



SHEAR KNOWLEDGE BROKER TEAM FROM
RED CROSS RED CRESCENT CLIMATE CENTRE
AND PRACTICAL ACTION CONSULTING



Contents

This reporting period has been an eventful one. Between the coronavirus pandemic and a particularly severe natural hazard calendar, the importance of translating science into practice in order to anticipate, prepare for, and respond to disasters, is made ever more clear. Different applications of science to the humanitarian sector are being advanced and promoted by SHEAR researchers around the world who are developing tools, publications, and relationships to enable practitioners and communities toward resilience. In this reporting period, this work has been particularly effective. In this short document are summarized a few of these stories of impact – with many more to come.



Knowledge Products

In order to capture the lessons, learnings and research findings from SHEAR, the knowledge broker has developed a series of knowledge products that have been disseminated broadly at key events and among the humanitarian and development sector. Some of these products include: [A Practical Guide on Seasonal Forecasts](#), a new series of podcasts “[Can’t take the Heat](#)” which showcase a variety of SHEAR research, a [Thesaurus of Early Action](#) in partnership with OCHA, and an overview of [the use of social media in early warning systems](#). Additionally, the new RCRC Climate Centre guidance notes on [Forecast-based Financing and Early Action for Drought](#) showcases several SHEAR projects outcomes. SHEAR projects have also contributed to a new guide “[Future of Forecast: Impact based Forecasting for Early Action](#)”. In 2020, some of the key events in which SHEAR research will be highlighted include: The World Bank GFDRR Understanding Risk Forum, The Red Climate Summit of the Red Cross Red Crescent, the American Geoscience Conference and the Anticipatory Action Dialogue Platforms, among others.

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Improved Risk Awareness

Strong progress has been made in the generation of new and more reliable science, data and tools. SHEAR projects have improved the understanding of the characteristics of specific hazards, of the risks that hazards pose to vulnerable communities, and of the impacts on livelihoods, infrastructure, public assets and natural resources caused by natural hazard-related disasters.

Examples of improved risk awareness include the assessment of tropical cyclone frequency and behaviour in sub-Saharan Africa ([PICSEA](#)), boulder landslides in rivers in Nepal ([BOULDER](#)), as well as development new short-term forecasts of convective activity and also potential flood impacts and risk in Senegal ([NFLICS](#)).

Our understanding of the risk that these hazards pose are compiled into usable information and analysed by a variety of projects, forming the basis for decision-making about anticipation and response. Notably, the risk of large landslides in Nepal is now being tracked by automatic tipping-bucket rain gauges and LiDAR river level sensors by the [Landslide-EVO](#) project as well as at a country-wide scale through an automated landslide mapping that uses machine-learning techniques (Earthquakes and Landslides in Nepal). Similarly, newly installed weather stations in Kampala have also contributed to better understanding of urban flood risk (Towards Resilience).

Many SHEAR projects have also undertaken the complex process of mapping these different hazards through risk maps; for instance, in Sub-Saharan Africa, ForPAC is gathering data and mapping and improving multi hazard risk maps in order to better assess flood and drought risk.

Finally, SHEAR projects are emphasizing the importance of linking hazard knowledge to the understanding and prediction of hazard impact. For this, new models have been developed this year by SHEAR projects to analyse the impacts of different types of flood events (Towards Resilience) and heatwaves (COSMA) in the major urban centres of Kampala and Colombo. The impacts of drought and flood cycles in arid and semi-arid environments are also being characterised by an innovative approach which looks at reservoir sediments in Southern Africa ([Connect4WR](#)). A numerical model for precipitation has also been developed to integrate remotely sensed soil moisture levels into estimates of agricultural drought, supporting the identification of and response to drought events ([SATWIN-ALERT](#)) and research has significantly advanced on the understanding of the use of Vegetation Condition Index as a key indicators for early action ([ForPAC](#)).

TOWARDS FORECAST-BASED PREPAREDNESS ACTION WITH FORPAC

ForPAC is a SHEAR-funded project in Kenya that aims at developing forecast-based action for droughts and floods, help decision-makers in the anticipation and planning for these hazards, and this way reduce risk and increase resilience. The researchers are developing crucial drought early warning systems in rural Kenya, supporting the development of a flood early warning system in Nzoia river basin, and examining the impact of urban flooding in Nairobi. The work from ForPAC has had impact on a range of other projects, notably the forecast-based early action programs by the Red Cross Red Crescent.



Improved Disaster Preparedness

TOWARDS DEVELOPING USABLE DISASTER PREPAREDNESS AND RESPONSE TOOLS WITH FATHUM

FATHUM (Forecasts for Anticipatory Humanitarian Action) is a large collaborative project between universities in the United Kingdom, Uganda, Germany, Mozambique, and the Netherlands along with international organizations such as the RCRC Climate Centre and the World Food Program. Its overarching aim is to build understanding of flooding, and our ability to forecast the hazards, in Mozambique and Uganda in order to support the development of forecast-based financing and early action, enabling both anticipatory response and long-term preparedness and resilience.

Scientific knowledge and tools developed by SHEAR are being applied by decision makers to prepare for, respond to and recover from disasters.

In terms of preparedness, SHEAR projects have fundamentally contributed to the development and analysis of hydro-meteorological data which are being used at national and municipal levels. Examples include the application of data collected and analysed by [Connect4WR](#) and Towards Resilience in the design of new government projects in Botswana and Kenya. The 10 ICPAC member countries (Burundi, Kenya, Rwanda, Uganda, Sudan, South Sudan, Ethiopia, Somalia, Tanzania and Djibouti) now make their seasonal climate forecasts using climate modelling methods informed by SHEAR science (ForPAC). The knowledge developed by SHEAR projects has also contributed to the development of the [Drought Guidance Notes](#) being now used as a reference in ongoing Red Cross Red Crescent Forecast-based Financing drought programmes; influence of SHEAR projects in this conversation can be found on the [SHEAR blog series](#). Another notable report by the Overseas Development Institute and the World Food Programme, developed from SHEAR research, is [the evidence base on anticipatory action](#) (FATHUM). This report has had a significant influence in the operations of all the anticipatory community of practice (Early Action Task Force, REAP and Anticipation Hub). The Red Cross Red Crescent has been a key user of SHEAR research outcomes (ForPAC and FATHUM) where advances in forecasting and trigger development has been part of the Early Action Protocols of national societies in Kenya, Uganda, Mozambique and Bangladesh.

SHEAR projects are also contributing to essential disaster response. For instance, the real-time flood hazard reports developed by FATHUM were used by humanitarian agencies in Mozambique following Cyclones Idai and Kenneth and shortlisted for the 2019 Times Higher Education awards ([FATHUM](#)). Similarly, 40 NGOs in Pakistan and the Philippines have also used guidance notes produced by SHEAR during heatwave and cyclone events this year (IRIS). In India, SHEAR is also working to co-produce a closed pilot of experimental, prototype landslide forecast bulletins throughout the monsoon with the Geological Survey of India ([LANDSLIP](#)).

Finally, SHEAR projects are supporting important recovery processes after disasters. For instance, supporting the assessment of impact, the successful pilot of SHEAR's methodology for participatory agro-climatic indices has now been rolled out across three districts in Malawi ([IPACE-Malawi](#)). Districts in Uganda are now adopting key recommendations from the findings of the [NIMFRU](#) livelihood baseline survey to better identify the type of response to hazards required and most effective. As well, UN agency World Food Programme and insurance broker Risk Shield are using SHEAR tools to manage insurance schemes which target over three million farmers in Zambia – and they are now being taken up in Namibia and Kenya ([SatWIN-ALERT](#)).



Improved Capacity

TOWARDS CO-IMPROVING CAPACITY THROUGH RESEARCH AND RELATIONSHIPS AT LOCAL AND NATIONAL LEVELS WITH CONNECT4WR

Connect4Water Resilience is a multidisciplinary project on droughts and floods in the Limpopo Basin in Southern Africa that examines the interactions between the physical and social causes of vulnerability in order to improve preparedness and bolster resilience to future hazards. Three main components of the project include assessing hydro-connectivity at the basin scale, assessing social connectivity between local communities and government institutions, and combining these two dimensions to build solutions that reduce impacts and increase benefits of climatic patterns. An overarching aim is to strengthen the relationship between scientists and local water managers and stakeholders at different scales.

SHEAR projects are working alongside partners in mandated agencies, non-governmental organisations, Red Cross Red Crescent Societies, and communities to build capacity so that the knowledge and tools produced by the programme can continue to have an impact on preparedness and resilience in the long term.

Improved capacity is occurring in decision-making thanks to SHEAR projects. For instance in Kenya where ForPAC has facilitated a series of workshops which introduced, discussed and demonstrated the skill of optimised seasonal forecasts for preparedness actions, workshops that were attended by a wide range of stakeholders including representatives of government ministries, UN agencies, non-governmental organisations, media outlets, and community groups.

SHEAR projects have also contributed to the capacity to monitor and map hazards. For instance, in Nepal, SHEAR is working with the National Society for Earthquake Technology to build capacity in landslide mapping and modelling, as well as local level field monitoring to complement the use of satellite data (Earthquakes and Landslides in Nepal); at local levels, stakeholders have participated in OpenStreetMap training and municipal level DRR plan preparation, and a communication chart for local-level landslide early warning system is in development (Landslide-EVO). In Uganda, training on use of ICT is also taking place as researchers at Makerere are training in the use of the open-source QGIS programme; project partners have also collaborated on the installation of weather stations and have been trained to maintain the equipment and download the data (Towards Resilience). In India, a method for recording landslide occurrences has been

developed and training delivered at local and District level to build the capacity of community members, NGO staff and government officials to collect better quality and quantity of landslide data, which can feed into the national Geological Survey of India database and improve landslide forecast models (LANDSLIP).

Finally, a fundamental component of SHEAR pertains to knowledge exchange and cross-learnings. A good example of this component is of a hydrologist at the Department of Water Affairs in Botswana who is now representing the DWA as part of a trans-boundary groundwater management project after participating in training by the [Connect4WR](#) project. [FATHUM](#) brought 4 government scientists to Reading University to build capacity and foster joint research and application of research. This relationship-building is also emphasised for example in Malawi, where the development, trialling and implementation of the participatory agro-climatic indices methodology has involved the input of MSc students and Malawi Red Cross staff ([IPACE-Malawi](#)). Similarly, key stakeholders in India, including the Indian Met Department, Geological Survey of India, and Indian academic researchers such as Amrita University, work in close partnership with SHEAR, ensuring mutual capacity development between partners based in the UK and India ([LANDSLIP](#)).

→ Improved early warning and early action

The improvements in science, application, and the influence on national policy of SHEAR projects are leading to improved early warning and early action. Significant progress has been made towards achieving this impact.

Notably, in Africa, the [FATHUM](#), HYFLOOD and PICSEA teams collaborated to provide real-time emergency flood bulletins to DFID and partner humanitarian agencies responding to Cyclones Idai and Kenneth. The bulletins provided probabilistic information on the predicted tropical cyclone tracks and the amount and spatial extent of rainfall, alongside flood forecast information using the Global Flood Awareness System ([GloFAS](#)). These bulletins were used to inform decision-making and early action in Mozambique, improving response by providing key information about the areas which would be most affected. FATHUM researchers also co-designed early action triggers in Uganda with Uganda Red Cross, to ensure that early action will happen before a potential disaster. In India, [LANDSLIP](#) has made considerable progress in improving the lead time possible for forecasting the likelihood of landslides occurring, by trialling a novel method of using weather patterns, allowing

forecasts up to 14 days in advance. The LANDSLIP project has also been developing forecast bulletins for rainfall-triggered landslides, which are being trialled experimentally in real time within a prototype system over the 2020 monsoon, which will serve to a) build the capacity of the Geological Survey of India to interpret complex forecast information and disseminate appropriate forecast information, and b) support decision-makers in local government to take early action in response to warnings. In Bangladesh, [FATHUM](#) has contributed to the development of a Forecast-based Financing trigger for floods, which has enabled the first large scale joint anticipatory action for floods funded by the UN Central Emergency Fund and Forecast-based Action by DREF of the Red Cross Red Crescent. The UN released US \$5.2 million in funding for early action based on these triggers.

→ National Policy Influence

Through all these projects comes a significant amount of influence on national policy.

A concrete example of this occurred in Nepal this year: the National Reconstruction Authority has this year committed to adopting maps produced by SHEAR using a new high resolution Digital Elevation Map dataset which will support

decision making around landslide risk for the NRA and the Ministry of Home Affairs, integrating the new knowledge produced by the programme into national level policy and planning (Earthquakes and Landslides in Nepal).

INCREASED EXPOSURE THROUGH PUBLICATIONS

Many new publications by SHEAR-researchers could be highlighted here but notably those authored and co-authored by the SSC cohort of PhD students.

Hossain et al. 2019. [Hydrometeorological drivers of the Brahmaputra basin in Bangladesh](#). *Hydrology and Earth System science*.

Newell and Taylor. 2020. [Fiddling while the Planet Burns? COP25 in Perspective](#). *Globalizations*

Docherty, et al. 2020. [A framework for understanding water-related hazards in a sustainable development context](#). *Progress in Physical Geography: Earth and Environment*.

Paul, Buytaert, and Sah. 2020. [A Technical Evaluation of Lidar-Based Measurement of River Basin Levels](#). *Water Resource Research*.

Barrett et al. 2020. [Forecasting vegetation conditions for drought early-warning systems in pastoral communities in Kenya](#). *Remote Sensing of Environment*

