because of a lack of suitable data. Further work is required to establish how local sea surface temperatures and meso-scale convective systems affect seasonal and sub-seasonal rainfall patterns.



Integrated warning communication mechanisms, including feedback inclusion processes

Many participants stated that there was a need to improve communication and information exchange among stakeholders at risk areas, and to research how 'feedback' from communities could be used to improve the integration of warnings and early warning systems.

2.3.2 Research approaches that best meet end-user needs

The key points made at the workshop in terms of how research approaches met end-user needs were that they should be developed along the following lines:

- There needs to be a focus on applied research, putting communities at the centre of research programmes;
- The findings of research should be linked to operational budgets with a commitment to 'operationalise' the outputs;
- There should be an inter-disciplinary approach with multiple stakeholders;
- Research should take place at the regional level, rather than focusing on specific countries.

Annex A Workshop attendees

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