Reality of Resilience is an initiative run by the BRACED Knowledge Manager. BRACED aims to build the resilience of up to 5 million vulnerable people against climate extremes and disasters.

www.braced.org/reality-of-resilience

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BRACED KNOWLEDGE MANAGER

Reality of Resilience

LEARNING FROM CLIMATE EXTREMES

Reality of Resilience facilitates the generation, collection and dissemination of real-world examples of resilience interventions during floods and droughts.

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INTRODUCTION

Extreme events produce crucial moments for reflection and learning that can provide a testing ground for what works well (and not so well) for building resilience during an actual climate shock or stress. Reality of Resilience is an initiative that supports the generation, collection and dissemination of evidence on resilience during and after extreme events.

It is a new approach to learning, piloted in the UK government's largest resilience programme, BRACED, which is made up of 15 consortia working on resilience strengthening projects across 13 countries in Africa and South Asia. Throughout the three-year BRACED programme the methodology for Reality of Resilience is refined and adapted, based on lessons from implementation.

HOW DOES REALITY OF RESILIENCE WORK?

Taking advantage of the new and innovative approaches and interventions employed by BRACED consortia, Reality of Resilience offers the opportunity for a diverse set of partners to convene in order to learn about what works to build resilience. It functions as follows:

1. The BRACED Knowledge Manager (KM) monitors satellite information, rain gauges and flood models to detect where extreme rainfall may lead to flooding, and where lack of rainfall or soil moisture deficits may lead to drought.

2a. When a predefined threshold is exceeded, the BRACED KM sends a notification of a possible extreme event to partners on the ground, who verify the remotely sensed information.

2b. Alternatively, partners on the ground inform the BRACED KM of an extreme event and this information is verified using meteorological data.

3. This notification initiates information gathering by a regional network of journalists, resilience project implementers and thematic experts, who document and share a) how project interventions may have helped vulnerable people anticipate, absorb and adapt to the extreme event, possibly avoiding disaster and b) what can be learned from this experience.

The evidence generated through Reality of Resilience is compiled on the BRACED website at braced.org/reality-of-resilience. It takes the form of news articles, videos, blogs, case studies and photographs. Local partner organisations, the science community and others working on climate resilience are invited to contribute content about extreme events. Various channels for engagement and dialogue, including webinars, discussion fora and presentations at key policy and practitioner fora, are offered. These encourage conversation and learning within development, climate and disaster communities about resilience and adaptation to climate extremes and disasters.

Documenting post-extreme events contributes to the evidence base for resilience interventions that are effective locally and could potentially be scaled up. The process provides an opportunity for project implementers to reflect on and adapt their practices based on what works and what does not during and after an extreme event. Ultimately, these lessons can be amplified at the policy-level to benefit entire regions and countries by equipping decision-makers with the information that supports truly climate-resilient development.

The following guide to developing a Reality of Resilience system is intended for those working in disaster management, development and/or climate change adaptation. Reality of Resilience is primarily a learning tool used to identify floods and droughts after they have occurred. Given the need for a simple way to monitor the occurrence of extreme events over a vast expanse of area, the information obtained is at a coarse resolution and represents conditions following a possible extreme event. This system is not recommended to provide any kind of warning to communities about an extreme event.

This report remains a living document, which will be updated as new technologies for monitoring hazards are developed and lessons are learned through the application of this system. Additional methodologies for monitoring hazards, such as heatwaves and dust storms, may be added according to demand and feasibility.

WHY IS REALITY OF RESILIENCE TIMELY AND IMPORTANT?

Devastating floods, scorching heatwaves, and debilitating droughts are increasingly becoming common place across the world. In parallel, non-governmental organisations (NGOs) and governments are implementing projects and policies to better understand how those most vulnerable can adapt and build resilience to climate extremes and disasters. Urgency is building, as this knowledge will enable a scaling up and replication of measures currently being tested, in order to respond to the growing threat of a changing and more extreme climate.

Reality of Resilience takes advantage of the critical time period immediately following an extreme event, to document how resilience interventions are working in expected and unexpected ways. This provides an opportunity to highlight instances where a meteorologically extreme event has occurred, but few people have been impacted. Similarly, it offers an opportunity for 'learning-by-doing', by revealing when an intervention has not been working as expected and allowing projects to adapt to new information and stressors.

For example, a project might have implemented an early warning system to anticipate river flooding. Here, Reality of Resilience provides the tools to observe whether or not prior warning effectively reached the intended audiences and if appropriate action was taken. A post-flood interview may reveal, for example, that female-headed households did not receive the early warning because they did not have access to radio, often the primary mode of dissemination. It may be that the warning reached nearby towns that were not actually forecasted to flood, and the early action many people took to protect their livestock and houses was in vain, resulting in different kinds of losses (such as time or resources diverted from other essential services). Perhaps people did receive the warning, but have gone on to take no action in response because they continue to be unsure of what they can do. All these scenarios present instances where important lessons can be used to make improvements to projects.

In this way, extreme events can help confirm expected behaviours, reveal unexpected ones or highlight how differences between people (such as gender, age and social standing) influence the outcomes of a project intervention.

The post-extreme event landscape is rich with opportunities for learning that are often not documented or shared with the wider resilience community. This leads to repeated mistakes and missed opportunities to scale up effective approaches. Reality of Resilience is the first system that convenes climate scientists, journalists, regional and thematic experts to document and disseminate the challenges and successes associated with building resilience in the face of climate shocks and extremes, with a focus on honest learning.

SEVEN STEPS FOR REPLICATING THE REALITY OF RESILIENCE SYSTEM

Step 1: Define types of extreme events

BRACED's Reality of Resilience currently focusses on floods and droughts, but many other types of extreme events may impact the region in question. Events that occur most often or have the greatest impact are often of interest, and the global disaster database, EMDAT, can be an important resource for identifying these kinds of natural hazards. National or regional stakeholders, such as Hydro-Meteorological Services, are also a useful source of information. When choosing which types of events to focus on, it can also be useful to consider the purpose of the desired learning. For example, the choice may be obvious for course-correcting a project that is already underway and focuses on one specific type of extreme event. However, for long-term learning within a community, it may be most useful to research the types of extreme events that are projected to occur more frequently in that community in the future.

Step 2. Choose the monitoring system

Technological advances enable us to monitor weather events that happen thousands of miles away. For example, we can use satellites orbiting the earth to fairly accurately estimate variables that can indicate information such as where and approximately how much rain is falling. These monitoring systems can be coupled with news and social media networks to provide information about what is happening around the world in near real-time.

A review of available climate and weather-related information systems reveals three major categories: remote monitoring systems, forecasting systems and ground-based reports. Remote monitoring systems are simply tools that can be used to monitor a particular variable from a distance. They are integral to Reality of Resilience because they separate the extreme event from the other two components of disaster risk: the exposure and vulnerability. This separation allows for an attribution of the impacts of the event (or lack thereof). For example, if a weather event is found to occur almost every year, but severely impacts many people, those impacts can be largely attributed to the high vulnerability and exposure of the community rather than the extremeness of the weather event.

Reality of Resilience aims to use remote monitoring systems to identify extreme events that are meteorologically extreme, but may not result in devastating impact. This is because the populations and infrastructure may not be exposed and/or vulnerable to this extreme event. This type of event rarely receives media coverage or attention. However, it provides key opportunities to learn about why communities are resilient and how the identified extreme event **did not** result in disaster.

Conversely, ground-based reports are also useful because they allow us to identify events, typically where people have been highly impacted, and assess if the weather or climate event that caused the impact was meteorologically extreme.

Finally, forecast information, while integral to those implementing resilience-building interventions on the ground, is not used in Reality of Resilience. This is because forecasts provide information about what the weather will be like in the future; instead, Reality of Resilience focuses on extreme events that have already happened.

A sample list of monitoring systems can be found in Annex 2. Each monitoring system has been categorised by frequency of updates, skill of detection, geographic coverage, hazard type and resolution. This list can be narrowed by defining organisational needs under these criteria and prioritising by order of importance. For example, it may be essential that the chosen monitoring system assesses drought and has global coverage so it can detect an event across multiple continents, but it may not require near real-time updates. The monitoring systems chosen will therefore likely vary between organisations, depending on these priorities.

Step 3. Define thresholds

In order to detect an extreme event, it is necessary to define what an 'extreme event' means in reference to the chosen monitoring system. Many extreme event monitoring systems will include internal thresholds of what is considered dry enough to constitute a drought or wet enough to constitute a flood. For example, a system may flag an area as flooded if the amount of water that a satellite detects over that area exceeds the 95th percentile, meaning that the detected amount of water only occurs in this area about 5% of the time.

However, those internal thresholds may be inadequate for the purpose of identifying sufficiently extreme events. For example, a flood monitoring system may identify all minor runoff events as 'floods'. In this case, it may be necessary to set an additional threshold on top of the one already established in the monitoring system. Choosing this threshold is subjective, but it is helpful to think about how often, on average, this threshold would be reached (the return period of the event) and how often a notification to regional partners should be triggered. Based on this, it is possible to choose a sufficiently uncommon threshold that is only reached about as often as post-extreme event information is able to feasibly be collected.

Step 4: Set practical protocols for monitoring extreme events

False alarms, where a monitoring system 'observes' an extreme event when one is not actually occurring, are inevitable with imperfect monitoring systems. For example, areas that have received heavy rainfall, but where water levels have not yet risen to cause inundation, can sometimes be identified as flooded. In other cases, monitoring systems are unable to identify certain types of water events, such as flash flooding.

Practical protocols can be set, using the thresholds from the previous step and multiple sources of data, to reduce the number of false alarm notifications sent to regional partners on the ground. Multiple false alarm notifications can lead to regional partners' mistrust in the monitoring system. This makes it important to be aware of the false-alarm rate of the chosen monitoring system and also communicate it. This will provide a realistic expectation of how often the observed event will turn out to be incorrect.

Reports of storms, heavy rainfall or flooding in the local news – as well as local weather station information – can be incorporated into monitoring protocols and used to corroborate satellite information before a notification is sent to partners on the ground.

Step 5. Establish a regional network of partners

The Reality of Resilience initiative depends on a network of key informants engaged in monitoring the impacts of extreme events on the ground and learning about resilience. It convenes partners with different areas of expertise, geographic location and language. These include journalists, NGO field staff and regional experts who work towards common goals of understanding what is effective at reducing impacts from climate extremes and disasters. It then uses that evidence to implement better resilience-strengthening strategies. A regional network of partners provides the crucial connection to what's happening on the ground in order to tell the stories of resilience.

Ensuring the regional network of partners has a thorough understanding of Reality of Resilience – how it works and why it is important – is crucial to ensure active participation and engagement. The lessons and stories of resilience after an extreme event must come from local communities and project implementers, as these are the stakeholders who best understand the local vulnerability and exposure context.

Creating a strong regional network requires face-to-face time and good explanatory materials to help explain the context to new partners who join.

Step 6. Generate and collect evidence

Post-extreme event stocktaking of interventions needs to be completed with the utmost sensitivity to those impacted. While BRACED's Reality of Resilience reports on the meteorological extreme event as it happens in near real-time, the evaluation of resilience-strengthening interventions and impacts on communities is done in accordance with the wishes of those impacted by the event.

Knowledge is divided into four domains: the extreme event, project interventions, impacts on people and learning. Once an extreme event notification is sent, the Reality of Resilience team works with the regional network of project implementers, regional experts and journalists to establish an evidence base around it. This evidence is collected through a variety of methods and posted on the BRACED Reality of Resilience webpage in the form of blog posts, news articles, pictures and videos.

To define the kinds of post-extreme event information that would be useful, the Reality of Resilience team focus on these four domains to guide their questions; the regional network then conducts interviews with key informants who are identified by project partners as having knowledge of day-to-day project activities and events on the ground.

Within the BRACED model, identified regional engagement leaders interview regional experts with a set of questions. They also gather pictures and videos during and after the event to support their post-climate event stories. Regional experts include those focused on climate and weather, including the National Met Office, along with service officials and agriculture extensions agents, as well as experts on related areas, such as livelihoods, food security and disaster management.

Journalists are also key players in collecting information after an extreme event. When available, they interview community members to understand how the extreme event impacted their homes, livelihoods and families, and to find out if a resilience project, policy, social network or indigenous coping strategy helped to reduce the impact of the extreme event.

It is understood that there is a potential for bias in the information collated. To mitigate this risk, all evidence collected follows the BRACED KM Quality Assurance strategy and data protocols. Evidence for Reality of Resilience follows a rigorous peer review process to improve its quality. In addition, perspectives from a wide variety of sources, including disparate viewpoints, are made available through this initiative. Critical engagement with the evidence collected and opportunities to debate and discuss different interventions will encourage readers to draw lessons from this work.

Step 7. Share lessons and link to practice

Once lessons have been identified, they can be shared, discussed and further reflected upon with regional partners, other consortia and practitioners working in the climate change adaptation and resilience fields. Incentives can encourage greater uptake in the learning process to actively learn from what has been proven as effective and move away from the 'business as usual' approach.

The BRACED KM facilitates learning processes following extreme events by offering platforms such as discussion fora and webinars, as well as an internal Learning Lounge to allow project implementers gain insights and experiences from one another and also provide a platform where they offer their own expertise and inform a wider audience about their successes and challenges.

Evidence collected around an extreme event is synthesised into case studies, co-written with partners who experienced and learned from the extreme event. The case studies provide a medium for learning practical lessons that will prove useful at various levels, from the individual to national and international organisations, as people try to respond to extreme events and disasters, and adapt to climate change. These case studies are shared using various dissemination channels, including social media, newsletters and the BRACED website.

Lessons can also be shared through journalism and media channels. For example, an article written on flooding in Senegal by a freelance journalist was shared on Reuters' newswire and reprinted by many news outlets, reaching a wide audience. Through continued engagement with the project partner on the ground and the journalist who reported on this story, the impact of the reporting (regardless of whether the lessons were taken up) was also able to be tracked.

ESTABLISHING REALITY OF RESILIENCE IN THE BRACED PROGRAMME

Reality of Resilience focuses on two types of extreme events: floods and droughts. Globally, flooding is the most frequent type of extreme event, accounting for 43% of all climate events and affecting 2.4 billion people in the past 20 years, more than all other types of natural hazards.[1] In Africa and Asia, flooding occurs more frequently than on other continents. Similarly, drought affected more than one billion people worldwide from 1994 to 2013. Droughts also occur most frequently in Africa, with 131 occurring between 1994 and 2013.[2]

In order to identify floods and droughts across the 13 countries in which BRACED operates, a remote monitoring system needs to meet certain criteria. It should detect extreme events with some skill, update in near real-time, cover Africa and South Asia, and have a relatively high resolution for pinpointing population centres near the extreme event.

Flood monitoring

The University of Maryland's Global Flood Monitoring System (GFMS) is the primary flood monitoring system used in BRACED's Reality of Resilience, since it is updated regularly (every three hours), provides rainfall, stream flow and flooding estimates, has global coverage and includes both coarse (12km) and fine (1km) resolution data.

The GFMS system uses satellite data on rainfall that is routed through a hydrological model to identify areas of potential flooding. It is effective for riverine flooding because it uses the local hydrology of rivers and lakes to determine where flooding might be occurring. It also contains an internal threshold, which is set at the 95th percentile of water stored at the surface for each 12km by 12km pixel. Thus, a 'flood' only occurs on the map when that threshold is exceeded.

During the rainy season, the GFMS often labels large swaths of areas where heavy rainfall has occurred as 'flooded' on a daily basis. It appears that the internal

1. Centre for Research on the Epidemiology of Disasters. (2015) Human cost of natural disasters 2015: a global perspective, Centre for Research on the Epidemiology of Disasters. Hawthorn: Australian Policy Online (viewed 10 May 2016, http://apo.org.au/node/53603).

2. Ibid

threshold for flooding is too low to be considered sufficiently extreme. This means a higher threshold is set on top of this, by requiring a flood depth in the model of at least 20mm above the 95th percentile, so that dark purple areas on the map meet the requirements of an 'extreme event'.

Standard operating procedure for flood monitoring

The following procedure is followed to monitor flooding on a daily basis:

1. Check 12-km resolution flood detection map from GFMS for areas of flooding above 20 mm threshold.
   - If flooding is detected, go to step 2.

2. Check higher resolution 1km resolution inundation map from GFMS for areas of flooding above the 20mm threshold.
   - If flooding is detected, go to step 3.

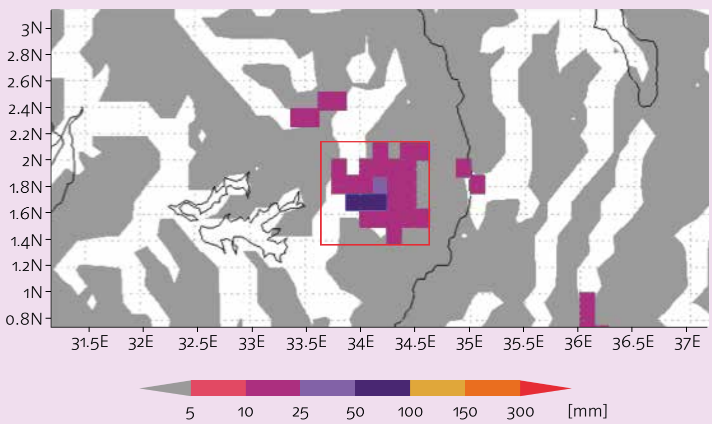
3. Check local rain gauge measurements over the last one to three days for anomalously high rainfall, if available, OR corroborate with news sources (e.g. floodlist, Al Jazeera or BBC).
   - If heavy rainfall OR flooding reports are present, go to step 4.

4. Send a notification to the relevant regional partners to initiate post-extreme event knowledge gathering.

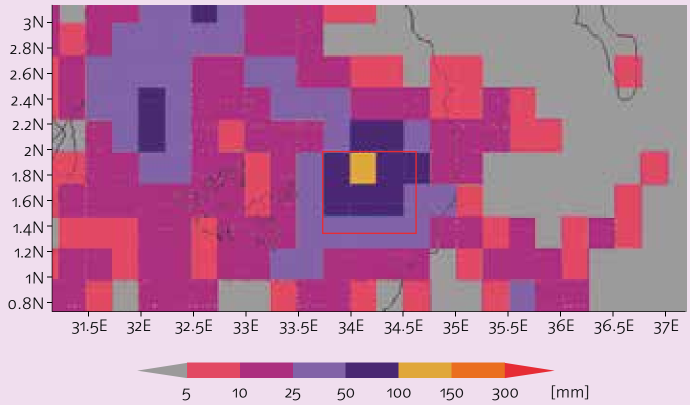
Box 1: Example – monitoring flooding in Uganda

Through continuous monitoring of the GFMS, flooding above the 20mm threshold was detected at 12km resolution in eastern Uganda (Map 1). Satellites also indicated heavy rain in the area during the previous three days (Map 2).

Map 1: Flood detection/intensity (depth above threshold [mm])

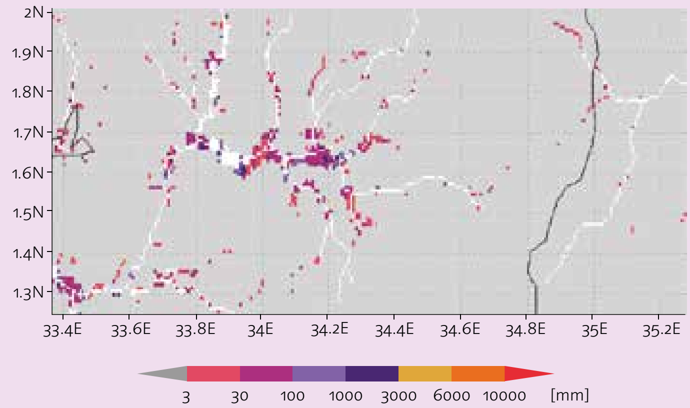


Map 2: Rainfall (3–day accum.) [mm]



The 1km inundation product from the GFMS was checked to ensure the areas for potential flooding correlated with the coarser resolution map. The map below has been zoomed into the area around the red box above and does indeed show indundation.

Map 3: Inundation map 1km res. [mm]



Based on this information, regional partners were contacted about possible flooding. In this particular case, it was found that no flooding occurred, and instead some heavy rainfall was observed. This case exemplifies the importance of ground-truthing information from a strong regional network because satellites and flood models are imperfect and false alarms will occur.

DROUGHT MONITORING

Drought is a slow-onset event that can usually be detected when rainfall does not occur as expected. It typically leads to crop losses, depressed yields, dried reservoirs, along with many other impacts. It can be defined in a variety of ways that are relative to its impacts (agricultural, meteorological, hydrological and socioeconomic); as a result, depending on the focus of the interventions on the ground, different definitions of drought may be appropriate for monitoring.

Reality of Resilience uses 10 – day rainfall estimates according to crop subdivision in each country (e.g. FewsNet Mapviewer). These indicate agricultural drought and seasonal total rainfall anomalies (departures from the average) that serve as an indicator for pasture availability. Pasture availability is important for pastoral communities who depend on animals for their main source of income.

Standard operating procedure for drought monitoring

The following steps have been developed for weekly drought monitoring under the Reality of Resilience system and continue to be refined through the experience of monitoring these events:

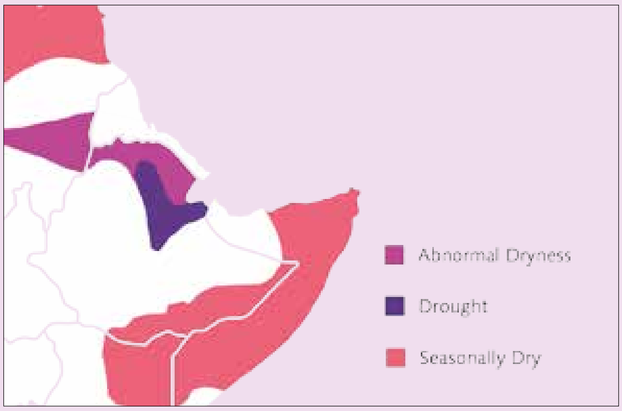
1. Monitor NOAA Climate Prediction Center's Africa Hazards Outlook on a weekly basis for areas identified as 'abnormally dry'.
    - If the same areas are identified as 'abnormally dry' for over three weeks, go to step 2.

2. Check FewsNet Mapviewer to compare the current seasonal rainfall to 'normal' seasonal rainfall.
    - If seasonal rainfall has been missed, erratic or is severely lower than usual, spatially identify the areas most impacted (based on objective rainfall data). Go to step 3.

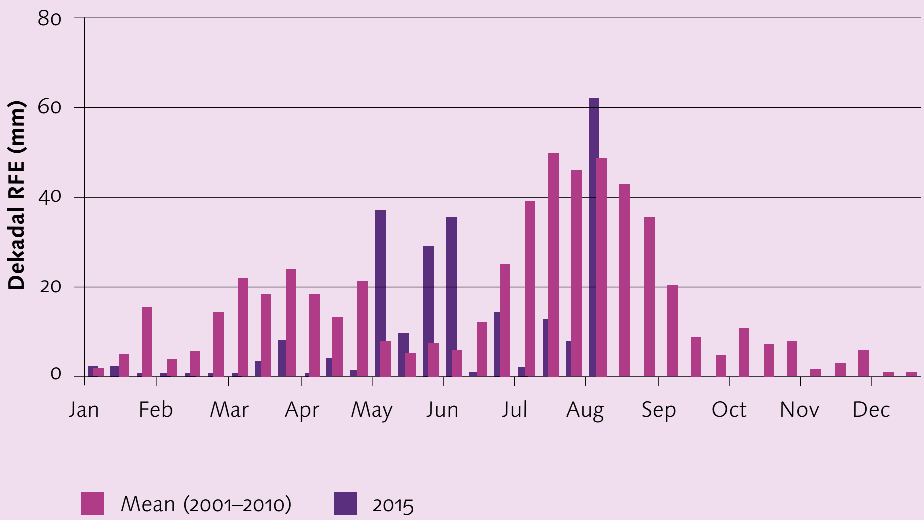
3. Send notification to the relevant regional partners.

Box 2: Example – monitoring drought in Ethiopia, 2015

Signs of drought in Ethiopia began to emerge after the failure of the Belg rains from February to April 2015. As per the standard operating procedures, the Africa Weekly Hazards Outlook was monitored until the northeastern region of Ethiopia was declared abnormally dry for several weeks and, eventually, to be in drought.



The FewsNet Mapviewer also confirmed that rainfall was late and erratic across the Afar region.



Regional partners based in Ethiopia were contacted and put in touch with a local agricultural extension office in the Afar region to gather information and pictures about the impact of the drought. Concurrently, other partners implementing resilience-building projects in the region were contacted by the BRACED KM for information on how their project was faring during the drought and whether they were managing to effectively reduce the impact of the drought on local communities. The Ethiopia Drought featured on the BRACED website, along with guest blog posts and other content illustrating the situation on the ground and some of the resilience interventions that worked during this drought.

COLLECTING AND SHARING LESSONS

Once an extreme event is detected, the Reality of Resilience initiative relies on BRACED's extensive global network of partners to initiate evidence gathering. Partners include the Thomson Reuters Foundation (TRF), which has direct access to local freelance journalists who have the capacity and knowledge to write about climate-related events and impacts in their region. Nine BRACED KM Engagement Leaders (KMELs), who are experts in fields related to climate, disasters or development and are based in many of the countries in which BRACED operates, provide a critical link to local information and networks. They connect with their regional networks to gather perspectives on the impact of the extreme event and performance of resilience-strengthening interventions to prevent impacts. BRACED Implementing Partners (IPs) carrying out the resilience interventions on the ground generate and share lessons learned after extreme events. This takes place through the BRACED website and learning platforms, such as webinars, blogs and discussion fora.

After an extreme event has occurred, the four domains of inquiry (the extreme event, project interventions, impact on local people and lessons learned) are used to tell the story of what happened on the ground. Documenting events during a flood, for example, can help determine which project interventions worked as expected to reduce impacts, and if certain groups were disproportionately affected by the event. A survey, carried out by the BRACED Knowledge Manager collects information from key informants on the four domains, as well as other lessons project implementers are learning (see Appendix I).

Evidence collected through Reality of Resilience is available on the BRACED website.

At a minimum, two different perspectives are required to initiate a Reality of Resilience case study. This stipulation enables competing viewpoints to be openly shared for the purposes of learning and reflection. Ideally, most case studies will include four or more perspectives to ensure a robust characterisation of the events occurring on the ground.

Box 3: Lessons from flooding in Kaffrine, Senegal

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On July 24th, 175mm of rain fell in central Senegal – a record for the beginning of the season. 1,500 households were affected, with nearly 100 clay huts destroyed, agricultural fields engulfed by sand and tonnes of millet and seeds swept away by the flood waters. Momar Niang, a freelance journalist working with Thomson Reuters Foundation visited the affected area, the site of the Decentralising Climate Funds (DCF) project.

This project provides climate funds to those at the most local level. DCF has funded a number of community-led initiatives including a cereal bank for storing grains and a reforestation project – although these had not been implemented when the floods struck.

Momar interviewed key informants such as farmers, community members, meteorologists and mayors, in order to understand what happened during the flood. He discovered that a few farmers received a weather forecast through the regional agricultural service. However, this forecast did not reach most of those affected. In addition, it lacked detail, giving no indication of the quantity of rainfall.

A local agriculture meteorologist reflected: 'We don't yet have a system that allows us to alert the whole population, and that is perhaps the first thing we should try to address.' The extreme flooding revealed key gaps in the existing early warning system. With the wide publication of Momar's article, those gaps will gain attention from local and international actors who could help to fill them and improve Kaffrine's resilience to future flooding.

Senegal floods expose need for community warning, preparation,
by Momar Niang

CONCLUSION

The BRACED KM Reality of Resilience initiative supports on the ground resilience building and provides evidence to ensure that interventions designed to bring about adaptive capacities are sustained where they work, or adapted where they do not. The 'learning-by-doing' approach undertaken so far will ensure that the methodology continues to evolve and address challenges. One such challenge has been convincing partners to investigate extreme events that haven't turned into disasters. When the remote monitoring systems detect an extreme event, but there is no apparent disaster on the ground, the default reaction is to conclude that there has been a false alarm. This assumption ignores the possibility that an extreme event occurred, but people were not impacted because they were resilient. Learning from this, the BRACED KM has built stronger links with national meteorological agencies, so that ground-based rain gauge measurements can corroborate satellite information when they are available to do so. Despite these efforts, a reluctance to gather evidence around these events remains, perhaps because "no disaster" events aren't considered newsworthy; when systems work as they should to protect life and property they're rarely recognised.

As Reality of Resilience continues to operate through its second and third year, with BRACED projects continuing their implementation, there is ample opportunity to learn about the impact this initiative can have for promoting adaptive programming. It also offers a chance to identify promising interventions. It is anticipated that the Reality of Resilience model can be adapted and moulded to suit other resilience-building initiatives. The linking up of programmes such as BRACED will further facilitate learning and collective knowledge on what works. This, in turn, will bring about resilience to climate extremes and disasters.

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APPENDIX 1: REALITY OF RESILIENCE QUESTIONS FOR KEY INFORMANTS

These questions have been developed with the intention that they will be asked in an open-ended interview format, to allow for detailed and nuanced responses that speak to the reality after an extreme event. They are intended to guide conversation and can be adapted by partners to fit the local context. They should be asked of project implementers, field officers, thematic experts and others familiar with the aftermath of a particular extreme event. These questions can inform case studies written about the event in question for Reality of Resilience or act as a stand-alone output for posting on the Reality of Resilience webpage (http://www.braced.org/reality-of-resilience/).

Domain: extreme event

1. Describe the weather or climate event (e.g. storm, flood, drought or heatwave) that took place recently.
2. Was this an extreme event?
    a. If Yes:
        - What made this event 'extreme'?
    b. If No:
        - Why not?
3. Is this event similar to other events that have occurred in the past?
    a. If Yes:
        - How is it similar?
        - How often do events like this occur?
    b. If No:
        - What made this event different?
3. Did the community receive a forecast or warning of this weather event?
    a. If Yes:
        - Describe the warning.
        - How far in advance did community members you know about the weather event?
        - Who took action based on the warning?
        - Were the people who took action able to prevent any impacts?
    b. If No:
        - Would community members have known what to do to prevent some of the impacts if they had received a warning?

Domain: Impact

1. Who is most affected?
    a. How are they affected?
2. Who is least affected?
    a. Why are they less affected?
3. How were women able to respond differently to prevent the effects of the weather event?

4. Did community members take any actions to protect themselves against this kind of event?
    a. If Yes:
        - What did they do?
        - What was the result?
    b. If No:
        - Have they taken any actions to protect themselves from this type of weather event in the past?
          If Yes:
            - What did they do?
            - What was the result?
5. How did the event impact the community?
6. Were there damages to people's property (e.g. belongings, houses or livestock)?
    a. If Yes:
        - What happened?
        - How do they plan to cope?
        - Are there government services to help them cope?
    b. If No:
        - Why weren't there any damages?
6. Are any community members planning to do something differently to prevent negative impacts in the future?

Domain: project interventions

1. How did you **expect** the [project activities] to help people anticipate or absorb the impact of this event?
2. Did the [project activities] work as expected during this event?
3. Were unforeseen challenges encountered?
    a. If Yes:
        - What were the unforeseen challenges?
    b. If No:
        - What ensured that the intervention was successful?
4. Did indigenous coping strategies help reduce the impact of this event?
    a. If Yes:
        - How?
    b. If No:
        - Why not?
5. What was the role of the government in preventing or responding to the event?
6. What basic services were available to people before, during and after the event?

Domain: learning

1. What did you learn about your project activities from this extreme event?
2. How has (or will) your project adapt your programming because of this extreme event?
3. How will you use this knowledge, going forward?

APPENDIX 2: SAMPLE MONITORING SYSTEMS

Name	Source	Extreme event	Type of system	Resolution	Metric(s)	Update frequency	Geographic scope	Skill estimate available?
Water and Development Information for Arid lands – Global Network (G-WADI)	Center for Hydrometeorology and Remote Sensing (UC Irvine)	Flood	Remote monitoring system	4km by 4km (0.4 degree grid)	Estimated precipitation total: rain, heavy rain (3, 6, 12, 24, 48 and 72 hour accumulations)	Near real-time, 40 min to 1 hr, 50 min latency period	180W to 180E and 60S to 60N	Yes
Flood List	NA	Flood	Report-based	NA	Network of Reporters, crowdsourcing	Daily, depending on reports and reporters	Global	NA
Global Flood Monitoring System (GFMS)	University of Maryland	Flood	Remote monitoring system	1/8th degree and 1km	Flood detection (depth), streamflow (12km, 1km res), above threshold, surface storage (1km res), inundation map (1km res), routed runoff (12km), rainfall (Inst., 1, 3, or 7 day)	Near real-time (3-hour lag)	50°N–50°S	Yes
FEWSNET Map Viewer	FEWSNET, USGS, USAID	Drought	Remote monitoring system	Administrative zones	Rainfall Estimate (RFE), Normalised Difference Vegetation Index (eMODIS NDVI)	Near real-time	Africa	Yes

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This report remains a live document that is updated periodically as the Reality of Resilience system is applied and tested. For questions, contact us at: learning@resilienceexchange.net

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