

Bahamas, 2019. Richard Little's house endured 14 feet of flood water from Hurricane Dorian. Communities like his are keen to prevent future disasters, and need climate-smart investments in poverty reduction and social protection, focusing on the people most at risk.

© IFRC / John Engedal Nissen

REDUCING RISKS AND BUILDING RESILIENCE



**Minimizing the
impacts of potential
and predicted
extreme events**

Contents

Introduction – mobilizing to prevent and reduce the impacts of rising climate risks	172
4.1 Adapting to climate risk – reducing the future impacts of climate change and extreme weather events	175
4.2 Getting ready to act – reducing the impacts of imminent events through effective early warning systems that reach the last mile	199
4.3 Acting pre-emptively – preventing risks from becoming disasters by linking early warnings to anticipatory action	206
4.4 Conclusion and recommendations	217

Definitions

Resilience: The ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions through risk management ([UNDRR, no date](#)).

Risk-informed development: A risk-based decision process that enables development to become more sustainable and resilient. It pushes development decision-makers to understand and acknowledge that all development choices involve creating uncertain risks, as well as opportunities ([ODI/UNDP, 2019](#)).

Climate change adaptation: The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate change and its effects ([IPCC, 2012](#)).

Disaster risk reduction: Action focused on preventing new and reducing existing disaster risk and managing residual risk, all of which contribute to strengthening resilience and therefore to the achievement of sustainable development as outlined in the Sendai Framework for Disaster Risk Reduction ([UNDRR, no date](#)).

Climate-smart programming: There is no universally accepted definition of climate-smart programming. For the purpose of this report we use the Red Cross and Red Crescent definition which equates this to 'good and sustainable programming': supporting inclusive green development and making use of available weather forecasts and climate science to enable people to anticipate, absorb and adapt to climate shocks. It also includes our efforts to reduce our climate and environmental impact during humanitarian programming, response and recovery operations ([Red Cross Red Crescent Climate Centre and IFRC, 2020](#)).

Preparedness: The knowledge and capacities developed by governments, response and recovery organizations, communities and people to effectively anticipate, respond to and recover from the impacts of likely, imminent or current disasters ([UNDRR, no date](#)).

Early warning system: An integrated system of hazard monitoring, forecasting and prediction, disaster risk assessment, communication and preparedness activities systems and processes that enables individuals, communities, governments, businesses and others to take timely action to reduce disaster risks in advance of hazardous events ([UNDRR, no date](#)).

Anticipatory action: A set of actions taken to prevent or mitigate potential disaster impacts before a shock or before acute impacts are felt. The actions are carried out in anticipation of a hazard impact and based on a prediction of how the event will unfold. Anticipatory actions should not be a substitute for longer-term investment in risk reduction and should aim to strengthen people's capacity to manage risks ([Anticipation Hub, 2020](#)).

INTRODUCTION – MOBILIZING TO PREVENT AND REDUCE THE IMPACTS OF RISING CLIMATE RISKS

Rising climate risks are a problem for the entire planet, and for too long we have failed to address them. The humanitarian community has largely ignored how climate change affects its work. The climate and development communities have effectively left the impacts of climate change to be dealt with by the humanitarian community. But we can no longer ignore the increasing number, frequency and severity of climate- and weather-related disasters that are already happening nor the impacts already being felt from more gradual climate change such as sea level rise and environmental degradation. We have a responsibility to act, to act urgently, and to address these rising risks together.

We are not helpless in the face of climate change impacts. The efforts we take today to address exposure as well as vulnerability and its root causes (including poverty, inequality, environmental degradation, social injustice, environmental mismanagement and failed governance) will determine how well people are able to cope today and tomorrow. The only way to reduce risk in the face of more climate-related hazards is to reduce the vulnerability and exposure of people.

But we cannot solve these challenges (many of which are laid out in previous chapters) with yesterday's rule book for disaster management. To save lives and reduce the impacts of future extreme climate and weather events, we need to do more, collectively. We need to urgently scale up climate change adaptation and risk-informed development in the most at-risk communities. We also need to anticipate and act much more quickly on the basis of forecast information. To do any of this well, we need the humanitarian, development and climate/environment sectors to collaborate more than ever before.

Having a sound understanding of why people are more likely to be impacted by hazards in a changing climate is essential. By understanding what makes people more vulnerable to shocks and stresses and why, it is possible to address the root causes of these vulnerabilities and strengthen people's adaptive capacities. And by understanding more comprehensively who and what is exposed to hazards, it is possible to focus interventions on those regions, countries, sectors, populations and infrastructure that are most exposed. (see discussion of vulnerability and exposure in Chapter 3, section 3.1).

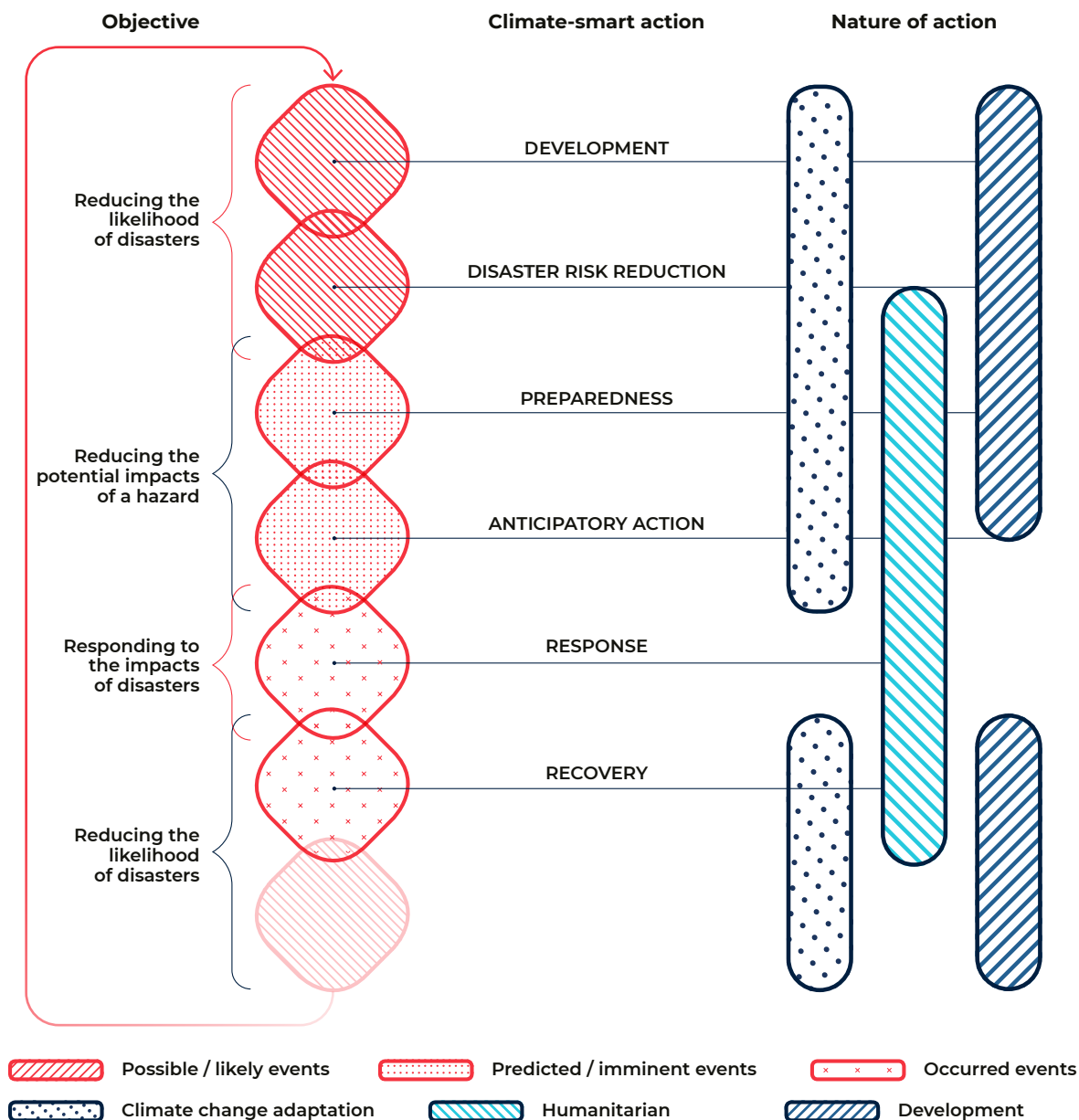
So how can organizations put into action the transformation needed to keep pace with the rising impacts of climate change? If we want to effectively reduce risks, we will need to simultaneously reduce exposure and vulnerability, which requires efforts that cut across prevention, preparedness, response and recovery, with resilience as the common goal. The humanitarian, development and climate/environment sectors each have complementary roles to play (see Figure 4.1) – and can do more to collaborate, reinforce and align efforts and co-produce solutions.

This chapter sets out some of the key areas where we need to step up, or where we need to do things differently, as humanitarian, development and climate/environment communities. Preventing and reducing

the impacts of rising climate risks requires an urgent scale-up in climate action, together with changes in our ways of working. But to really make a difference and ensure our planet is truly ready to face the climate crisis, we need to foster and strengthen new and different types of partnerships to increase our impact and reach.

And finally: we cannot forget that alongside more effective risk management we must also be sure we are not exacerbating risk through the local and global footprints of our own activities. Better environmental management is an essential component of any climate-smart approach and is addressed in Chapter 5.

Figure 4.1: Action to reduce the likelihood of hazards becoming disasters





Myanmar, 2019. "It's my responsibility to protect my community. It's better to prepare for disasters before they happen," says Khine Soe Lwin, a Red Cross volunteer in Ma Ngay Gyi village.

© American Red Cross

4.1 ADAPTING TO CLIMATE RISK – REDUCING THE FUTURE IMPACTS OF CLIMATE CHANGE AND EXTREME WEATHER EVENTS

As the world continues to develop and evolve, our levels of exposure and vulnerability are being shaped by the nature of development planning and investment decisions, land use and urban planning, infrastructure, measures to reduce poverty and inequality, and our management of the natural environment around us. Creating safer and more equitable cities, living conditions and environments and supporting diversified livelihoods can reduce the number of people at risk from weather- and climate-related disasters. Mobilizing communities to act is a central component to all these efforts. When taken together, such action will protect lives and livelihoods and reduce the need for emergency humanitarian aid in the future, reducing the huge potential financial and human cost of our current trajectory.

Sustainable and inclusive development that considers changing risks (risk-informed development) is the key starting point for reducing exposure and vulnerability and increasing capacities. Whether risk is addressed through the lens of development, disaster risk reduction (DRR) or climate change adaptation, core and common objectives of each approach are to reduce the exposure and vulnerability of people to risks now and in the future, and strengthen the capacity of communities to anticipate, absorb and adapt to shocks and stresses. This requires managing climate risk across timescales, linking short-term humanitarian response to longer-term risk planning, and building resilience of the most disadvantaged and vulnerable communities

Some key development areas to focus on in adapting to an increase in climate shocks and stresses are agriculture, water systems, the natural environment, cities and infrastructure (see for example, [GCA, 2019](#)). Equally, making investments in health, education and social protection that take a long-term view of climate risks will be critical to ensure adaptation efforts are sustainable. Efforts to support people, households and communities to reduce risks and prepare for disasters and crises will also be vital to ensure people are equipped to anticipate, prepare for and respond to rising risks. There is growing evidence of how local understanding and knowledge of hazards and risks are being used to shape solutions to adapt to risks, and that these solutions must be scaled up as cost effective and socially accepted measures ([Agrawal A et al, 2019](#)).

BOX 4.1 / CASE STUDY

MANAGING RISK ACROSS TIMESCALES: EXTREME HEAT IN INDIA

Heatwaves are deadly, predictable and on the rise globally due to climate change. It is therefore crucial to scale up efforts around the globe to prevent heatwave impacts on people. Their impacts are also preventable through the deployment of simple, low-cost actions in the short and medium term and deliberate longer-term planning strategies.

For example, air conditioning is India's most common solution to deal with excessive heat (though there is a long history of more passive measures). But the negative effects of air conditioning, such as increased energy consumption and pollution, create further risk. Moreover, high up-front costs and infrastructure requirements push air conditioning out of reach for poor and vulnerable populations, especially in low-income countries.

As a long-term action to reduce heat stress, the Government of Gujarat has implemented district cooling – a centralized air-conditioning system where centrally chilled water is distributed to consumers through underground pipes ([IMF, 2018](#)).

In the medium term, critical measures such as identifying populations vulnerable to extreme heat has also been a priority in Gujarat. Risk assessments concluded that women are often more exposed to heat stress as they tend to stay at home and may be afraid to leave their windows open because of a high frequency of petty crime ([Singh, 2019](#)). By understanding these risks, short- and medium-term actions can be crucial to save lives.

Recognizing that not all risks related to extreme heat can be reduced, as a short-term action, the Indian Red Cross has implemented awareness-raising campaigns based on weather forecasts of heatwaves including through using flash mob dances by volunteers in crowded markets, and even at the airport to prepare for heatwave temperatures that reached 43°C ([Climate Centre, 2017](#)).



4.1.1 State of play: still many gaps and challenges

A few key challenges stand in the way of effectively addressing exposure and vulnerability to future risks. One is **being able to properly identify and understand these risks in the first place – particularly changing risks in light of climate change**. The availability, quality and accessibility of data on hazards, exposure and vulnerability (at the right scale, granularity and including dynamic changes over time) remains an obstacle. This is particularly because data and information are often generated in silos, at institutional level, rather than shared through open platforms (noting legal and privacy constraints).

A second challenge is **the extent to which programmes and projects consider changing climate risks and seek to reduce or address them**. As a result, development, DRR and even recovery efforts are often developed based on historical risks, without considering the changing nature of climate risks, leading to poor development choices. For example, only 5 of the 35 OECD countries have revised at least one technical code or standard to take into account changing physical climate risks based on climate projections ([GCA, 2019](#)). In the USA, a 2018 analysis found significant residential and commercial development across the country in areas with long-term flood risk, with population growth in high-risk flood areas actually increasing at a higher rate than areas outside of flood zones ([Maciag, 2018](#)).

A third challenge relates to **insufficient targeting of development, climate change adaptation and DRR plans, programmes and investments towards communities where they are needed most**. This is due to lack of political will and funding. Too often, disaster risk management (DRM) projects are based on how great their financial benefit will be, not on how great the benefit will be to people and their well-being ([Hallegate et al, 2016](#)). When projects focused to reduce disaster risk are assessed on the basis of avoided asset losses or monetary value, those projects that protect or support richer areas or people appear to bring greater value ([Hallegate et al, 2016](#)). And too often, development, DRR and climate change adaptation programmes focus on national level and more populated and developed areas, leaving behind the most at-risk areas where people are most exposed and vulnerable to shocks and stresses. For example, an analysis undertaken by the Humanitarian Country Team in Ethiopia in 2017 found that there was a significant disconnect between districts targeted by a range of development programmes and those most at risk of recurrent climatic shocks. This issue and potential solutions for reaching and serving the most vulnerable communities is addressed further in Chapter 7 on smarter financing.

Fourthly, **“adaptation interventions are mainly project-based and often externally driven; they seldom guarantee local leadership in decision-making processes”** ([Mfitumukiza et al, 2020](#)). If local communities are not brought in from the design stage, interventions risk failing to address the needs of people most at risk, or worse, being outright resisted or rejected ([The Carnegie Trust, no date](#)). At the same time, the communities most vulnerable to climate shocks and hazards are in many cases the hardest to reach, or the most marginalized from the rest of society. Hence these communities are often left behind in climate adaptation and risk reduction investments as well as in humanitarian response (see [IFRC, 2018a](#)). The *World Disasters Report 2018* brought attention to different groups often left behind in humanitarian response: people who may be out of sight (not showing up on maps or public records, often lacking basic documentation), out of reach (due to physical barriers of terrain, climate, insecurity or lack of transportation infrastructure), out of money (whereby particular contexts are not in favour with donors), out of scope in

humanitarian response efforts (such as irregular migrants and people stuck in situations of urban violence) and people with distinct needs who may be left out due to the design of programmes (such as older people and persons with disabilities) ([IFRC, 2018b](#)). The same groups remain at risk of being left behind in DRR and climate change adaptation efforts.

Lastly, **approaches to reducing exposure and vulnerability are often tackled from different sectors, institutions or communities**, reducing the effectiveness of interventions ([PLACARD, 2020](#)) and leaving gaps. These silos exist at different levels: on one hand between DRR and climate change adaptation institutions, under the umbrella of development, and on the other between the development and humanitarian communities. Despite the overlapping objectives of DRR and climate change adaptation to reduce exposure and vulnerability, given their separate historical development, the two are often addressed from different institutional mandates, budgets, plans and policies ([PLACARD, 2020](#)). Moreover, these two approaches are also often disconnected from other approaches that also seek to reduce vulnerability, such as efforts to reduce poverty (see also Chapters 6 and 7).



Yemen, 2020. Exceptionally heavy rains and floods hit Yemen hard, killing dozens of people and affecting tens of thousands more. Many people are vulnerable due to the combined impacts of conflict, climate change, poverty and disease outbreaks, including COVID-19.

© ICRC / Munder Ahmed

“

To be effective, efforts must be based on a sound risk analysis that is informed by evolving risks in a changing climate, and by lived experience and local knowledge.

”



BOX 4.2. FAILING TO ADHERE TO CLIMATE-SMART PROGRAMMING IN DISASTER MANAGEMENT

When planning for disaster preparedness at local and national levels, disaster managers risk trusting existing evacuation or response plans, including regarding evacuation centre locations, which may be inadequate for a new level of disaster. Or they may see the existing evacuation centres, relief item warehouses or planned distribution routes being flooded and made unusable by a more extreme storm or flood.

Likewise, support to livelihoods recovery can be unsustainable in the long term if it does not help affected people adjust to the ongoing and expected changes in water availability and changing patterns of flood and drought risks – if the opportunities to help adapt to changing conditions are missed (see Chapter 5).

Recent examples of situations where the response plans were not designed to meet local climate conditions include the 2018 flash flood response operation in Lao People's Democratic Republic. In this case, the shelter design for the displaced population did not adequately take into account the high temperatures, resulting in people sleeping under raised floorboards, as that was the coolest part of the shelter. Similarly, some of the camps for the displaced population connected to the Afghan drought of 2018 were unsuitable for the forthcoming winter. In camps in Jordan, the shelters were too hot in summer, resulting in the need to install air-conditioning units (which in turn impacted energy consumption and air pollution), and too cold in the winter due to insufficient insulation and heating (IFRC, 2020b, interview with humanitarian shelter expert). The risk of making such mistakes will increase as climate change induces more extreme weather events.



4.1.2 Getting to where we need to go: solutions to accelerate progress

To tackle these challenges, better manage risk across time scales, and contribute to building resilience in the world's most vulnerable places the measures presented here focus on how we can draw on collaborative efforts of the humanitarian, development and climate sectors, make better use of data and science, and leverage the benefits of local knowledge and nature.

1. Improve the availability and accessibility of climate risk data

Greater investment needs to be made in improving the accuracy of climate projections at national and subnational level, as well as short-term forecasts. And the design of development, DRR and climate change adaptation interventions needs to focus on improving the capacity of authorities and organizations to make use of weather forecasts (daily and seasonal) and climate projections (years and decades) in combination with other risk data and risk trends ([GCA, 2019](#)).

Some good initiatives are attempting to bring different sectors and levels together to identify and address risks across time scales. Humanitarian organizations may offer an important perspective and insight on the vulnerability and capacity of communities, given their experience in anticipating and responding to humanitarian needs in emergencies. For example, collaborative and coherent ways to share and use open source data to inform programming. These include Humanitarian OpenStreetMap and the Missing Maps project, ThinkHazard developed by the Global Facility for Disaster Reduction and Recovery, the INFORM Risk Index led by the European Commission Joint Research Centre (including a new product being developed for early warning and early action), and the Flood Resilience Measurement for Communities tool of the Zurich Flood Resilience Alliance.¹ Meanwhile, Asia Regional Resilience to a Changing Climate (ARRCC) by the UK Met Office focuses on the development of climate services at all time scales, especially impact-based forecasting. Efforts and approaches like these will need to be scaled up globally and sustained.

¹ See [Humanitarian OpenStreetMap](#), [Missing Maps project](#), [ThinkHazard](#), [INFORM Risk Index](#), [Flood Resilience Measurement for Communities tool](#) and [ARRCC](#).

BOX 4.3: BRINGING SPACE-BASED INFORMATION TO PEOPLE ON THE GROUND FOR BETTER PREPAREDNESS

Before, during and after a disaster, satellite images can reveal life-saving details: the communities most at risk or most affected, the destroyed or damaged roads and bridges, and the areas where a helicopter can land safely to deliver medical staff and supplies. This requires timely access to these images and information.

The UN Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER), a programme operated by the UN Office for Outer Space Affairs, seeks to make critical satellite data available to disaster management agencies around the world.

Agencies can access maps and space-based information free of charge through mechanisms set up by the global space community, including the International Charter: Space and Major Disasters, the Copernicus Emergency Management Service and Sentinel Asia. These mechanisms allow authorized users to request and rapidly access satellite data collected from space agencies all over the world. They can also download satellite imagery from open sources such as the Sentinel satellites. UN-SPIDER also provides advice on space technologies that can be used to monitor different types of natural hazards, on products developed by the space community for disaster management applications, links to satellite imagery sites, and information on software packages to process such imagery.

The system has already improved how disaster managers reduce risks and build resilience globally. For example, in Ghana, UN-SPIDER has been working with the country's National Disaster Management Organisation (NADMO) since 2013. The organization's staff have received training to map the geographical and temporal evolution of floods and droughts. NADMO has become an authorized user of the International Charter: Space and Major Disasters, able to activate it at the request of national disaster management agencies in countries or regions affected, improving its capability to respond to disasters and saving lives in Ghana and beyond.

When severe floods devastated rural regions and towns in the Central African Republic (CAR) in autumn 2019, NADMO activated the charter on behalf of CAR's Ministry of Humanitarian Action and National Reconciliation. Space agency members of the charter collected satellite imagery that NADMO could use to create up-to-date maps of the areas affected by the floods in Bangui and Kouango to support directing relief efforts. Soon after, NADMO activated the charter again to map the impact of landslides in north-western Kenya, at the request of the Kenya Defence Forces.

BOX 4.4: ARTIFICIAL INTELLIGENCE AND EARTH OBSERVATIONS FOR CLIMATE-SMART PROGRAMMING

Humanitarians are improving how they make science-informed risk management decisions, thanks to greater availability and application of Earth observation data.

For example, machine learning and neural networks can use artificial intelligence to find patterns in and correct missing data ([Lary et al, 2018](#)). While such methodologies are gaining in popularity, some challenges remain in their development and application, including inadequate principles to govern standardized data processing approaches which can lead to limitations in data accuracy, bias and responsibility ([Lahoz and Schneider, 2014](#); [Oroz, 2017](#)). This presents challenges to humanitarians working in contexts where protection of lives and livelihoods are central to programming and where they cannot afford to rely on data that is lacking appropriate validation.

Partnerships among humanitarian and Earth-observing organizations are increasingly offering the ability to overcome these challenges. The recent Earth Observations for Humanitarian Action initiative between NASA and the IFRC seeks to blend NASA's satellite capabilities with the IFRC's early action protocols and forecast-based financing work, using on-the-ground humanitarian knowledge to complement the information derived from satellites.

Through opportunities like this, maps, data platforms and tools can be co-developed and validated with specific contexts in mind. In working together, users of this information can move past understanding past disasters and towards a better understanding of future thresholds of risk and opportunities for designing interventions before a disaster occurs.



2. Make all development, DRR and humanitarian programming climate smart

The effectiveness of climate change adaptation, DRR, development and humanitarian actions depend on our understanding of risk. To be effective, efforts must be based on a sound risk analysis that is informed by evolving risks in a changing climate, and by lived experience and local knowledge. Undertaking a thorough analysis includes looking at past hazards as well as potential future hazards in the context of a changing climate. This requires making use of weather forecasts (daily, seasonal) and climate projections (years and decades) in the design of development, DRR and climate change adaptation interventions. It also requires an understanding of the vulnerability, exposure and capacity of communities, often enabled through strong local responders. An example is through community-based vulnerability and capacity assessments ([IFRC, no date](#)) – a participatory tool to gauge people's exposure to and capacity to manage natural hazards.

In development projects for national infrastructure, the process of taking into account climate projections is sometimes referred to as 'climate-proofing' or 'climate-resilient' design. In a changing climate, major infrastructure, including roads, bridges, seawalls, public buildings, water and sanitation facilities and residential housing, needs to be designed or retrofitted to withstand projected climate and weather extremes ([GCA, 2019](#)), rising sea levels, extreme heat and coastal retreats. For humanitarian and development programmes, incorporating climate and weather information into the process of assessing risk and designing a sustainable project can also be referred to as 'climate-smart' programming (see Box 4.6). In many cases this might require an additional element of working with hydrometeorological agencies and research institutions to incorporate both current and projected trends in hazards and other societal trends.

Incorporating future risks includes looking at changes not only in the nature and frequency of hazards, but also in exposure and vulnerability. And while designing and implementing DRR and adaptation measures may reduce risk in the short term, they can increase exposure and vulnerability in the long term. For example, dyke systems may reduce flood exposure in the short term by providing immediate protection, but then attract settlement patterns that may increase risk in the long term ([IPCC, 2012](#)). Similarly, measures aimed to reduce poverty and vulnerability in the short and medium term might inadvertently create incentives that increase risks in the long term, by not considering climate risks. For instance, while a social safety net programme in Ethiopia for people regularly exposed to seasonal shocks such as drought helped increase off-farm activities and increased incomes, in many cases these alternate income-generating activities involved natural resource extraction (such as collecting firewood and producing charcoal) ([Weldegebriel and Prowse, 2013](#)).

Climate-smart programming stresses the need to use climate information across timescales, considering landscapes and ecosystems as key areas of intervention – all in close collaboration with governments, specialists and the private sector. Longer-term projections can help us to identify important trends and shifts of local climates and inform long-term risk reduction and adaptation needs, strategic future programming, policy dialogues and investment priorities. Medium-term or seasonal forecasts can prompt the monitoring of short-term forecasts carefully for potential extreme events and to invest in cross-sectoral preparedness for anomaly seasons. Short-term forecasts can trigger anticipatory actions (see section 4.2).

Ironically, 'climate smart' is best explained by indicating what would fail if we do not make our work climate smart. There have been situations of government or private investors establishing irrigation schemes in rivers that go dry, for example, or drinking water tanks that get flooded because of unprecedented and unforeseen risks. It is these types of unsustainable practices that fail to allow for what is likely – even in the near future – and hence fail to be climate smart.

BOX 4.5: COMMUNITY-LED ASSESSMENTS OF RISK

Community-led assessments that identify potential future risks, including climate displacement, are already taking place in some contexts. For example, in Mongolia, community assessments are analysing the risks of displacement of nomadic herders due to dzud (a combination of severe drought and severe winter). Based on these assessments, the Mongolian Red Cross Society has supported communities at risk of dzud and associated displacement. It has constructed community shelters to prevent livestock deaths; supported herders to stockpile hay and feed; facilitated the creation of community groups to pool resources during dzud; and supported diversification of livelihoods to reduce dependency on livestock, including through developing sewing and barber skills.

Some governments undertake comprehensive risk mapping, such as Mexico's Risk Atlas ([IFRC and UNDP, 2014](#)) and Nicaragua's legislatively mandated early warning system that includes a 'bottom-up' mechanism to include communities' contributions to risk information ([IFRC and UNDP, 2014](#)).

In the humanitarian sector, the Missing Maps project, led by digital and field volunteers, is increasing OpenStreetMap data in the most vulnerable and uncharted territories. This data gathering contributes to the risk assessment and many humanitarian organizations, including National Red Cross and Red Crescent Societies, are integrating this information into their vulnerability and capacity assessment data collection processes.



BOX 4.6 / CASE STUDY

CLIMATE-SMART PROGRAMMING BY PARTNERS FOR RESILIENCE IN THE PHILIPPINES

A number of climate-smart initiatives have been implemented by Partners for Resilience (PfR), a global alliance that seeks to enable communities to withstand shocks from natural hazards and sustain development by securing or transforming their livelihoods by integrating ecosystems and climate change into DRR – or integrated risk management.

In Metro Manila, PfR worked with local governments and partners living around the Malabon-Navotas-Tullahan-Tinajeros (MANATUTI) river basin to integrate risk management into the MANATUTI Water Quality Management Area Action Plan. The project sought to ensure that actions are based on a landscape-wide assessment of existing and projected climate, disaster and environmental risks. It also helped the area's governing body to understand how landscape-wide actions addressing risks contribute to better water quality management. During this process, the MANATUTI governing body was able to harmonize the river system's area-based plan and action plan, and ensure a landscape-wide approach of rehabilitating the river that also helps address the risks and needs of vulnerable communities in the river system. The action plan is approved by the area's governing board and covers ten years.

In Mindanao, PfR is working to identify and assess risks to erosion on slopes and riverbanks, and implement action plans to reduce people's vulnerabilities to landslides and flooding. The group worked with indigenous people to replant native trees and cacao on slopes, both for holding the topsoil and developing livelihoods. The alliance is working with local stakeholders on a nature-based solution (bio-engineering) growing grass, native trees and shrubs for securing the riverbank and preventing future erosion.



3. Prioritize the scale-up of development, climate change adaptation and DRR in the areas, and for the people, most at risk

DRR and climate change adaptation need to be scaled up everywhere, but we should focus on the people most at risk, as outlined in Chapter 3. As noted earlier, risk is not only determined by hazard and exposure, but also vulnerability (which is impacted by social and economic factors, including around development and inequality) as well as levels of capacity to manage shocks and stresses (which relates to levels of investment in, for example, DRR or climate adaptation, good governance, infrastructure and access to social protection).

Sadly, the very reasons why people are at risk are often the reasons they get left behind when governments set priorities for large risk reduction investments – for example, marginalization and lack of influence in decision-making. In many cases, compound risk factors aggravate these disparities, for instance conflict and displacement. Overlapping threats can pose additional challenges, such as in the case of the COVID-19 pandemic.

Reducing vulnerability in the long term also requires climate-smart investment in poverty reduction and social protection, with a focus on the people most impacted by climate extremes as well as by gradual changes to livelihoods due to climate change. Social protection investments are rapidly increasing in low- and middle-income countries, and they are, by and large, targeted to the poorest and most vulnerable people. A large body of evidence documents the contributions of social protection (especially social assistance programmes such as cash transfers and public works) to positive outcomes associated with key indicators of well-being and social resilience, such as nutrition, building productive and non-productive assets, health and education ([Agrawal et al, 2019](#)).

There is an opportunity to improve the effectiveness of these investments in reducing disaster risks and enhancing climate change adaptation by ensuring that their targeting and coverage is expanded to the people and groups most vulnerable to climate risks. In addition, policies that improve the coverage of social safety nets and enable access to financial services in the event of, or ideally ahead of, the impacts of disasters, can significantly mitigate the impact on poor and vulnerable households when shocks are imminent ([Hallegatte S et al, 2016](#)) (see Chapter 7 for more on finance reaching and serving the most vulnerable people).

BOX 4.7 / CASE STUDIES

PROGRAMMES THAT TARGET COMMUNITIES MOST AT RISK, INCLUDING IN HARD-TO-REACH PLACES

Targeting communities most at risk in Colombia

The communities of Nueva Venecia and Buenavista in Colombia face severe environmental and social vulnerabilities, including high flood risks and challenges to livelihoods connected to overfishing, and were ranked by the Government of Colombia at the top of the 2015 Unsatisfied Basic Needs Index. In 2000, these communities were victims of a massacre as part of the protracted armed conflict that left deep social, economic and health wounds in the population.

To contribute to reducing these increasing risks, the Colombian Red Cross with the German and Spanish Red Cross implemented a project supporting livelihood diversification and regulation of fishing practices to mitigate overfishing. This established a new waste collection system, formalized community-level water management and treatment committees, and set up regular clearing of the water tributaries to mitigate the chance of flooding in the rainy season and oxygenate the swamp to avoid fish dying in the dry season. First aid response groups were also established to play an important role if there was a major flood or other hazard.

Promoting more sustainable access to water for conflict-affected communities in Iraq

Countries affected by conflict tend to receive less climate adaptation support than more stable countries. At the same time, climate change exacerbates the existing vulnerabilities of people already facing the hardship of conflict. Climate-smart programming targeting people affected by conflict is essential. In Iraq, ICRC works to alleviate water stress and improve sustainable and equitable access to water in rural and urban environments. Jointly with the Iraqi Red Crescent Society, it supports rural communities, mostly in the south of the country, to adapt to water scarcity by providing alternative water sources to increasingly unreliable surface water. In urban settings such as Mosul, the ICRC has rehabilitated water pumping and treatment stations and piped networks, while working with the authorities to reinforce their ability to better manage the use of water. The objective is to reduce water losses rather than use more water, which only exacerbates water stress ([ICRC, 2020](#)).

Disaster risk reduction in vulnerable communities in Mali

A number of communities vulnerable to climate change and disasters in central Mali live in hard-to-access areas affected by conflict. Mali Red Cross seeks to improve the resilience of communities in the area, with support from the Danish and Norwegian Red Cross, and in coordination with the Malian Meteorological Service and the Malian Institute of Rural Economy. It has carried out innovative agro-sylvo-pastoral techniques (these combine pastoralism, agriculture and tree cultivation), including improving cooking stoves and producing local compost. Over six years, the programme has created local markets and organized community reforestation. It has supported vulnerable households with income-generating activities in intensive agro-farming (cash crops and poultry farms). It also uses weather data for early warning systems and radio broadcasts, and has set up DRR management committees and emergency teams in the villages. The use of weather data and new climate-smart agriculture techniques have helped to increase crop yields and reduce seed losses. The programme has paid particular attention to including women, and has increased their income. The rise in yield and income has also created livelihood opportunities for young men, who now have a viable future staying in the community instead of migrating elsewhere (Danish Red Cross et al, 2019).



Mali, 2017. A herder near Mopti, where extreme heat now lasts longer and infrequent rains are destructive. Countries in conflict tend to receive comparatively less climate adaptation support. Yet climate change adds to their vulnerabilities, so support is vital.

© HCCS / Samuel Turpin

4. Mobilize local capacities

Communities are on the frontline of rising risks and are experiencing the brunt of climate and weather extremes. Families, communities and local organizations are not only the first to respond, but also play a vital role in adapting to rising risks. Supporting local leadership and integrating local perspectives into local and national planning processes is essential – especially perspectives from groups most vulnerable to climate risks. Local community engagement in the design of DRR and climate change adaptation projects is vital to ensuring their effectiveness, in the short and long term.

One positive outcome of the COVID-19 pandemic is that it has reinforced the intrinsic value of locally led action. In light of the COVID-19 restrictions, the international community has not been able to support in the same way: international deployments have simply not been an option. This has led to stepping up of locally led action and demonstrated the need to invest in local capacity.

For example, a rapid analysis of the response to Tropical Cyclone Harold in Vanuatu observed that investments made in the Community Disaster and Climate Change Committees enabled greater community participation and ownership and drove a more appropriate response. “The Malvatumauri (National Council of Chiefs) mobilized communities to raise funds and collect relief items. Youth and women’s groups from unaffected villages and islands identified ways to help by donating root crops and organizing delivery logistics. Sourcing food rations locally – promoted by the government – meant that the food relief provided to affected communities was more diverse and nutritious than the standard relief food items distributed in previous responses.” ([Humanitarian Advisory Group and Vanuatu Association of NGOs, 2020](#)).

Structures and resilience mechanisms like these may have been sidelined in the past, but the COVID-19 context provided the space for their greater engagement, and it is hoped that this experience will lead to a continued shift in power and resources towards local responders (for full analysis see [Humanitarian Advisory Group and Vanuatu Association of NGOs, 2020](#)).

For this to happen systematically, greater attention is also needed towards strengthening capacities of local communities to understand and reduce the risks they face, and enabling communities to take the lead in managing their own risks. For example, the IFRC, through its ‘preparedness for effective response’ common approach, is working to strengthen the local preparedness capacities of National Red Cross and Red Crescent Societies in line with global localization ambitions ([IFRC, 2017](#)). The approach has now supported more than 50 National Societies to become stronger and more equipped, and skilled local partners and leaders in responding to disasters. The examples in Box 4.8 – from communities and local organizations, often with the support and partnership of governments and international organizations – illustrate how there are many good initiatives already underway around the world that could be scaled up.

BOX 4.8 / CASE STUDY

SNAPSHOTS FROM ACROSS THE GLOBE ON ENABLING COMMUNITY-LED ACTION

The Ethiopian Red Cross Society has worked with local authorities to establish community-based DRM committees in high-risk areas. In a drought, the committee works with communities to identify the most-affected and vulnerable people requiring grain. If the communities do not experience a drought or other disaster before the start of the next harvesting period, the grain is sold and the proceeds put into a bank account set up by the Ethiopian Red Cross Society and the community-based DRM committee, serving as a local fund that can be drawn on in times of disaster (see [Canadian Red Cross, 2019](#)).

Since 2012, **The Nature Conservancy** and the **Grenada Red Cross Society** have run the At the Water's Edge project, supported by the Grenada Fund for Conservation, to increase local communities' social and economic capacity to adapt to climate change. Grenada relies heavily on natural resources, and as its primary economic sectors are tourism, agriculture and fishing, climate change is increasing the pressure on livelihoods and coastal and marine resources. The project empowers communities to assess risks and vulnerabilities by providing training in DRM and mangrove restoration, and also addresses degraded coral reefs by installing submerged breakwater structures.

The Chinese government launched its community-based National Flash Flood Prevention Project in 2010 to respond to the increasing risk of flash floods. Local residents disseminate their own warning based on the actual situation and their experiences. The project includes ten 'one item' activities for each village. The years of practice in flash flood disaster prevention have helped accumulate valuable experiences in accountability systems, prevention planning, village (community) monitoring and warning, public education and training and exercises. These have helped to build an organizational model for localized action in China (see also section 4.2).

The Red Cross of Montenegro works with flood-prone communities of Skadar Lake basin to increase their resilience to floods. The Red Cross facilitates the assessment of risks, capacities, needs and priorities on flood preparedness at local level, and shares this information with community members, local authorities and other stakeholders to empower local people to develop and implement flood preparedness activities and small-scale mitigation projects.

The impacts of the monsoon season in **Nepal** have become more severe in recent years. Flooding in August 2017 affected 1.7 million people and caused devastation amounting to 585 million USD, equivalent to three percent of Nepal's GDP. In 2020, COVID-19 has been further testing the resilience of flood vulnerable populations. Communities already report lack of access to essential items such as food, water, and hand soap. Research targeting 46 flood vulnerable communities in five districts of western Nepal, found that one in five communities do not have access to health services during floods and landslides; and distancing in shelters is a major challenge. To address this, **Mercy Corps, a member of the Zurich Flood Resilience Alliance**, is working with community disaster management committees to ensure that evacuation sites are safe from flooding and equipped with hand-washing stations, so that people can maintain their personal hygiene and prevent COVID-19 transmission.

5. Recognize and use local knowledge and experience

Certain groups in local communities may also contribute important knowledge and experience on effective mechanisms to reduce risks in their communities. Indigenous and elder knowledge, for example, can complement or even strengthen more structural investments to reduce risks. In Fiji, the sighting of a local bird called the *metulei* by the elders from the people of Ono-i-Lau sends signals of an impending cyclone, and prompts preparedness efforts. An analysis conducted after Tropical Cyclone Gita found that communities in the Ono-i-Lau area were well prepared before the cyclone struck and that local leadership had played a pivotal role ([PIANGO, 2018](#)). In Australia, traditional Aboriginal cool fire-burning practices that focus on regrowth and retaining soil moisture have been credited with saving lands from the 2018 Tathra bushfire ([Brown, 2020](#)).

Engaging women and ensuring women's leadership can contribute to addressing the climate crisis, help to address power imbalances and, in doing so, reduce vulnerability. In Uganda, a community of 1,642 women-led associations under the Women's Empowerment for Resilience and Adaptation Against Climate Change initiative have generated a pool of funds worth over 2.8 million US dollars (approximately 2.7 million Swiss francs) from individual savings from their network of 250,000 women. Funds can be borrowed from this fund for women to invest in income-generating activities that address either climate change adaptation or mitigation (see [UNFCCC, no date](#)).

In Vanuatu, an information communication system called *Women Wetem Weta* (Women's Weather Watch) provides women leaders with information about extreme weather events that they then share in the local language through bulk text messages with their communities. As women are often the caregivers of other vulnerable groups, including children, older people and persons with disabilities, including them in early warning can help to ensure that communities and livelihoods are protected during emergencies ([SPREP, 2020](#)).

6. Connect environment and natural resource management to disaster risk management

This issue of silos is being increasingly recognized, with a number of good initiatives seeking to overcome the challenges (see Chapters 6 and 7 addressing silos in policy/regulatory and financing frameworks too). In South Africa, for example, people and organizations from multiple disciplines and sectors related to ecosystem services, DRR and climate among others are working together to understand and manage complex systems, and reduce risks connected to floods, wildfires, storm waves and droughts. In one of four case studies, South African National Parks made a multi-million-dollar investment to clear non-native invasive plants to reduce wildfire risk in and around a large protected area in the urban matrix of the region ([Reyersa et al, 2015](#)). Various countries and the PfR consortium have taken up the concept of integrated risk management, as explained in Box 4.9.

Increasingly, the natural environment is being recognized as one of the most effective and cost-efficient resources we have to reduce exposure and vulnerability while also overcoming silos. Nature-based solutions (NBS) are "actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits" ([IUCN, 2016](#)). NBS can contribute simultaneously to DRR, climate adaptation, climate mitigation

and environmental management. In that respect, NBS can be an effective mechanism for overcoming silos and bringing together partners from the climate, development and humanitarian communities to address risks across time scales.

There is growing evidence about the critical role of nature in advancing climate, DRR and development ambitions. NBS are considered to have the potential to contribute around a third of the climate mitigation needed by 2030 and to stabilize warming to below 2°C ([Griscom et al, 2017](#)). They can provide significant protection from natural hazards and be more cost effective than structural infrastructure ([Cusick, 2020](#)). For example, studies have shown that mangroves can reduce up to 66% of wave energy in the first 100 metres of forest width. Moreover, restoring mangroves to protect communities from storm surges is “two to five times cheaper than building engineered structures like underwater breakwaters” and also contributes to storing carbon and improving water quality ([GCA, 2019](#)). And NBS can reduce vulnerability by providing new or enhanced livelihood opportunities. A study of a project implemented by the Viet Nam Red Cross Society found that mangroves not only protected dykes and coastal communities well, but also led to an increase of yield from aqua product collection of up to 780%, benefitting the poorest members of the communes most significantly ([IFRC, 2011](#)). Additional income for coastal communities through an increase in yields of aquaculture products was estimated at between 341,000 and 6.7 million US dollars (between 334,000 and 6.6 million Swiss francs) ([Kapos et al, 2019](#)).

Given the mounting evidence, there is now a growing movement towards NBS bringing together a range of partners – as evidenced through the 2019 UN Climate Action Summit and the Nature-based Solutions for Climate Manifesto ([UNEP, 2019](#)) signed by more than 70 governments, private sector, civil society and international organizations. Strong partnerships are needed between donors, governments, the private sector, local communities, development and humanitarian organizations, and environmental authorities to change the way nature is planned and used in development and humanitarian work.





Kenya, 2019. Murito Loso is a Maasai in Nkoilale village. The Maasai, like other pastoralists, see their livelihoods affected by droughts. Reducing vulnerability in the long term requires climate-smart investment in poverty reduction and social protection, with a focus on the people most impacted by climate extremes, including changes to livelihoods.

© IFRC / Corrie Butler

BOX 4.9 / CASE STUDY

INNOVATIVE RISK MANAGEMENT APPROACHES

Integrated risk management through Partners for Resilience in Ethiopia

In the past decade, the global alliance PfR has invested in implementing integrated risk management interventions in Ethiopia. These have been designed following vulnerability and capacity assessments and are complemented by landscape and climate-smart assessment to identify the causes of community risk. Through this novel approach, the Ethiopian Red Cross Society and partners centred their work on making people, communities and systems better prepared to withstand catastrophic events, and enabling them to bounce back more quickly and emerge stronger from shocks and stresses.

In collaboration with hydrometeorological services and agricultural extension services, PfR introduced agricultural innovations into project areas, including improved pre-harvest technology and soil- and water-conservation techniques to meet the increasing constraints from changing rainfall patterns and degraded ecosystems. Just over half of survey respondents to the independent evaluation reported taking advantage of these (PfR, 2018).

New livelihood options generally increased household income for two-thirds of respondents who took them up. Average annual income from on-farm activities increased around three-fold from the baseline average.

Supporting resilient Caribbean islands through ecosystem-based adaptation

Resilient Islands – a project supported by The Nature Conservancy and IFRC – supports Caribbean islands to cope with climate change impacts by working with communities and governments to design innovative decision tools, train local leaders and integrate adaptation strategies based on ecosystems into national policies. In Jamaica, the project supports the government in creating ecosystem-based adaptation projects that provide several benefits to coastal communities. These include a vulnerability capacity assessment, a checklist of ecosystem-based adaptation actions for communities, a guide to integrate such solutions into community planning tools, a mobile application for community resilience planning, and local demonstration projects and model sites that promote coastal resilience.

4.1.3 Recognizing our limits and the limits of adaptation

Unfortunately, we cannot remove all risk. In recent years increasing attention has been paid to the so-called ‘limits to adaptation’, the barriers that may mean at some point we simply will not cope with the climate conditions that are coming our way. The Intergovernmental Panel on Climate Change describes adaptation limits as “points beyond which actors’ objectives are compromised by intolerable risks threatening key objectives such as good health or broad levels of well-being, thus requiring transformative adaptation for overcoming soft limits” ([Roy et al, 2018](#)).

As climate change progresses, we will face more and more of these limits to adaptation. There is a distinction between *hard limits* – unavoidable limits to adaptation under certain climate conditions, and *soft limits* – practical constraints to adaptation, which may change over time ([Klein et al, 2014](#)). The best examples of hard limits are found in biophysical systems, such as coral reefs which will simply be gone when we reach 2°C of global temperature rise. This in turn also means hard limits to adaptation for the associated livelihood systems. As climate change accelerates it will undermine food security and challenge nature’s continued provision of other resources that people rely on for their survival, livelihood and culture ([Klein et al, 2014](#)). The further climate change progresses, and the faster the changes, the more of these limits we will see ([Singh et al, 2018](#)).

Some limits are already in sight, for example the limit of heat tolerance — there are places on Earth where people will not survive outside ([Roy et al, 2018](#)). Other examples of hard limits include melting permafrost that will permanently affect certain settlements and livelihoods ([Roy et al, 2018](#)). And of course sea level rise is already resulting in rising risks to many coastal areas, which may become inundated more frequently, while it becomes more and more expensive to defend against the rising risks ([Roy et al, 2018](#)). For example, in the USA, coastal erosion has passed management limits in some areas and discussions are taking place on ‘managed coastal retreat’, where communities would be relocated from highly exposed areas such as Alaska and Louisiana ([Ferris and Weerasinghe, 2020](#)). In small island developing states, several atoll islands are projected to become uninhabitable at 1.5°C of warming, due to increases in aridity and decreases in freshwater availability, along with additional risks from sea level rise and increased wave-induced storm surge ([Hoegh-Guldberg et al, 2018](#)).

The limits to adaptation can already be seen in humanitarian work, due to the continued lack of substantial global investment in adaptation work keyed to DRR practices. Humanitarians can see the effect of disasters in places that lack early warning systems, in places of poverty, in communities affected by climate change and conflict, and among people already displaced by conflicts or disasters. And we see them especially acutely affecting women and girls, persons with disabilities and other groups of people who are marginalized, as set out earlier. Local environmental conditions are key determinants for communities’ vulnerability and exposure to climate shocks and stresses.

So in analysing and seeking to reduce the impacts of climate change, we must focus on what determines those limits. As discussed, addressing marginalization and empowering people can remove many current limits to adaptation ([Roy et al, 2018](#)), but not all. We will also face hard limits, and places where the only solution is more transformative adaptation, or a shift in livelihoods. And instead of forcing these changes

on people by letting climate change progress and then experience the increasing impacts until they reach those limits, we should enable the dialogues that provide an honest space for discussion about the rising risks, and empower people and communities to make decisions about their own futures.

Finally, humanitarians – possibly more than anyone else – realize that climate change is already posing massive challenges today, and that continued warming will result in immense additional human suffering. Of course we will need to adapt, and we will continue to help people who already face limits to adaptation. **But we also need to add our powerful voice to the global chorus calling for increased efforts to urgently reduce emissions, to avoid facing more and more of the limits to adaptation in the coming decades.** Some climate change is already with us, but the worst can still be avoided – and it is up to all of us to turn that tide.



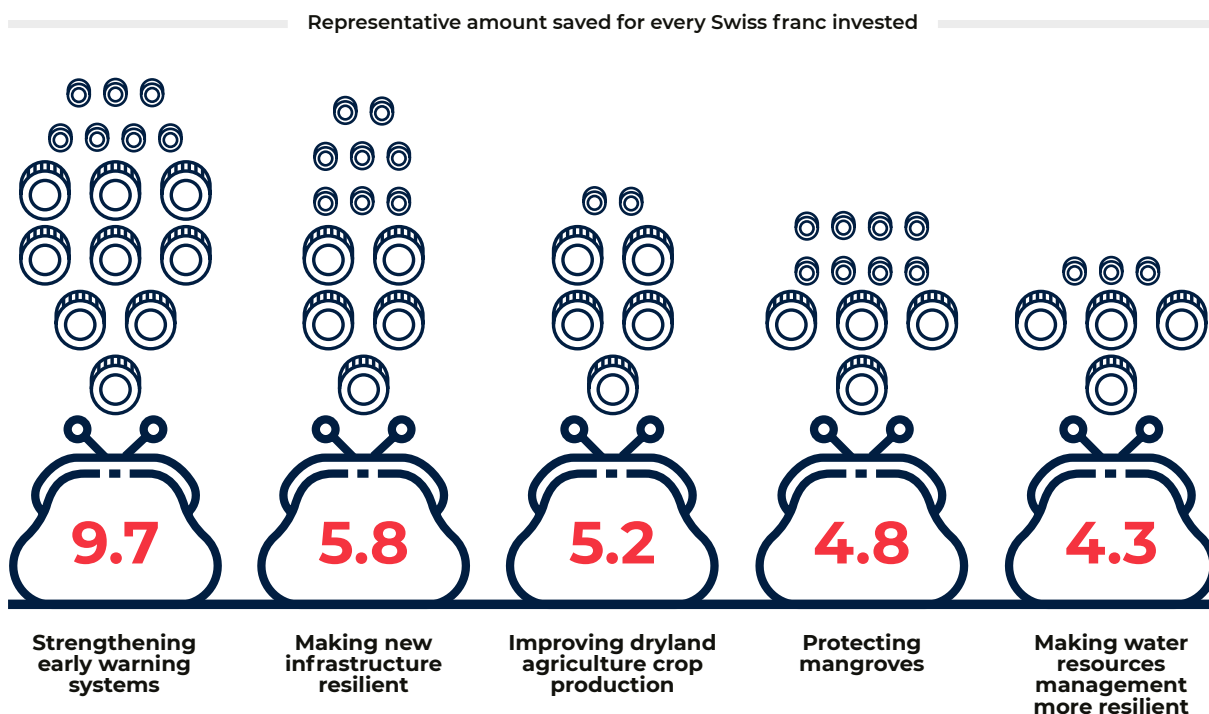
Norway, 2018. In the 2010s, 46% of disasters triggered by natural hazards were floods, affecting more than 673 million people worldwide. The economic toll of floods is high: in the first half of 2019, losses were estimated at 33.7 billion US dollars.

© Konrad Soglo / Norwegian Red Cross

4.2 GETTING READY TO ACT – REDUCING THE IMPACTS OF IMMINENT EVENTS THROUGH EFFECTIVE EARLY WARNING SYSTEMS THAT REACH THE LAST MILE

Early warning systems convey critical information on potentially hazardous events. They are said to have the highest benefit-cost ratio of any adaptation investment (GCA, 2019; see also Chapter 6). Indeed, “Just 24 hours warning of a coming storm or heat wave can cut the ensuing damage by 30 percent, and spending \$800 million on such systems in developing countries would avoid losses of \$3–16 billion per year” (GCA, 2019).

Figure 4.2 Benefits and costs of investments in adaptation



Source: GCA, 2019

With the aggravation of global climate change and increment of extreme weather events and exposures, flash flood risk has been rising and drawing substantial attention globally. One positive example of the impact of early warning systems comes from China. China is prone to flash floods, in particular in more mountainous and hilly areas, and these have accounted for significant casualties over recent decades. In this context, the Chinese government launched the National Flash Flood Prevention Project in 2010. The monitoring and warning system includes a rainfall and water-stage monitoring system, which can automatically receive monitoring data from observation stations and conduct analyses. Flash flood disaster monitoring and early warning platforms have been established in 2,058 counties in China. Further, a hierarchical information management system has been set up at multiple levels of governments and agencies, including 1 at national level, 7 at river basin level, 30 at provincial level and 305 at county level. Under critical conditions, the system sends a warning message to residents by mobile phone, television or radio broadcast. The project has proven to be an effective system for flash flood control. Annual flash-flood-induced casualties have reduced from 1,079 in the 2000s to 382 during the project's 13th five-year plan (2016–2020) even with the observable increase of extreme precipitations.

4.2.1 State of play: why are lives still being lost?

As the World Meteorological Organization (WMO) *2020 State of Climate Services* report ([WMO, 2020](#)) shows, many nations lack early warning system capacity and financial investment is not flowing into the areas where the most investment is needed, particularly in the countries where the capacity gaps are the greatest. Analysing the data provided by 138 WMO members (including 74% of least developed countries and 41% of small island developing states), the report identifies the global and regional capacity gaps against the five components of WMO good practice guidance on multi-hazard early warning systems: detecting, monitoring and forecasting the hazards; analysing risk; disseminating timely warnings; preparing to respond; and monitoring and evaluating the results. The report also noted that only 40% of WMO members reported having multi-hazard early warning systems in place.

WMO observed large capacity gaps in Africa, South America and small island developing states which are experiencing challenges around warning dissemination and communication (especially least developed countries in Africa and small island developing states), preparedness and response capacities (especially in South America) ([WMO, 2020](#)). Of 95 countries that provided data to WMO in 2019, 5 (5%) were providing climate services at a less-than-basic level, 24 (25%) at a basic level, 42 (44%) at an essential level, 13 (14%) at a full level and 11 (12%) at an advanced level according to WMO criteria. ([WMO, 2019](#))

Even where there are forecasting capacities, multi-hazard early warning systems are only effective if they actually reach and are actionable by those who need them. Communities at risk might not be fully aware of the potential consequences of the hazard or have limited capacity to effectively plan the actions they could take to prepare for a disaster. Despite improvements in forecast science, some of the most extreme recent events were predicted, yet still caused mass devastation. For instance, Cyclones Idai and Kenneth devastated Mozambique, Malawi and Zimbabwe in March and April 2019, taking more than 1,000 lives, leaving 2.6 million people in need of humanitarian assistance and causing at least 1 billion Swiss francs in damages. Research indicated that the loss of life could have been reduced if there had been better uptake and understanding of needed actions, as well as better flood forecasting ([ZFRA, 2020b](#)).

Overall, critical gaps in early warning systems need to be addressed to translate warnings into action. First, by improving the decision-making process to decide when and where to act before a disaster. This is done by understanding what and who is likely to be impacted, an approach called impact-based forecasting. Second, by improving early action planning and linking understanding of risks with potential actions that can reduce those risks and/or prepare for an effective disaster response. Third, by creating financing mechanisms that can disburse funding based on the warnings produced by using impact-based forecasting. Historically, early warning systems have failed even when good enough warnings and plans were in place, given the lack of resources to implement timely actions. In the last decade, humanitarian organizations have invested in addressing these gaps by enhancing and transforming early warning systems into anticipatory action strategies.

4.2.2 Getting to where we need to go: ensuring early warning systems have impact

1. Invest in relevant capacities

Explicit investments in hydrometeorological forecast capacities are essential, in particular in countries where capacities are weak. However, investing in forecasting capacities will only work if coupled with investment in the communication strategies that help to interpret and distribute warnings and decision-making tools that are fit for context. New and existing initiatives in disaster preparedness and early warning need to reach and work with the most vulnerable communities and first responders who are on the frontlines of climate-related disasters. Government agencies and civil society need to have clear responsibilities and plans in place to take early action to support people when a hazard is forecast.

2. Report in forecasts not only what the weather will be, but what the weather will do

Forecasting the local impacts of the particular hazard on a given community (and particular groups of people in that community), with their unique vulnerabilities and capacities, is thereby essential. For example, in Mozambique, houses were not built to withstand storms and therefore official warnings of “stay safe, go to your house, close windows and doors, make sure you stay inside” did not take into account the vulnerabilities of certain poor communities and the nature of their housing ([ZFRA, 2020a](#)). To address this gap in early warning systems, impact-based forecasting is transforming how forecasts are produced by considering not only climate and weather information but also other crucial risk data (exposure, vulnerability and disaster impacts records) at all levels. Combining scientific, local and indigenous knowledge is crucial to predict and manage disaster risks. This is best done by engaging vulnerable communities, government authorities, humanitarians and other key players who are on the frontline of disasters from the beginning when developing early warning systems. These insights, especially data on vulnerable groups and assets, could also be used to inform long-term DRR and adaptation (see section 4.1.2).

By turning forecasts and warnings from descriptions of what the weather will *be* into what the weather will *do*, the impact-based forecasting approach enables organizations and individuals to take forecast-based early action to anticipate and mitigate the impact of a disaster. Nevertheless, making sure that the most vulnerable communities, groups and people are prioritized requires a greater exchange between hydrometeorological offices, first responders and local communities and thus greater investments in community-based early warning systems.

BOX 4.10: IMPACT-BASED FORECASTING AROUND THE WORLD

The UK Met Office, with the World Bank and the UK Foreign, Commonwealth and Development Office, are supporting the Governments of Pakistan, Nepal, Bangladesh and Afghanistan to improve comprehensive climate and weather services through the Asia Regional Resilience to a Changing Climate (ARRCC). This invests in capacity building and hydrometeorological modernization, focusing on developing downscaled climate projections for each country, improving seasonal forecasts and developing impact-based forecast services.

The programme brings together stakeholders from national hydrological and meteorological services, DRR agencies, the climate sector such as the International Centre for Integrated Mountain Development and the Regional Integrated Multi-Hazard Early Warning System for Africa and Asia, and humanitarian partners including the Red Cross Red Crescent Climate Centre and the World Food Programme.

By applying this multidisciplinary approach, the programme is creating a robust user-oriented perspective in the development of climate services. The co-production of new types of impact-based forecast services for short-, medium- and long-term timescales will signify a better risk-informed decision-making process for adaptation and risk reduction measures including anticipatory action (see section 4.2.4). The Red Cross Red Crescent Climate Centre has contributed to this process by producing a new Guide on Impact-based forecasting for Early Action ([Red Cross Red Crescent Climate Centre, 2020](#)).

Similarly, the Caribbean Institute for Meteorology and Hydrology is helping national meteorological services build capacity to combine hazard, exposure and vulnerability information to forecast risk. Storm surge and coastal flooding are the deadliest cyclone-related hazards in the Caribbean and the Weather Ready Nations programme is expanding impact-based forecasting to start communicating what the weather will do.



3. Provide early warning information in the right language

Early warning information must be provided in the right language – in terms of local and minority languages – and using terminology that makes sense to the community. It is essential to have a process to engage communities and understand needs, priorities and what works for them (see Box 4.11).

On Funafuti in Tuvalu, forecasts and early warning messages issued by government authorities were hardly used by communities to prepare for and respond to disasters. A key barrier was that the information and suggested action were not tailored to local knowledge and locally relevant actions. To facilitate the development of an early warning that reached the most vulnerable people, the Tuvalu Red Cross Society set up community dialogues on early warning early action. They brought together national stakeholders and local community members to discuss what early warning early action is, how it works in Tuvalu, and how communities would like to engage.



Tuvalu, 2019. Posters in the local language, Tuvaluan, on Funafuti, Tuvalu. Only when early warning information is provided in the right language can it help communities prepare for disasters.

© Sean Gallagher

BOX 4.11: WHEN LISTENING SAVES LIVES: THE CYCLONE PREPAREDNESS PROGRAMME IN COX'S BAZAR, BANGLADESH

When more than 700,000 people fleeing from Rakhine State, Myanmar, arrived in Cox's Bazar in August 2017, the Bangladeshi Ministry of Disaster Management and Relief decided to expand and adapt the existing Cyclone Preparedness Program in the refugee camps. This was due to the high risk of natural hazards in the district, and with the support of the Emergency Communications Task Force.

Initial focus group discussions among host and incoming communities helped identify existing knowledge, perceptions and coping mechanisms for extreme weather events, the effectiveness of available disaster preparedness communication materials, and information gaps. Based on these insights, the Bangladesh Red Crescent Society, IFRC and American Red Cross teamed up with the UN Development Programme and Translators without Borders to adapt the programme's early warning information campaign. They considered the relevant languages and formats, used additional formal and informal channels, and ensured better information was provided on what to do depending on the hazard. Support to mainstream the campaign was provided by BBC Media Action, Internews and others. Examples include video animations and audio recordings in the local language for less literate community members, as well as flashcards and field discussion guides in Bangla, Burmese and English for staff and volunteers.

Community members reported having better access to consistent, timely cyclone preparedness information and acting on it. A Joint Multi-Sector Needs Assessment conducted in June 2019 found that 87% of refugees surveyed mentioned they had received cyclone preparedness information. Among them, 99% said the information received was clear. Ground Truth Solutions data also shows a higher proportion of people felt they had the information they needed and felt adequately prepared for the cyclone season in November 2019 than they did in April 2019 ([Ground Truth Solutions, no date](#)).



4. Link early warnings to early actions

Finally, early warnings should be linked to early actions, increasingly labelled anticipatory actions (see following sections). People may well be aware of the threat and want to act but do not know what to do or cannot take the recommended steps. They also need to be updated regularly based on experience. For example, during Cyclone Amphan in May 2020, acting based on alerts was a particular challenge. Evacuation plans were in place yet it was a struggle to implement these safely as some evacuation centres had been repurposed as quarantine centres for the COVID-19 crisis. New and existing initiatives in early warning need to reach and work with the most vulnerable communities and first responders. This is only possible where communities are engaged in developing the plans to take early action when a disaster is forecast. Ideally, early warnings are linked to more comprehensive plans that clearly outline who does what, when and which are supported by pre-arranged financing. An example of such an anticipatory approach is forecast-based financing (FbF). This relies on scientific forecasts and risk analysis to release funding for taking predetermined actions before a disaster materializes and acute impacts are felt. The key to this is the so-called early action protocol, which clearly defines the most important tasks and responsibilities. The early action protocols are developed well in advance and communities are consulted to assure appropriateness of the anticipatory actions.



Bangladesh, 2018. Volunteers participate in a disaster simulation drill in Cox's Bazar. The drill is helping to prepare residents to stay safe during monsoon season.

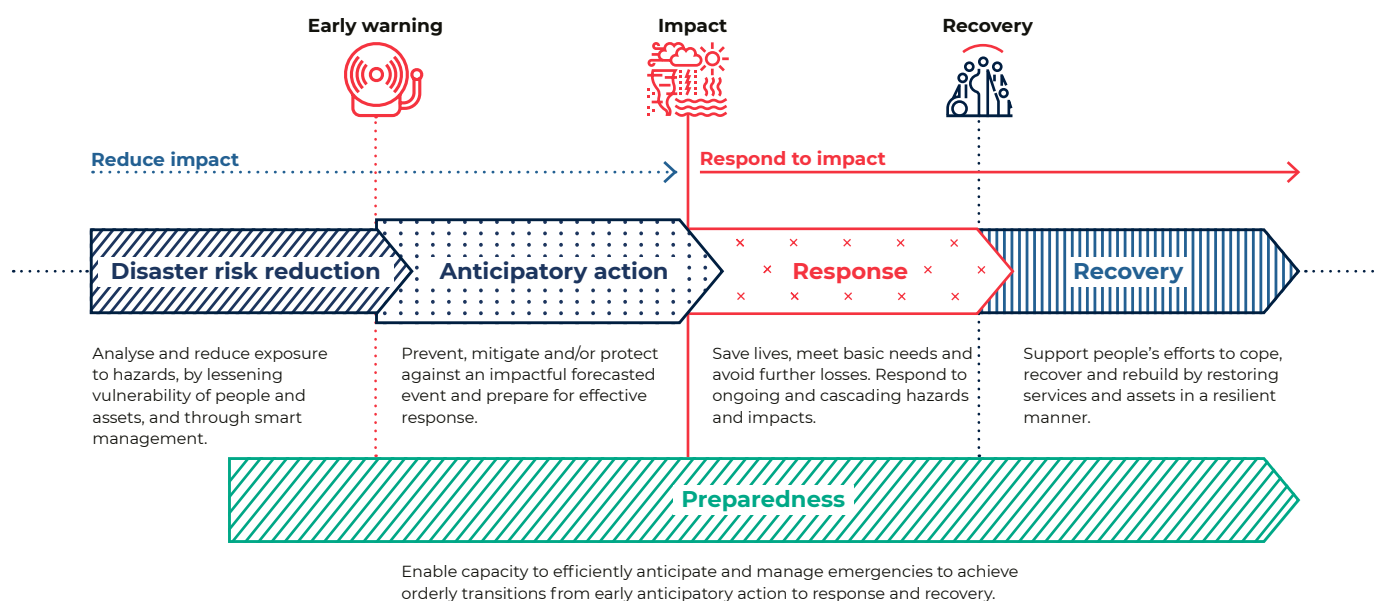
© American Red Cross / Brad Zerivitz

4.3 ACTING PRE-EMPTIVELY – PREVENTING RISKS FROM BECOMING DISASTERS BY LINKING EARLY WARNINGS TO ANTICIPATORY ACTION

Anticipatory approaches seek to reduce human suffering, losses and damage by providing populations with assistance ahead of an imminent disaster. Measures include providing cash, sanitation and hygiene kits and shelter toolkits but also safeguarding livelihood measures such as evacuations of livestock. These anticipatory actions seek to cushion the impact of a potentially harmful event. While there is no general definition, anticipatory approaches typically link robust predictions (such as forecasts and risk assessments) to action.

These action plans are prepared well in advance and clarify who does what, when and how. They are typically supported by a standby funding agreement to enable a quick move to action in case the action plan is triggered (see Chapter 6).

Figure 4.3: Anticipatory action in the DRM continuum



Source: Anticipation Hub (IFRC, German Red Cross, Red Cross Red Crescent Climate Centre)

They aim to empower communities and humanitarians to act earlier and thus prevent or at least reduce an imminent humanitarian crisis. Given the comprehensive work involved in setting up anticipatory approaches (such as developing trigger levels and action plans, providing equipment, setting up logistics chains) they sit between preparedness and response (see Figure 4.3).

Growing evidence indicates that anticipatory approaches have significant potential ([WFP, 2020](#)). The reason is straightforward: acting ahead of a disaster brings a better, faster and cheaper solution to humanitarian needs. One that is more dignified. One that deals with problems before they arise and where they arise. One that has a better cost-benefit ratio: allowing every dollar to go further. They are urgently needed.

4.3.1 State of play: the momentum is there, coordination is needed

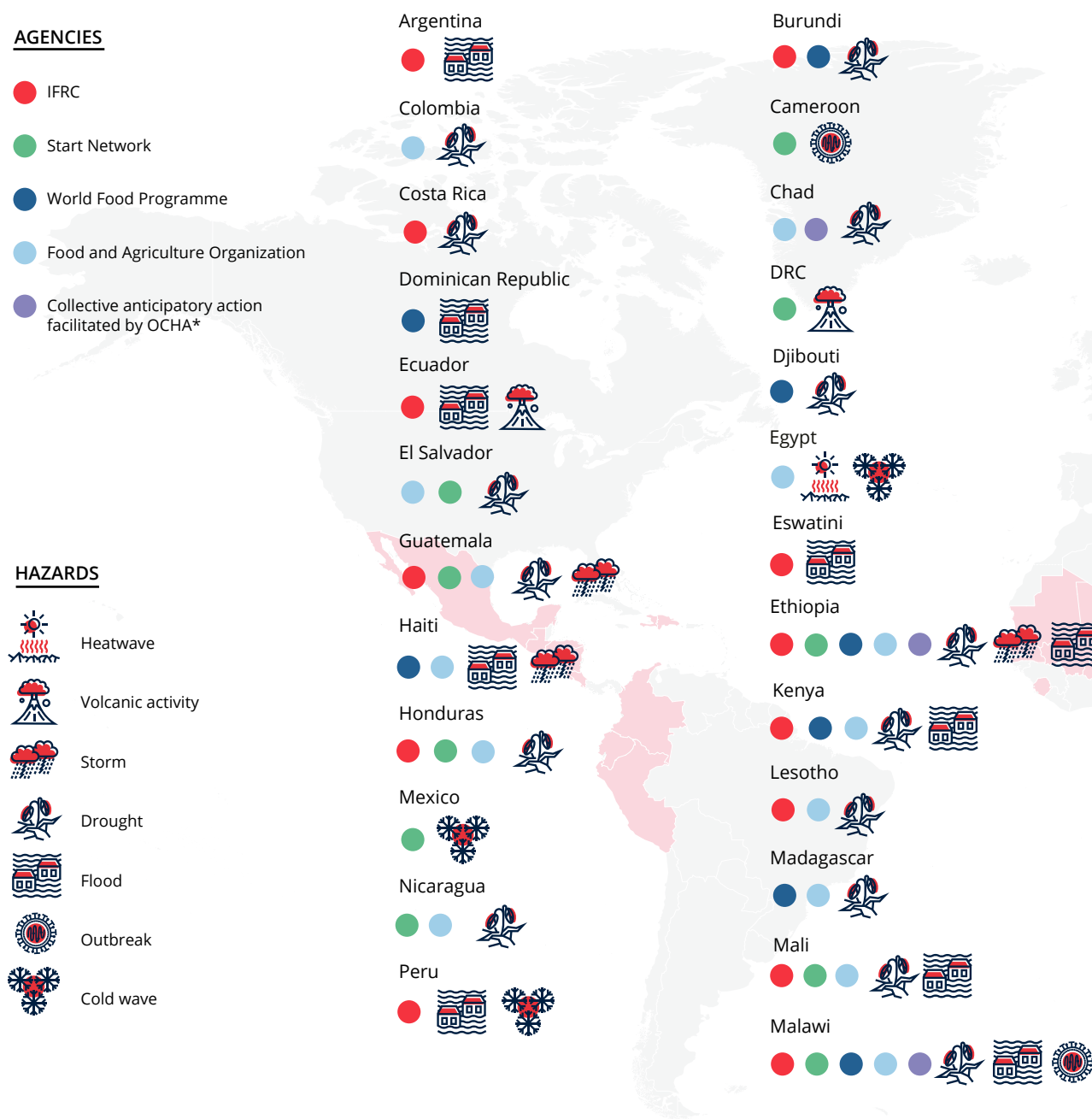
Anticipatory approaches have gained significant momentum in recent years. Alongside the Red Cross and Red Crescent Network and the World Food Programme (WFP)'s pioneering work in the form of FbF, other humanitarian agencies such as the Start Network, the Food and Agriculture Organization (FAO) and, more recently, the UN Office for the Coordination of Humanitarian Affairs (OCHA) are funding and developing similar approaches. In 2018 the IFRC set up the Forecast-based Action by the Disaster Relief Emergency Fund as its own dedicated financial mechanism to enable funding for implementing anticipatory actions by National Red Cross and Red Crescent Societies worldwide. The vehicle expands the scope of the classic Disaster Relief Emergency Fund and provides a vehicle for donors to support the FbF concept. Taken together, anticipatory approaches are now being implemented in over 60 countries. These initiatives also complement the wider work by the development and climate community to strengthen governments' systems through innovative disaster risk financing tools (for example: [ARC, 2017](#); [GIZ, 2019](#); [Scherer, 2020](#); [World Bank, 2017](#)).

Despite the encouraging developments, much more needs to be done for a more anticipatory humanitarian system. Building on the successful piloting efforts of recent years, the vision now is to scale up and mainstream anticipatory action as an approach across DRM processes and frameworks.

Scaling up means dedicating more funding to expand anticipatory action so that more people can receive assistance ahead of predictable shocks. It also means expanding the geographic coverage and types of shocks that can be anticipated, as well as the ability and capacity of the system to respond collectively in a coordinated manner. Therefore, scaling up is not just more, it also means better.

In recent years, several global initiatives have been launched to help scale up anticipatory approaches through technical assistance and investments in learning and leveraging collaboration, including financing, across sectors. They include the Early Action Focus Task Force, the Risk Informed Early Action Partnership (REAP) and the Anticipation Hub. The task force has been formed to encourage dialogue and collaboration between UN agencies (WFP, FAO and OCHA), the IFRC and NGOs (Start Network) while REAP brings together partners to increase partnerships and investments in early action. Gathering over 800 scientists, experts, practitioners and donors since 2015, the annual Regional and Global Dialogue Platforms on Anticipatory Humanitarian Action have become essential spaces for exchange between science, policy and practice. Building on the dialogue platforms, the German Red Cross, together with the IFRC and the Red Cross Red Crescent Climate Centre and financially supported by the German government, will launch the Anticipation Hub – a platform for sustained learning and exchange on anticipatory action, in December 2020.

Figure 4.4: Geographic distribution of internationally supported anticipatory action initiatives in advance of natural hazards



Source: Early Action Focus Task Force (FAO, IFRC, OCHA, Start Network, WFP, 2020)

Notes: *Other UN agencies involved: UNFPA, WHO, UNICEF, UNHCR, IOM.

This map includes initiatives up to September 2020

Mozambique



Namibia



Niger



Rwanda



Senegal



Sierra Leone



Somalia



South Sudan



Sudan



Togo



Uganda



Zambia



Zimbabwe



Tajikistan



Kyrgyzstan



Afghanistan



Bangladesh



Cambodia



Democratic People's Republic of Korea



Indonesia



Mongolia



Myanmar



Nepal



Pakistan



Philippines



Sri Lanka



Viet Nam



Fiji



Papua New Guinea



Solomon Islands



Timor Leste



On the side of strengthening government systems, in 2018 the World Bank, the UK and Germany established the Global Risk Financing Facility (250 million US dollars – approximately 245 million Swiss francs), which supports governments to put in place systems, early warnings, plans and financing to strengthen resilience and enable earlier action in emergencies. Most recently, the World Bank introduced the Crisis Response Window Early Response Mechanism – a 500 million US dollar (490 million Swiss franc) crisis fund that builds in pre-planning requirements to support anticipatory action for pandemics and food insecurity crises. See Chapter 7 for more information on different disaster risk financing instruments.

Some of these initiatives are still in their infancy, but they can become key vehicles to coordinate approaches and deliver a systemic shift towards anticipatory action that will save people's lives and protect livelihoods now and in the future.



Italy, 2020. Italian Red Cross voluntary nurses holding awareness sessions and health screening in "Albergo popolare" and "Ostello il Carmine" which are two local shelters for homeless and poor people.

© Michele Squillantini

4.3.2 Getting to where we need to go: scaling up anticipatory approaches

Adequate, long-term and coordinated resources are needed to bring anticipatory approaches to scale. A substantial part of the investments will be needed to assure that early warnings also lead to early actions. This requires investment in impact-based forecasting, including predictive analytics and forecasting capacities. But the best science is of limited help if it does not reach the communities at most risk (see previous section). The feasibility of implementing anticipatory actions in the short time window between a trigger and the impact of the event depends highly on the operational and administrative capacity of the local implementing organizations.

The IFRC, FAO, WFP and the Start Network have improved access and volume for anticipatory action funding over the past few years through their respective mechanisms. More recently, the OCHA-managed Central Emergency Response Fund is facilitating scaled-up collective anticipatory action. While funds to support anticipatory action are growing, they remain small compared with post-disaster humanitarian spending. Investments are small-scale, fragmented and agency specific. Moreover, they are rarely anchored in government systems or linked to more systematic investments in meteorological services, early warning systems, risk analyses or disaster preparedness.

BOX 4.12: RISK-INFORMED EARLY ACTION PARTNERSHIP

To address the need for a massive scale-up in anticipatory approaches, and to broker greater connections between the climate, development and humanitarian communities, REAP was established at the 2019 UN Climate Action Summit with the ambition of making 1 billion people safer from disasters. Through its four targets, it seeks to bring together partners to improve national planning, financing and delivery mechanisms to support early action, and to improve investment and coverage in warning systems with a focus on these reaching the most vulnerable people.

1. Anchor anticipatory action in national disaster risk management frameworks and strategies

Through such an approach, synergies can be created for taking actions before disaster impacts materialize. Law and policy have a key role to play in establishing relevant processes and coordination mechanisms, as well as allocating responsibilities and funding, to effectively integrate anticipatory action into national DRM systems ([IFRC, 2019a](#)). Governments must see the value of acting early and be supported to identify appropriate anticipatory actions and implement these in the short window of time between a hazard is forecast and it occurs.

Entry points could be disaster preparedness or response funds (see Box 4.13) but also social safety net programmes. In recent years, governments and donors have made significant investments in setting up shock-responsive social protection systems that increase coordination and in building their supporting structures (staff, tools, resources) as well as systems for targeting and registering people at risk delivering benefits and managing information. These systems could be used not only during emergencies but before they reach existing people at risk with anticipatory action, and for identifying and enrolling new people at risk ([Costella et al, 2017](#)).



Tajikistan, 2020. The FbF project team participated in a cold wave simulation. The aim of the project was to evaluate the effectiveness of planned early action measures to reduce the impact of extreme cold spells on the local vulnerable population.

© S Abdujabarov / German Red Cross

BOX 4.13 / CASE STUDY

THE PHILIPPINES: MAINSTREAMING ANTICIPATORY ACTION THROUGH SUBNATIONAL TECHNICAL WORKING GROUPS

In the Philippines, establishing subnational technical working groups on forecast-based financing (FbF) has been instrumental in supporting the integration of anticipatory action into relevant policies, plans and processes.

To ensure that FbF speaks to local needs and capacities, local chapters of the Philippine Red Cross set up technical working groups at provincial level. Members involve all government and non-government agencies relevant to the development of FbF. They include members from local government units and the national meteorological service PAGASA, where possible. The Red Cross involved the technical working groups heavily in developing and testing appropriate anticipatory actions. The close engagement highlighted to stakeholders the value of acting based on forecasts and also benefited the local government unit's understanding of Philippine Red Cross activities once a trigger is being reached. It stimulated a buy-in from government authorities in the anticipatory action concept, facilitated coordination across silos and improved anticipatory action planning.

Some local government units involved in the subnational technical working groups replicated the concept and allocated their own budget lines from their local preparedness fund to complement anticipatory actions. For example, the province of Davao de Oro allocated 200,000 Philippine pesos to support early harvesting of matured crops, early evacuation of people and/or livestock, and other anticipatory actions for the risk of flooding. And the city of Mati allocated 500,000 Philippine pesos to procure shelter strengthening kits for vulnerable households, and asked the Philippine Red Cross for training on installing the kits in anticipation of a typhoon. Very recently, the municipality of San Isidro allocated 500,000 Philippine pesos for the evacuation of livestock.

Moreover, in 2019 the National Risk Reduction and Management Council adopted Memorandum 60 which allows local government units to declare a state of calamity before disaster impacts materialize but on the basis of scientific forecasts and the predicted impact on its population. Such a declaration will enable the units to access the Quick Response Fund, and thus, an additional layer of financing to support anticipatory actions. The initiatives of local government units preparing for extreme events with appropriate early action plans show that an active, well-defined participation and sustained engagement of vulnerable stakeholders are key ingredients in mainstreaming anticipatory action.

2. Expand the application of anticipatory action

While anticipatory actions are available for an increasing number of hazards, most approaches focus on immediate, visible crises such as tropical cyclones and floods. Much more consideration must be given to invisible, creeping crises such as heatwaves and droughts.

Heatwaves are among the most dangerous of natural hazards but rarely receive adequate attention because their death tolls and destruction are not always immediately obvious. According to WHO, from 1998 to 2017, more than 166,000 people died due to heatwaves ([WHO, 2020](#)). Extreme heat accounts for some of the mostly deadly disasters on record, including for example, the 2003 European heatwave that is estimated to have caused 70,000 excess deaths and the 2010 Russian heatwave estimated to have killed over 55,000 people. Due to global warming, heatwaves are likely to become more frequent and intense. Together with other trends such as population growth and urbanization, the number of people exposed to heatwaves is likely to increase. The impacts of heatwaves are particularly felt in densely populated cities where the urban heat island effect intensifies heat. Heatwaves pose a significant hazard to older people, street vendors, young children and people with pre-existing health conditions. Despite their large impacts, rising trend, and very good predictability, heat risks have often been left behind in DRM interventions. Early warning systems that incorporate heat and link warnings to anticipatory action could reduce health risks and discomfort. To minimize heatwave impacts in urban contexts, the Viet Nam Red Cross Society has set up a FbF project in Hanoi. Anticipatory actions include providing cooling centres and buses, retrofitting houses in informal settlements (such as shading roof installations) and procuring climate-friendly cooling systems ([German Red Cross et al, 2019](#)).

Anticipating other crises beyond those caused by hydrometeorological hazards is a growing field of application. To expand the original focus to geological, biological hazards (epidemics) and more complex, human-induced crises such as, for instance, migration/displacement due to conflict and violence, requires a detailed understanding of how such hazards and crises unfold and evolve. Identifying risks, thresholds and appropriate anticipatory actions for other types of hazards and more human-induced risks opens up strong opportunities for building partnerships between government departments beyond the humanitarian sector. Building that expertise requires engaging in learning and exchange with other areas and sectors, such as epidemiology, medicine, displacement and migration, peace and conflict studies (see Box 4.14). Conflict analyses must also be built more systematically into humanitarian information systems, and thus help anticipatory approaches to address compound risks.

Meanwhile, anticipatory action should be expanded to places where risks and needs are highest. People affected by conflict are very likely to be impacted by climate change ([ICRC, 2020](#)). To protect such exposed and vulnerable populations, anticipatory action for people affected by conflict is essential, yet there is still a knowledge gap for effective early warning and early action in these complex contexts. More research and practice are needed to address these gaps (see Box 4.14).

In 2016, Concern Worldwide activated its anticipatory mechanism in Somalia when the La Niña phenomenon was predicted. People affected were living in an already fragile environment due to the protracted conflict, political instability and previous disasters. Early actions included cash transfer, fodder for animals and action to prolong the productivity of milk animals during drought to protect against malnutrition, particularly for children. The trigger system consisted of a red-flag approach that helped to identify areas most at risk. It combined climate data, vulnerability factors, disaster impact history and satellite-based remote sensing data (Warner and Jaime, forthcoming 2020).

BOX 4.14: EXPANDING ANTICIPATORY ACTION

Anticipating epidemics

The importance of anticipating infectious diseases has become particularly evident in the context of the COVID-19 pandemic. The increase in many infectious diseases is a result of the combined impacts of rapid demographic, environmental, social, technological and other changes in our ways of living. Disease outbreaks may lead to major public health crises with devastating effects on people's lives and livelihoods.

Addressing epidemics and pandemics is a cross-cutting task that depends on effective case detection and surveillance, community-based risk communication, close coordination and collaborations across countries, agencies and sectors. Moreover it depends on anticipating cascading effects and integrating forward-looking considerations into programming, as shown by COVID-19. Anticipatory actions in the face of natural hazards such as storms had to be adjusted to ensure an additional safety net for the most vulnerable populations. Adjustments included identifying additional shelters to ensure physical distancing and distributing masks, disinfection gels and handwashing facilities. People believed to have the virus were accommodated and cared for in separate shelters.

Anticipation in conflict settings

A major challenge in this context of compounding risks is how to adapt anticipatory action to conflict-affected settings. Extreme weather events and conflict are two of the gravest global risks to food security today and require enhanced attention. Especially in any areas where agricultural productivity is low and means of coping are limited, climate-related change in severity and frequency of extreme weather is a threat multiplier for hungry and undernourished people.

Combined with conflict, extreme weather events and environmental degradation causes migration and displacement, destroys livelihoods, widens inequality and challenges sustainable development. WFP has developed a number of FbF projects in conflict-affected contexts to address food security risks, especially those related to droughts. A menu of anticipatory actions that can be implemented ahead of a drought, based on a region's seasonal cropping calendar and unique context. Depending on the lead time, they include constructing irrigation infrastructure and disseminating early warnings as well as cash transfers and food distribution programmes. More recently, OCHA has also implemented a pilot for drought-related anticipatory action under the Central Emergency Response Fund.

3. Create coordinated disaster risk financing systems

The shift from a reactive to a more anticipatory management of risk needs to be backed up with sufficient resources (see also Chapter 7). This requires a greater technical exchange and coordination between the disaster risk financing initiatives and instruments being set up by government and humanitarians at global, regional or national level. Catalyzing a more effective disaster response requires integrated disaster risk financing systems, that is, harmonized trigger systems where funds are released and anticipatory action implemented in a coordinated way according to aligned plans ([Montier et al, 2019](#), [Harries and Jaime, 2019](#)). Partners would act in a harmonized way, not necessarily all for the same events or at the same time but reflecting their specific mandates, relative strengths and capacity.

The benefits of a more coordinated approach were shown in July 2020 when the Central Emergency Response Fund supported anticipatory action by WFP, FAO and the UN Population Fund (UNFPA) with 2.8 million US dollars. Bangladesh Red Crescent Society together with the German Red Cross and the Red Cross Red Crescent Climate Centre, supported the design of this anticipatory action plan, including establishing the trigger for implementation. The same trigger was also used by the IFRC to release financing from Forecast-based Action by the Disaster Relief Emergency Fund earlier in the monsoon season. Building on such examples, the humanitarian, climate and development sectors and their initiatives need to come together to agree on joint risk assessment and harmonized plans and triggers for action to deliver anticipatory action and response at the scale needed.



Peru, 2019. In the Peruvian Andes, forecasts of extreme cold and heavy snows trigger the release of funds and the deployment of Red Cross volunteers and staff before the thermometer starts dropping, allowing Alpaca herders to protect their livestock.

© Peruvian Red Cross / Bruno Chávez

4.4 CONCLUSION AND RECOMMENDATIONS

This chapter has identified key actions to reduce the risk of climate- and weather-related disasters – and their impact on people through reducing exposure and vulnerability, and increasing their capacity to manage shocks and stresses. Here we summarize how the humanitarian, development and climate and environment sectors need to approach their work to better manage climate, environment and disaster risks and achieve better outcomes for people's lives, livelihoods and dignity.

How we need to do things differently

Prioritize the most vulnerable people and places and measure success based on lives and livelihoods saved

- Climate-smart programming must be focused on where it is most needed. The main incentive for investing in preventing and reducing the impacts of climate shocks and hazards needs to be the greatest benefit to the people most vulnerable and exposed to climate risk. These people are often hardest to reach – reducing their vulnerability and exposure may be more expensive. As set out in the *World Disasters Report 2018*, this means prioritizing and incentivizing assistance to vulnerable communities through proactive and tailored strategies and tools, such as allocating funds solely for under-supported and hardest-to-reach groups ([IFRC, 2018b](#)).

Use the science: climate science, disaster risk and contextual environmental data and knowledge

- Access to quality, long-term, detailed climate, environment and disaster data and knowledge must be improved. This means building capacity at national and local levels to collect data and do contextual analysis to understand and appropriately act on existing and future risks. This includes sharing data as well as traditional and indigenous knowledge across international, national and local levels, and across humanitarian–development–climate and environment systems. It means establishing open access platforms where data is not only made available, but meaningful and actionable.
- Impact-based forecasts need to be prioritized, including through strengthening the mandate of national hydrometeorological services and ensuring service providers and users work together to make sure impact-based forecasting products and services are available and influenced by humanitarian needs and data.

Work with and listen to communities: and put the most vulnerable groups and people first

- All the sophisticated technology will not matter if we do not reach the communities and people most at risk.

- Communities are the frontline responders to the impacts of the climate crisis. In our call to strengthen investment to reduce exposure and vulnerability, improve early warning systems, scale up anticipatory action and strengthen environmental sustainability, we must always start by working with and listening to the priorities, experiences and expertise of communities. This includes harnessing indigenous and elder knowledge and promoting women's leadership.
- It is vital to assess the specific needs and priorities of persons of all gender identities, ages and physical and intellectual disabilities, analysing how these factors may affect their vulnerabilities and capacities. It is also crucial to analyse other aspects of diversity in those groups – the social, cultural, economic, ethnic and religious identities and experiences that make up the community.
- All programmes, policies and plans need to explicitly address how communities will be engaged and empowered in each step of planning, implementation and evaluation, consistently reporting back, adapting and reflecting on the progress to put people at the centre of everything we do.

Listen to and support local actors

- Local actors are often in a better position to co-design programmes with communities based on their needs, capacities and contextual knowledge about the surrounding environment. In the same way as prioritizing the most vulnerable people and places, we must also support local responders to establish the necessary data, tools, knowledge system and governance structures to build resilience and to plan and carry out anticipatory action.
- This requires flexible and predictable funding, from international donors and national governments. It also needs silos to be broken down across institutional mandates, accompanying funding streams and isolated actions so that local responders can design and implement holistic and integrated strategies and programmes.

Scale up anticipatory action

- Scaling up anticipatory action can help save lives and livelihoods. We must support the shift towards more predictable and rapid financing to expand anticipatory action so that many more people can receive assistance ahead of predictable shocks. Anticipatory action is needed more than ever as we face escalating humanitarian needs associated with the impacts of climate change.

Invest in nature-based solutions and more environmentally sustainable approaches

- The cost efficiency and co-benefits of NBS are well recognized, but implementation needs to be urgently scaled up. The humanitarian, development and climate and environment sectors should prioritize the use of NBS in DRR, climate adaptation, climate mitigation and environmental management, appropriately weighting short-term costs against long-term gains.

Collaborate – across systems and levels

- The impacts of climate change do not recognize national or social boundaries. We must move beyond our institutional mandates, frameworks, funding streams and programmatic cycles and work more efficiently and effectively towards our common objectives and as directed by communities' expressed needs and

priorities, to reduce exposure and vulnerability and build resilience ([Joint Steering Committee to Advance Humanitarian and Development Collaboration, 2020](#)). We can and must improve collaboration between development, climate and environment and humanitarian agencies at local, national and global levels.

- Globally, concerted efforts are needed to work towards collective outcomes and establish common and integrated approaches to DRM. These include collaborative data collection and analysis, harmonized reporting requirements, long-term partnerships and joint proposals with adequate time frames to allow for concurrent short-, medium- and long-term interventions across the humanitarian–development–climate and environment nexus.
- Disaster risk financing needs to be scaled up, including by mainstreaming anticipatory approaches in national DRM frameworks, developing harmonized thresholds for release of pre-positioned funds and implementing coordinated action plans. This requires concerted efforts to improve how we share data and information, establishing a common approach and supporting collective analysis to inform complementary programming.

Regardless of how well we reduce risk and increase resilience, there will still be disasters that take place, and building resilience throughout the response and recovery process is essential. Chapter 5 looks at how we can strengthen the environmental sustainability of response and recovery efforts and meet our responsibility of reducing our local and global climate and environment footprint, so that we do not inadvertently increase risks for communities and the world.

BIBLIOGRAPHY

Agrawal A et al (2019) *Climate resilience through social protection* (Background Paper to the 2019 Report of the Global Commission on Adaptation). <https://cdn.gca.org/assets/2019-09/ClimateResiliencethroughSocialProtection.pdf>

ARC (Australian Red Cross) (2020) *Australian Bushfires Report: January – June 2020*. <https://www.redcross.org.au/getmedia/fd3287ff-c893-4ba4-a34c-e41940b453c6/Report-6mth-FINAL-200708-1.pdf.aspx>

Brown B (2020) *Aboriginal communities call for ongoing funding of cultural burning for bushfire mitigation*. ABC News. 29 January 2020. <https://www.abc.net.au/news/2020-01-30/aboriginal-cultural-burning-funding-for-bushfire-mitigation/11910464>

Bugler W (2019) The flooding emergency in northern England is a policy failure not a freak of nature. *Acclimatise News*. 20 November 2019. <http://www.acclimatise.uk.com/2019/11/20/the-flooding-emergency-in-northern-england-is-a-policy-failure-not-a-freak-of-nature/>

Canadian Red Cross (2019) *Localization of Disaster Preparedness and Response Capacity in Ethiopia*. IFRC. https://media.ifrc.org/ifrc/wp-content/uploads/sites/5/2019/12/CaseStudy_LocalizationDisasterPreparedness_Ethiopia.pdf

Cardona OD et al (2012) Determinants of risk: exposure and vulnerability. In: CB Field et al (eds.) *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation: A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change (IPCC)*. Cambridge University Press. https://www.ipcc.ch/site/assets/uploads/2018/03/SREX-Chap2_FINAL-1.pdf

Climate Centre (2017) *Turn down the heat(wave)! Red Cross flash mobs in India*. <https://www.climatecentre.org/news/866/turn-down-the-heat-wave-red-cross-flash-mobs-in-india>

Cornish L (2020) How meteorology is helping women lead disaster response in Vanuatu. *Devex News*. 27 February 2020. <https://www.devex.com/news/how-meteorology-is-helping-women-lead-disaster-response-in-vanuatu-96644>

Costella C et al (2017) *Scalable and Sustainable: How to Build Anticipatory Capacity into Social Protection Systems*, IDS Bulletin. Institute Of Development Studies, 48(4), pp. 31–46. <https://doi.org/10.19088/1968-2017.151>

Cusick D (2020) *Green Infrastructure Can Be Cheaper, More Effective than Dams*. Scientific American. <https://www.scientificamerican.com/article/green-infrastructure-can-be-cheaper-more-effective-than-dams/>

Danish Red Cross, Croix-Rouge Malienne, Norwegian Red Cross (2019) *Evaluation Finale : Projet de résilience communautaire pour la Réduction des Risques de Catastrophes (RRC) et d'Adaptation aux Changements Climatiques (ACC) au Mali (RECOM)* (in French).

Ferris E and Weerasinghe S (2020) *Promoting Human Security: Planned Relocation as a Protection Tool in a Time of Climate Change*. *Journal on Migration and Human Security*. <https://doi.org/10.1177/2331502420909305>

FINPAC (2018) *Findings of the Finland-Pacific Project on Reduced Vulnerability of the Pacific Island Countries' Livelihoods to the Effects of Climate Change* (FINPAC Project 2018).

GAIN (2017) *Rank countries by ND-GAIN Country Index, Vulnerability and Readiness*. <https://gain-new.crc.nd.edu/ranking/vulnerability>

GCA (Global Commission on Adaptation) (2019) *Adapt Now: A Global Call for Leadership on Climate Resilience, 2019*. Global Center on Adaptation and World Resources Institute. https://cdn.gca.org/assets/2019-09/GlobalCommission_Report_FINAL.pdf

German Red Cross et al (2019) *Forecast-based Financing. Factsheet Vietnam*. https://www.forecast-based-financing.org/wp-content/uploads/2020/04/Factsheet_Vietnam.pdf

GIZ (2019) *Disaster Risk Finance – A toolkit*. https://indexinsuranceforum.org/sites/default/files/Publikationen03_DRF_ACRI_DINA4_WEB_190617.pdf

Griscom et al (2017) *Natural Climate Solutions*. National Academy of Sciences. <https://www.pnas.org/content/114/44/1164>

Ground Truth Solutions (no date) *Systematic feedback for Rohingya and host communities in Bangladesh*. <https://groundtruthsolutions.org/our-work/feedback-rohingya-bangladesh/>

Hallegate S et al (2016) *Unbreakable*. Global Facility for Disaster Reduction and Recovery and World Bank Group. https://www.gfdrr.org/sites/default/files/publication/Unbreakable_FullBook_Web-3.pdf

Harries C and Jaime C (2019) *Thinking impact before instruments in humanitarian disaster risk financing*. Start Network, IFRC and Red Cross Red Crescent Climate Centre. <https://startnetwork.org/resource/1-thinking-impact-instruments-humanitarian-disaster-risk-financing>

Hoegh-Guldberg et al (2018) *Impacts of 1.5°C Global Warming on Natural and Human Systems*. In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty in Masson-Delmotte et al (eds.). In Press. <https://www.ipcc.ch/sr15/chapter/chapter-3/>

Humanitarian Advisory Group and Vanuatu Association of NGOs (2020) *No turning back: Local leadership in Vanuatu's response to Tropical Cyclone Harold*. https://humanitarianadvisorygroup.org/wp-content/uploads/2020/06/TC-Harold-Practice-Paper_final-electronic.pdf

ICRC (2016) *Protracted conflict and humanitarian action: some recent ICRC experiences*. <https://www.icrc.org/en/document/protracted-conflict-and-humanitarian-action>

ICRC (2018b) *Displaced in Cities; Experiencing and Responding to Urban Internal Displacement Outside Camps*.

ICRC (2020) *When rain turns to dust: understanding and responding to the combined impact of armed conflicts and the climate and environment crisis on people's lives*. https://www.icrc.org/sites/default/files/topic/file_plus_list/rain_turns_to_dust_climate_change_conflict.pdf

IFRC (no date) *Vulnerability and Capacity Assessment*. <https://www.ifrc.org/vca>

IFRC (2011) *Breaking the waves*. https://www.preventionweb.net/files/globalplatform/entry_bg_paper~mangroveimpactreportfinalloawapril2011.pdf

IFRC (2017) *National society preparedness for effective response*. [https://media.ifrc.org/ifrc/what-we-do-disaster-and-crisis-national-society-preparedness-effective-response/#:~:text=Preparedness%20for%20Effective%20Response%20\(PER,national%20and%20global%20response%20systems](https://media.ifrc.org/ifrc/what-we-do-disaster-and-crisis-national-society-preparedness-effective-response/#:~:text=Preparedness%20for%20Effective%20Response%20(PER,national%20and%20global%20response%20systems)

IFRC (2018a) *Strategy 2030*. <https://future-rcrc.com/wp-content/uploads/2020/01/S2030-EN.pdf>

IFRC (2018b) *World Disasters Report 2018: Leaving No-one Behind*. <https://media.ifrc.org/ifrc/wp-content/uploads/sites/5/2018/10/B-WDR-2018-EN-LR.pdf>

IFRC (2019a) *Law and Disaster Preparedness and Response. Multi-Country Synthesis Report*. https://media.ifrc.org/ifrc/wp-content/uploads/sites/5/2019/11/DPR_Synthesis-Report_EN_Screen.pdf

IFRC (2019b) *The cost of doing nothing: the humanitarian price of climate change and how it can be avoided*. <https://media.ifrc.org/ifrc/the-cost-of-doing-nothing/>

IFRC (2020a) Interview with humanitarian migrant and refugee expert.

IFRC (2020b) Interview with humanitarian shelter expert.

IFRC and UNDP (2014) *Effective law and regulation for disaster risk reduction: a multi-country report*. [https://www.ifrc.org/Global/Publications/IDRL/reports/DRR%20Report%20\(full%20version\)%20final_page_LR.pdf](https://www.ifrc.org/Global/Publications/IDRL/reports/DRR%20Report%20(full%20version)%20final_page_LR.pdf)

IMF (International Monetary Fund) (2018) *Adapting to Climate Change – Three Success Stories*. <https://blogs.imf.org/2018/03/20/adapting-to-climate-change-three-success-stories/>

IPCC (Intergovernmental Panel on Climate Change) (2012) *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation*. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change. CB Field et al (eds.) Cambridge University Press. https://www.ipcc.ch/site/assets/uploads/2018/03/SREX_Full_Report-1.pdf

IUCN (2016) *Helping nature help us: Transforming disaster risk reduction through ecosystem management*. International Union for Conservation of Nature. https://www.iucn.org/sites/dev/files/content/documents/helping_nature_help_us_-_transforming_disaster_risk_reduction_through_ecosystem_management.pdf

Joint Steering Committee to Advance Humanitarian and Development Collaboration (2020) *The New Way of Working*. UN. <https://www.un.org/jsc/content/new-way-working>

Kapos V et al (2019) *The Role of the Natural Environment in Adaptation, Background Paper for the GC*. https://cdn.gca.org/assets/2019-12/RoleofNaturalEnvironmentinAdaptation_V2.pdf

Klein R et al (2014) *Adaptation opportunities, constraints, and limits*. Pages 899-943 in C. B. Field et al. editors. *Climate change 2014: impacts, adaptation and vulnerability. Part A: Global and sectoral aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge, UK. https://www.ipcc.ch/site/assets/uploads/2018/02/WGIIAR5-Chap16_FINAL.pdf

Lahoz WA and Schneider P (2014) Data Assimilation: Making Sense of Earth Observations. *Frontiers in Environmental Science*, 2(16). <https://www.frontiersin.org/articles/10.3389/fenvs.2014.00016/full>

Lary D et al (2018) *Machine Learning Applications for Earth Observation. Earth Observation Open Science and Innovation*, pp. 165–218. https://link.springer.com/chapter/10.1007/978-3-319-65633-5_8

Maciag (2018) <https://www.governing.com>

Mfitumukiza D et al (2020) *Scaling local and community based adaptation*. Global Commission on Adaptation Background Paper. https://cdn.gca.org/assets/2020-06/Local_Adaptation_Paper_-_Global_Commission_on_Adaptation.pdf

Mitchell and Van Aalst (2008) *Convergence of Disaster Risk Reduction and Climate Change Adaptation*. https://www.researchgate.net/publication/228879475_

Montier E et al (2019) *Disaster Risk Financing in Concert: How Coordinated Disaster Risk Finance Can Save More Lives*. Start Network. <https://start-network.app.box.com/s/fv0zlsyk661vtjv90cr6t48o8hr8bwc4>

Myanmar Red Cross Society (2020) *Urban Disaster Risk and Resilience program evaluation and end line survey report*.

ODI (Overseas Development Institute) and UNDP (UN Development Programme) (2019) Risk-informed development: from crisis to resilience. <https://www.undp.org/content/undp/en/home/librarypage/climate-and-disaster-resilience/-/risk-informed-development.html>

Oroz ML (2017) *From Big Data to the Humanitarian-in-the-Loop Algorithms*. UNHCR: Innovation Service. <https://www.unhcr.org/innovation/big-data-humanitarian-loop-algorithms/>

PEDRR (Partnership for Environment and Disaster Risk Reduction) (2020) *PEDRR Factsheet*. https://postconflict.unep.ch/publications/PEDRR_factsheet.pdf

- Peters K (2019) *Disaster risk reduction in conflict contexts: The state of the evidence*. <https://www.odi.org/sites/odi.org.uk/files/resource-documents/12691.pdf>
- PfR (Partners for Resilience) (2018) *Ethiopia Integrated Risk Management Program: Final Evaluation*. Partners for Resilience. https://www.partnersforresilience.nl/downloads/files/PfR%20Program%20Evaluation%20Ethiopia_DEF.pdf
- PIANGO (2018) *Na Yadrayadravaki, Case study of Community led resilience during TC Gita*. <http://www.piango.org/wp-content/uploads/2019/03/NaYadrayadravakiv6.pdf>
- PLACARD (Leitner M et al) (2020) *Bonding CCA and DRR: recommendations for strengthening institutional coordination and capacities*. <https://www.placard-network.eu/wp-content/PDFs/PLACARD-Insitutional-strengthening-May2020.pdf>
- Pregnotato M and Lewis E (2019) *Climate-driven extreme weather is threatening old bridges with collapse*. The Conversation. 6 August 2019. <https://theconversation.com/climate-driven-extreme-weather-is-threatening-old-bridges-with-collapse-121458>
- Reyersa B et al (2015) *Navigating complexity through knowledge coproduction: Mainstreaming ecosystem services into disaster risk reduction*. <https://www.pnas.org/content/pnas/112/24/7362.full.pdf>
- Red Cross Red Crescent Climate Centre and IFRC (2020) *What is climate-smart programming and how do we achieve it?* <https://www.climatecentre.org/downloads/files/What%20is%20climate-smart%20programming%20-%20MAR2020.pdf>
- Roy J et al (2018) Sustainable development, poverty eradication and reducing inequalities. In: Masson-Delmotte V et al (eds.) *Global warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*. IPCC. https://www.ipcc.ch/site/assets/uploads/sites/2/2019/05/SR15_Chapter5_Low_Res.pdf
- Scherer N (2020) *Insuring Against Climate Change. The Emergence of Regional Catastrophe Risk Pools*. Routledge. <https://doi.org/10.4324/9780429324642>
- Siddiqi A (2018) *Disasters in conflict areas: finding the politics*. <https://doi.org/10.1111/disa.12302>
- Singh R et al (2018) *A 1.5°C warmer world: a guide for policy-makers and practitioners*. BRACED Knowledge Manager. <http://www.braced.org/contentAsset/raw-data/499a2845-a832-4d66-b7e6-b6b87827c6a6/attachmentFile>
- Singh R et al (2019) *Heatwave Guide for Cities*. Red Cross Red Crescent Climate Centre. <https://www.climatecentre.org/downloads/files/IFRCGeneva/RCCC%20Heatwave%20Guide%202019%20A4%20RR%20ONLINE%20copy.pdf>
- SPREP (2020) *Women's Leadership Helping Rural and Remote Communities Access Early Warning and Disaster Information*. News. 25 March 2020. <https://www.sprep.org/news/womens-leadership-helping-rural-and-remote-communities-access-early-warning-and-disaster-information>

The Carnegie Trust (no date) *Investigating local resistance to climate change adaptation: Climate injustice in São Tomé and Príncipe*. <https://www.carnegie-trust.org/alumni/michael-mikulewicz-2/>

UNDRR (UN Office for Disaster Risk Reduction) (2015) *Sendai Framework for Disaster Risk Reduction 2015-2030*. https://www.unisdr.org/files/43291_sendaiframeworkfordrren.pdf

UNEP (UN Environment Programme) (2019) *The Nature-Based Solutions for Climate Manifesto*. <https://wedocs.unep.org/bitstream/handle/20.500.11822/29705/190825NBSManifesto.pdf?sequence=1&isAllowed=y>

UNFCCC (UN Framework Convention on Climate Change) (no date) *Momentum for Change, Women's Empowerment for Resilient and Adaptation against Climate Change, Uganda*. <https://unfccc.int/climate-action/momentum-for-change/women-for-results/womens-empowerment-for-resilience-and-adaptation-against-climate-change>

UNISDR (2009) *2009 UNISDR Terminology Disaster Risk Reduction*. https://www.unisdr.org/files/7817_UNISDRTerminologyEnglish.pdf

Wagner M and Jaime C (2020) *Forecast-based action in conflict*. Global Public Policy Institute and Red Cross Red Crescent Climate Centre. <https://www.gppi.net/2020/09/22/an-agenda-for-expanding-forecast-based-action-to-situations-of-conflict>

Weldegebriel ZB and Prowse M (2013) Climate-Change Adaptation in Ethiopia: To What Extent Does Social Protection Influence Livelihood Diversification? *Development Policy Review* 31 (supplement 2), pp. o35–56. <https://doi.org/10.1111/dpr.12038>

WFP (World Food Programme) (2020) *The Evidence Base of Anticipatory Action*. <https://www.wfp.org/publications/evidence-base-anticipatory-action>

WHO (World Health Organization) (2020) *COVID-19 situation in the WHO European Region*. <https://who.maps.arcgis.com/apps/opsdashboard/index.html#/ead3c6475654481ca51c248d52ab9c61>

WMO (World Meteorological Organization) (2019) *2019 State of Climate Services*. <https://public.wmo.int/en/resources/library/2019-state-of-climate-services>

WMO (2020) *2020 State of Climate Services*. https://library.wmo.int/index.php?lvl=notice_display&id=21777#.X5Chii2ZM6j

World Bank (2017) *Sovereign Climate and Disaster Risk Pooling*. <http://documents1.worldbank.org/curated/en/837001502870999632/pdf/118676-WP-v2-PUBLIC.pdf>

World Bank (2020) *Fragility, Conflict & Violence. Helping Countries Navigate a Volatile Environment*. <https://www.worldbank.org/en/topic/fragilityconflictviolence/overview>

ZFRA (Zurich Flood Resilience Alliance) (2020a) *Learning from Cyclone Idai and Cyclone Kenneth to Strengthen Early Warning Systems in Mozambique*. <https://reliefweb.int/report/mozambique/learning-cyclone-idai-and-cyclone-kenneth-strengthen-early-warning-systems>

ZFRA (2020b) *Post Event Review Capability (PERC) study analyzing the 2019 Cyclone Idai and Cyclone Kenneth impacts in Mozambique*.