World Disasters Report 2020

IFRC

COME HEAT OR HIGH WATER

Tackling the humanitarian impacts of the climate crisis together

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WORLD DISASTERS REPORT 2020

COME HEAT OR HIGH WATER

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Foreword

As the *World Disasters Report 2020* heads to press, the COVID-19 pandemic continues to hold a tight grip on the world. The pandemic's effects are being felt everywhere: the direct health impact has been immense, but it has also caused unprecedented suffering socially, financially and institutionally.

From the outset of this crisis, I have been impressed and humbled by the bravery of staff and volunteers from our 192 National Red Cross and Red Crescent Societies working hand in hand with IFRC teams across the globe. While helping their communities to prevent the spread of COVID-19, they are also working to reduce the risks and impact of climate- and weather-related disasters and other hazards. Unfortunately, other crises and disasters have not stopped during the pandemic, and this puts millions more lives at risk.

Climate- and weather-related disasters are causing massive humanitarian impacts across the world, directly affecting 1.7 billion people in the past decade alone. We fear this will get worse as the number, intensity and variability of extreme events increases.

At the same time, I feel there is much to hope for. The COVID-19 crisis offers an opportunity to build a better future – a future characterized by inclusive development and sustained climate action that prevents catastrophic humanitarian impacts triggered by climate change. It is time that we start creating our own momentum for positive change and bring about the necessary drastic transformation in every aspect of our lives. The *World Disasters Report 2020* provides clear analysis of the scale of the challenges and offers strong recommendations on how we – as humanitarian, development and climate/environment communities – can come together to reduce risks and save lives.

The IFRC has made serious commitments on climate change. The IFRC's Strategy 2030, the result of a multi-year consultative process across the whole IFRC network, and our guiding document for this decade, identified climate change as the first of five main global challenges our network needs to address. Earlier this year we released the International Red Cross and Red Crescent Movement Ambitions to Address the Climate Crisis, which boldly sets out how we can collectively reduce the current and future humanitarian impacts of climate change and support people to adapt in the face of these immense challenges. Climate action was one the key themes at the December 2019 33rd International Conference of the Red Cross and Red Crescent and as a result, we committed to develop a new Climate and Environment Charter to bring the practice of the broader humanitarian community to a higher standard. We also organized the first Climate:RED virtual summit, a 30-hour non-stop event run entirely online with more than 10,000 participants from over 195 countries taking part in some 200 online sessions, all discussing the issue of climate change and what we must collectively do to tackle this crisis together.

Words however are easy. What counts is action.

Reducing, preparing for and responding to the impacts of climate- and weather-related events is nothing new to the IFRC network. Through its global reach the IFRC network is scaling up locally-led climate action. We have always helped communities to prepare for and overcome disasters. In Mongolia we support communities to survive the dzud, a combination of drought and severe winter conditions. In Ethiopia we help establish community-based disaster risk management committees in areas at high risk of drought. We are improving flood preparedness in Montenegro, providing psychosocial support to communities affected by bushfires in Australia, and using forecast-based financing to deliver funds in Bangladesh ahead of a major storm.

While this is just a small selection of the significant work on disaster risk reduction, preparedness and response taking place across the IFRC network, we know this is not yet enough with the scale and urgency of the task before us. Even though we are winning small victories every day, in the big picture, we are not winning at all. We – as a global community – are not on track to make the changes that need to be made and to make them in time. Not yet.

Around the world, children, families, volunteers and leaders are taking to the streets, seeking to lift this issue to the top of the global agenda. Together, we need to urgently scale up climate action if we hope to reduce the threat it poses to our survival. Everyone, everywhere, at all levels. While the climate crisis is a humanitarian crisis, the solution must reach beyond. It requires ministries of finance, development, climate and environment disaster management and communities to all come together.

We need to plan together for the future, acknowledging that it will not resemble the past.

Past practices by all of us – including institutions, corporations and individuals – have contributed to today's climate challenges. We need to change our behaviour, and we must also demand policy change and real action from decision-makers – in government, industry and across all sectors.

We must think long-term.

We must work *together* to prioritize the people most at risk, the people with the least capacity to manage climate-related risks, the people with the greatest need. We need to base our decisions and investments on what will bring the greatest benefit to the people most exposed and vulnerable to climate risks.

Let's tackle this crisis head on. Together. Now.

Jagan Chapagain

IFRC Secretary General

Acronyms

CAR	Central African Republic
COP	Conference of the Parties (UNFCCC)
CSO	Civil society organization
DAC	Development Assistance Committee (OECD)
DPRK	Democratic People's Republic of Korea
DFO	Dartmouth Flood Observatory, University of Colorado
DRC	Democratic Republic of the Congo
DRM	Disaster risk management
DRR	Disaster risk reduction
ECHO	European Civil Protection and Humanitarian Aid Operations
EM-DAT	International Disaster Database, Centre for Research on the Epidemiology of Disasters
FAO	Food and Agriculture Organization of the UN
FbF	Forecast-based financing
FEWS NET	Famine Early Warning Systems Network
FIRMS	Fire Information for Resource Management System (NASA)
FTS	Financial Tracking Service (OCHA)
GCF	Green Climate Fund
GDP	Gross domestic product
GNI	Gross national income
ICRC	International Committee of the Red Cross
IDMC	Internal Displacement Monitoring Centre

IFRC	International Federation of Red Cross and Red Crescent Societies
IPCC	Intergovernmental Panel on Climate Change
NAP	National adaptation plan
NASA	National Aeronautics and Space Administration
NBS	Nature-based solutions
NCEI	National Centers for Environmental Information (NOAA)
ND-GAIN	Notre Dame-Global Adaptation Index
NEAT+	Nexus Environmental Assessment Tool
NOAA	National Oceanic and Atmospheric Administration
OCHA	Office for the Coordination of Humanitarian Affairs (UN)
ODA	Official development assistance
OECD	Organisation for Economic Co-operation and Development
REAP	Risk Informed Early Action Partnership
SDG	Sustainable Development Goal
SSPs	Shared socio-economic pathways
UK	United Kingdom
UN	United Nations
UNDRR	UN Office for Disaster Risk Reduction
UNEP	UN Environment Programme
UNFCCC	UN Framework Convention on Climate Change
US	United States
WASH	Water, sanitation and hygiene
WFP	World Food Programme
WHO	World Health Organization (UN)
WMO	World Meteorological Organization

Contents

Snapshot of climate- and weather-related disasters and their impacts

In the past ten years, **83% of all disasters triggered by natural hazards were caused by extreme weather- and climate-related events**, such as floods, storms and heatwaves.

The **number of climate- and weather-related disasters** has been increasing since the 1960s, and **has risen almost 35%** since the 1990s.

The proportion of all disasters attributable to climate and extreme weather events has also increased significantly during this time, from **76% of all disasters during the 2000s to 83% in the 2010s.**

These **extreme weather- and climate-related disasters have killed more than 410,000 people in the past ten years**, the vast majority in low and lower middle-income countries. Heatwaves, then storms, have been the biggest killers.

A further **1.7 billion people around the world have been affected by climate- and weather-related disasters** during the past decade.

EXECUTIVE SUMMARY

Overview

The COVID-19 pandemic has shown how vulnerable the world is to a truly global catastrophe. But another, bigger, catastrophe has been building for many decades, and humanity is still lagging far behind in efforts to address it, as communities and countries still need to adapt to its realities.

The impacts of global warming are already killing people and devastating lives and livelihoods every year, and they will only get worse without immediate and determined action. The frequency and intensity of climatological events are increasing substantially, with more category 4 and 5 storms, more heatwaves breaking temperature records and more heavy rains, among many other extremes. Loss of natural resources, food insecurity, direct and indirect health impacts and displacement are likewise on the rise. Many communities are being affected by concurrent and consecutive disasters, leaving them with little time to recover before the next shock arrives. The most at-risk people in these communities are in danger of being left behind if their needs and capacities are not understood, and their voices not heard.

The massive stimulus packages that are being developed around the world in response to COVID-19 are an opportunity to build back better – not only with a green recovery but an adaptive one, using funds to invest in making communities safer and more resilient.

The resources we need to adapt to current and imminent climate-driven disaster risks are within reach. As an example, it would take an estimated 50 billion US dollars (around 49 billion Swiss francs) annually to meet the adaptation requirements set out by 50 developing countries for the coming decade. This amount is dwarfed by the global response to the economic impact of COVID-19 which has already passed 10 trillion US dollars (approximately 9.8 trillion Swiss francs), including a 750 billion Euro (802 billion Swiss franc) COVID-19 economic bailout scheme agreed by EU leaders in July 2020, and a 2.2 trillion US dollar (2.1 trillion Swiss franc) COVID-19 stimulus bill adopted by the USA in March. This money should be used for the essential task of creating jobs, whilst at the same time also facilitating a green, inclusive and resilient recovery.

It is also critical to use available resources well – headlines about millions and billions of dollars should not distract us from ensuring that what is allocated is best spent for those people who need it most. At present, the available funding for climate change adaptation and disaster risk reduction does not seem to consistently prioritize the countries at highest risk and with the lowest ability to adapt and cope with these risks.

While higher volumes of funding do often go to countries facing the highest levels of vulnerability to disaster risk and climate change, this is not consistently the case. Many highly vulnerable countries are left behind, receiving little climate change adaptation support.

The analysis presented in *World Disasters Report 2020* shows that none of the 20 countries most vulnerable to climate change (according to ND-GAIN) and to climate- and weather-related disasters (according to INFORM) were among the 20 highest per person recipients of climate change adaptation funding. Somalia, the most vulnerable, ranks only 71st for per person funding disbursements. None of the countries with the five highest disbursements had high or very high vulnerability scores. At the other end of the spectrum, 38 high vulnerability countries (out of 60) and 5 very high vulnerability countries (out of 8) received less than $1 per person in climate adaptation funding, while two (Central African Republic and DPRK) received no disbursements at all. Notably, none of the largest five recipients are fragile contexts.

An additional challenge is ensuring that funding reaches the most at-risk people within these countries. Many communities may be particularly vulnerable to climate-related risks, from people affected by conflict whose capacity to manage shocks is already strained, to migrants and displaced people who may struggle to access the services and assistance they need, to urban poor people and other marginalized communities. Support needs to reach these communities most vulnerable to climate-related risks as a priority.

The issues are not only financial. The report argues it is time to shake off business as usual and turn words into action. Much of what needs to be done has been known for years – it is just overdue in implementation. But we also need to scale up some new lessons learned more recently from our changed environment. Fundamentally, we need to ensure that we are implementing the intertwined commitments in the Sustainable Development Goals (SDGs), the Paris Agreement under the UN Framework Convention on Climate Change (UNFCCC) and the Sendai Framework for Disaster Risk Reduction 2015–2030 in a joined-up way. And we must do a much better job of ensuring that all actors – including governments, donors, the humanitarian, development, climate and environmental sectors – prioritize support for the people, communities and countries most at risk.

Disasters during the COVID-19 pandemic

Climate change is not waiting for COVID-19 to be brought under control. Many people are being directly affected by the pandemic and climate-driven disasters all at once, and the world's poorest and most at-risk people are being hit first and hardest. Over 100 disasters took place between March 2020 (when the pandemic was announced) and six months later when this report was finalized, and over 50 million people were affected. So, we may well be "busy" with the pandemic, but there's still never been a more urgent time to act.

More than **100 disasters** occurred during the first **6 months** of the **COVID-19 pandemic**

More than **50 million** people have been affected

More than **10 different disasters** affected over **250,000 people**

99%

of people affected were impacted by extreme climate- and weather-related disasters

Sources: IFRC GO, EM-DAT

Notes: WHO declared the COVID-19 pandemic on 11 March 2020. Figures are from 1 March 2020 to 1 September 2020.

The *World Disasters Report 2020* takes a deep dive into the disaster risks that climate change is driving, and analyses the action needed to address their human impacts.

Chapter 2, **Hazards everywhere – climate and disaster trends and impacts**, analyses how the number of disasters has increased over time, and how climate- and weather-related disasters have increased in number and as a percentage of all disasters. As a result, we can expect not only less time to recover between disasters, but that multiple disasters will happen at once, in a manner described as compounding shocks. For example, the dangers of cyclones, flooding, droughts, fires or heat waves did not retreat while the world was adapting to the COVID-19 pandemic. This chapter looks at the potential humanitarian impacts of extreme weather events exacerbated by climate change over the next 10 to 30 years – including displacement, food insecurity and loss of livelihoods, damage to property, injury and loss of life – and the likelihood that many people will be pushed beyond their ability to cope. The number of people affected by climatological disasters is rising, and will continue to rise unless we take action on both climate change adaptation and mitigation.

Chapter 3, **Climate as a risk multiplier – trends in vulnerability and exposure**, looks at the uneven geographic impacts of climate- and weather-related hazards between regions (with Asia-Pacific bearing the greatest burden) and within countries. It considers how trends, such as rapid, unplanned urbanization and social and economic inequality, affect who is at greatest risk. It argues that efforts to reduce risks must be based on a fuller understanding of why some people are more vulnerable and/or have less capacity to cope with a crisis than others, bearing in mind the groups of people who tend to be more vulnerable, but also the significant variations of experience and circumstances within and between groups.

Without this, we will fail to reach the people most in need. The chapter also examines the strain the humanitarian system was under even before the global shock of the novel coronavirus, and warns that existing gaps will be worsened by the COVID-19 crisis.

Chapter 4, **Reducing risks and building resilience – minimizing the impacts of potential and predicted extreme events**, sets out how to effectively reduce the risk of climate- and weather-related disasters by reducing exposure and vulnerability, and increasing people's capacities to manage shocks and stresses. It calls for climate adaptation and risk-informed development efforts to be urgently scaled up today to respond to rising risks, and for a transformation in all approaches to resilience across the development, humanitarian, environmental and climate sectors.

Programmes and operations need to become 'climate smart'; we must do more to collaborate, reinforce and align efforts and co-produce solutions; and our adaptation and risk reduction practices must involve communities – particularly women, youth and indigenous people – in their design if they are to truly meet the needs of the most at-risk people. The chapter also looks at how the humanitarian sector has to not only become more effective, but also evolve if it is to cope with the increasing frequency and severity of climate- and weather-related events, specifically by expanding multi-hazard early warning and anticipatory approaches.

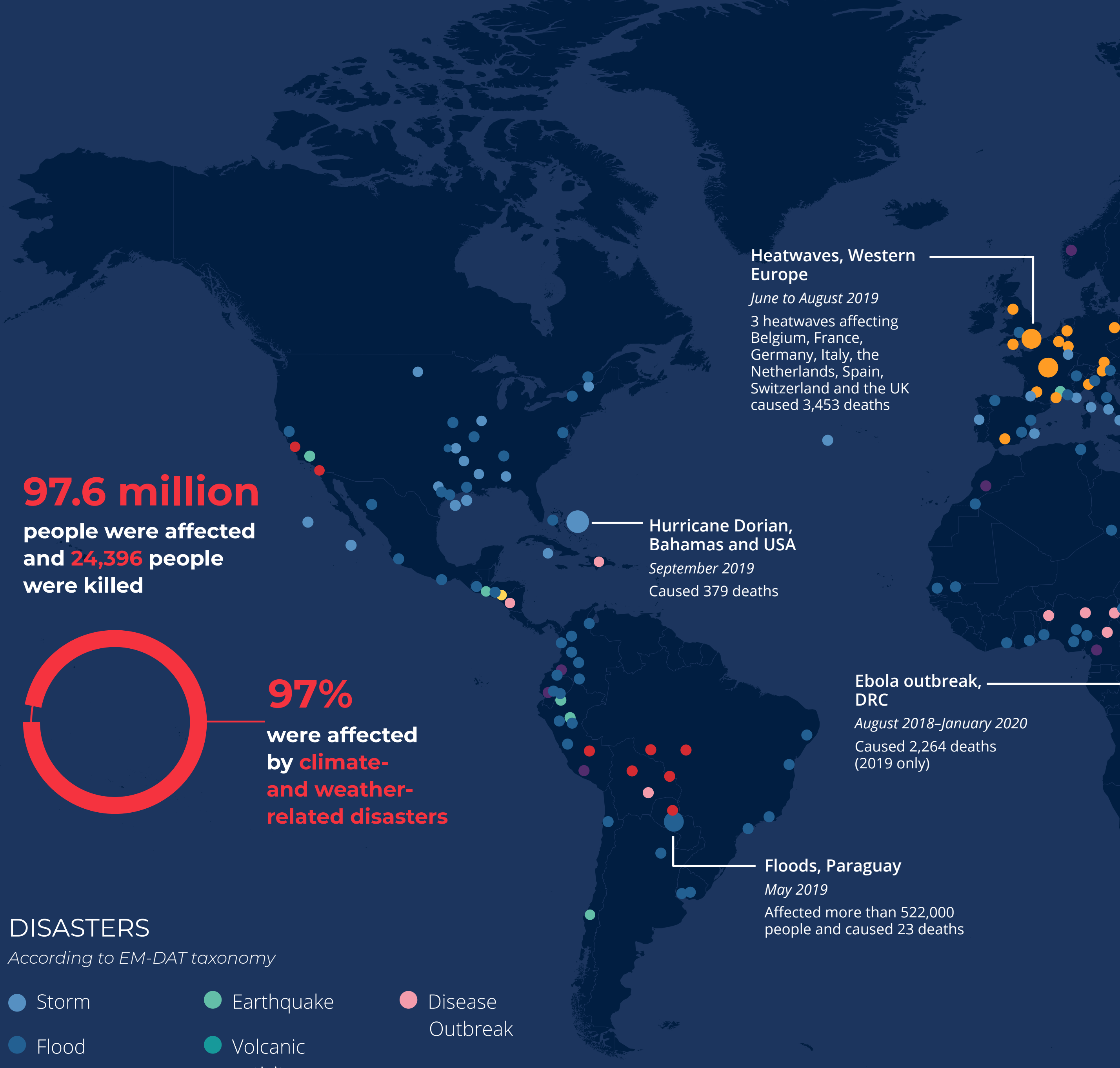
Chapter 5, **Going green – strengthening the environmental sustainability of response and recovery operations**, addresses the prospects for humanitarian assistance itself to become greener and more sustainable. It outlines ways in which the environmental sustainability of response and recovery operations can be strengthened while limiting the resulting climate and environmental footprint. And it argues that humanitarian organizations have a responsibility to do no harm, which means taking a much more serious approach across the sector to greening our own activities and operations, particularly in relation to our carbon footprint and our impact on the environment.

Chapter 6, **Climate-smart disaster risk governance – ensuring inclusive and coherent regulatory frameworks**, explores the imperative for countries to improve the effectiveness of their national risk governance frameworks in the face of increasing disaster risks and worsening climate trends. This should happen through coherent law and policy reform processes that enhance resilience to climate and disaster risks in a more systematic way. In this way, nations can optimize their available resources and increase the efficiency of their risk management measures. More integrated domestic laws and policies addressing climate and disaster risk are a key way to put in place cross-cutting international commitments under the SDGs, the UNFCCC Paris Agreement and the Sendai Framework.

Chapter 7, **Smart financing – getting the money where it's needed most**, argues that our current climate finance structures are not yet hitting the target when it comes to allocation. Smart financing is about the where and how of spending, not just the how much. It means deliberately directing money to the countries and communities most at risk of climate change crises and designing holistic funding strategies from a starting point of what these people and places really require. There is a clear responsibility for developed countries to meet their commitments to provide financing, and also for all those involved in spending it to ensure it is best directed and designed to make the greatest difference for the people who need it most. This must involve integrating the experience and expertise of local people and systems facing the worst effects of climate change. This needs a concerted effort not only to target the most vulnerable places, but also to develop financing plans and tools which support the best outcomes for people.

Throughout, the *World Disasters Report 2020* insists that urgent action must be taken at the community level, where it is needed the most. But all actors have to be smarter about how they do this. In its recommendations, the report calls for all actors to be **climate smart**, to **get the priorities right**, and to **integrate and localize** climate and disaster risk management approaches.

DISASTERS IN 2019



97.6 million

people were affected and 24,396 people were killed

97%

were affected by climate- and weather-related disasters

DISASTERS

According to EM-DAT taxonomy

- Storm
- Flood
- Landslide (hydromet)
- Wildfire
- Heatwave
- Drought
- Earthquake
- Volcanic activity
- Disease Outbreak

Sources: IFRC 2020 based on data from EM-DAT, NCEI (NOAA), WHO, DFO, FIRMS (NASA), National Hurricane Center, Joint Typhoon Warning Center, IBTrACS (NOAA), ReliefWeb, secondary data review

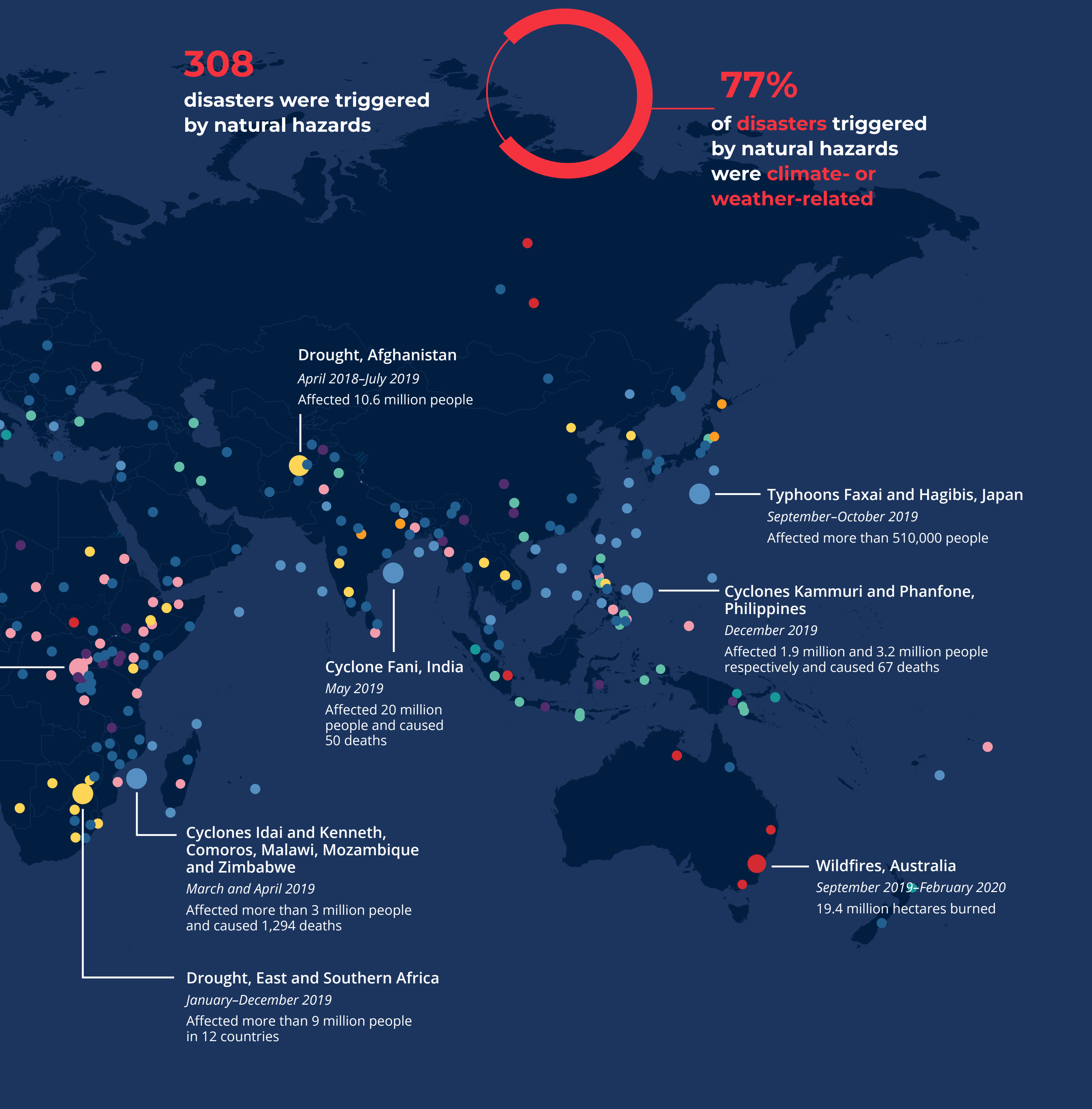
Note: The maps used do not imply the expression of any opinion on the part of the International Federation of Red Cross and Red Crescent Societies or National Societies concerning the legal status of a territory or of its authorities.

308

disasters were triggered by natural hazards

77%

of disasters triggered by natural hazards were climate- or weather-related



127	59	25	8	10	8	32	3	36
Floods	Storms	Landslides (hydromet)	Wildfires	Extreme temperatures	Droughts	Earthquakes	Volcanic activities	Disease outbreaks

Afghanistan, 2019. After years of drought, flash floods in March 2019 caused deaths and damage across many provinces in Afghanistan. Around the world, many communities are being affected by concurrent and consecutive disasters, leaving them with little time to recover before the next shock arrives.

Get climate smart

Humanitarian, development as well as climate and environmental actors need to become much better prepared to take actions triggered by a forecast (ranging from providing cash, sanitation and hygiene kits or shelter tool kits to safeguarding livelihood measures such as evacuations of livestock, among others) including through forecast-based financing. The *World Disasters Report 2020* argues that it is time to take this approach to scale, through both its incorporation in national disaster risk management laws, policies and plans, and in the procedures and practices of humanitarian donors and organizations.

The key to this lies in taking full account of – and acting on – what science tells us about upcoming risks, while understanding that these may be very different from those of even the recent past. This requires combining an existing understanding of vulnerabilities and capacities with one of possible future risks at different time scales (including weather forecasts, seasonal forecasts and longer-term climate change projections).

For disaster risk management programming, both long-term and medium/seasonal forecasts can be critical for planning and investment, while short-term forecasts should trigger anticipatory action. Forecast-based financing and similar approaches have gone well beyond the proof-of-concept phase, with IFRC, National Red Cross Red and Crescent Societies and other partners integrating them into their work in more than 60 countries to date. All early warning systems must reach the most at-risk people, and be easily understood and acted on by them, while investments in early warning must be matched by investments in early action if people's lives are to be saved. At the same time, information about risks and especially vulnerable groups that is collected to develop early warning and early action systems can seamlessly inform long-term risk reduction and adaptation planning (but currently rarely does!). For instance, alongside investments in flood early warning systems for vulnerable communities, critical infrastructure must be made more resilient in order to withstand the predictable – and often rising – risk of weather extremes and rising sea levels.

Get the priorities right

Our collective goal is to keep everyone safe from disasters, but our first priority and focus should be the communities that are most exposed and vulnerable to climate risks.

The *World Disasters Report 2020* shows that international climate and disaster risk reduction finance are not keeping pace with adaptation needs in low income countries, and the countries with the very highest risk and lowest adaptive capacities are not being prioritized.

A clear mandate to focus on the most at-risk people – and to ensure they participate in decision-making – is also missing from many disaster risk management laws and national adaptation plans. While the people and communities most at risk vary widely from place to place, slum dwellers, migrants and displaced persons, indigenous communities, older and disabled persons and persons with diverse sexual orientation, gender identity and expression and sex characteristics are among the people most frequently left behind.

Integrate and localize the approach

'Integration' may not sound like a particularly revolutionary approach to the global climate crisis, but it is indispensable. The main global regulatory frameworks – the SDGs, the Sendai Framework and the Paris Agreement – already call for integrated approaches in climate change adaptation, disaster risk reduction and development. However, few national disaster risk management laws and policies fully integrate climate change adaptation and some states employ parallel and separate institutional mechanisms and planning processes for climate change adaptation, disaster risk management and development.

There is also a lack of integration across international finance sources, with climate, development and humanitarian funding streams often operating in uncoordinated ways, leaving gaps in coverage – particularly in support for local responders and community-level action.

Local humanitarian and civil society organizations can anticipate, respond to, and support the recovery of affected communities, if these communities have the resources they need. Multilateral climate finance is extremely difficult for civil society groups to access, and there is a collective blind-spot that can prevent support from being available for long-term institutional capacity building of local disaster responders.

Summary of recommendations

For governments

- Design investments, including COVID-19 financial stimulus packages, to support a green, resilient and inclusive society, investing in climate change mitigation and adaptation.
- Ensure that major infrastructure, such as schools, hospitals, child and senior care facilities, seawalls, power plants and water and sanitation facilities, is designed (and where possible retrofitted) to withstand projected climate and weather extremes and rising sea levels, making use of environmental impact assessments as a regulatory tool.
- Review disaster risk management laws, policies and plans to ensure they are climate smart, understood and implemented. These should also consider key innovations such as forecast-based action and financing, linked to shock-resistant social protection systems.
- Invest and design integrated and people-centred early warning and early action systems that assure timely delivery of actionable warnings at community level, as well as an adequate protective response.
- Ensure decentralized access to funding for adaptation and disaster risk management activities, particularly at the local level.

For humanitarian (and other relevant civil society) organizations

- Embrace and strengthen climate adaptation, in particular in urban settings, as well as in contexts where development practitioners may be less present, such as complex crises.
- Scale up use of forecast information in planning and learn from successes in forecast-based triggers for early action

- Continue to strengthen rapid response and scale up capacity for disasters that cannot be avoided.
- Take responsibility to transparently report and improve on global and local climate and environmental footprints, strengthen the environmental sustainability of humanitarian activities and impact, and make stronger links to the environment throughout humanitarian work.

For multilateral and bilateral donors

- Design COVID-19 support packages to enable a green, resilient and inclusive recovery, investing in climate change mitigation and adaptation.
- Increase ambition to match the adaptation needs of the most vulnerable developing countries.
- Ensure allocation of climate and disaster risk reduction finance prioritizes countries that are at the very highest risk and lowest capacity.
- Change procedures so that multilateral climate finance can be accessed at local level for community-led resilience building as well as for strengthening long-term institutional and response capacities.
- Scale up support for anticipatory approaches so that many more people can receive assistance ahead of predictable shocks.
- Support humanitarian organizations to achieve a greener approach (which should include adequate budgeting for strengthening systems and allow for sustainable procurement) and coordinate among themselves to avoid contradictions in their demands on funding recipients.

For climate change institutions and experts

- Embrace and promote more effective management of disaster risk caused by climate change as a critical element of adaptation and thus an important goal of global and domestic climate action, alongside mitigation.
- Connect analytical tools (as well as policy and financing instruments) for long-term adaptation with short-term forecast-based action and post-disaster response.
- Redouble efforts, in cooperation with humanitarian and development partners, to ensure that communities receive timely and understandable scientific information about climate-driven risks.
- Build on the experience of the humanitarian and disaster risk reduction communities in managing shocks, which includes the need for multi-stakeholder approaches, and a strong focus on implementation at local level.

For everyone

- Ensure that the most vulnerable people are addressed as a matter of priority in climate change adaptation and disaster risk management.
- Listen more closely to the voice of communities, to understand local knowledge, coping mechanisms, practices and needs related to climate risk, and to design culturally appropriate programmes.
- Support and empower the leadership of local civil society and communities in climate change adaptation and disaster risk management efforts.
- Work together across silos to address climate-driven disaster risks.

Mozambique, 2020. In Praia Nova, people are still struggling to get back on their feet a year after Cyclone Idai.

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Time to act

COVID-19 has demonstrated that humanity has the capacity to recognize and respond to a global crisis, finding resources where none seemed available, and taking unprecedented and rapid steps to respond to the crisis.

Climate change is an even more significant challenge to humanity than the novel coronavirus, one which literally threatens our long-term survival.

We must address this threat by taking action to reverse climate change. In the meantime, we must work to limit the deaths and damage that climate-driven disasters are already driving.

We all – governments, donors, the humanitarian, and development, climate and environment communities – need to act effectively before it's too late. Let's not miss our chance.

Uganda, 2020. Kasese District in western Uganda was hit by flash floods in May 2020. The region was also affected by a locust invasion, leaving many communities food insecure. Measures to contain the spread of COVID-19 severely complicated relief and recovery operations.

© Uganda Red Cross / Denis Onyodi

1 INTRODUCTION

Why climate and why now?

Rising risks

In May 2020, in the midst of the COVID-19 crisis, heavy rains caused four rivers in Kasese District in Uganda to burst their banks, destroying homes, a hydroelectric power station and a hospital, burying villages in mud and displacing thousands of people. Floods and landslides also affected neighbouring Kenya and Rwanda, killing close to 300 people and displacing half a million more across the three countries. The floods left thousands of people in need of emergency food assistance as well as homeless, with many people seeking shelter in temporary accommodation centres where observing physical distancing – recommended to reduce transmission of coronavirus – is extremely difficult. This same area was also dramatically affected by a locust invasion (Huang, 2020) and the travel and movement restrictions designed to slow down the spread of COVID-19 hampered efforts to combat the swarms of locusts ravaging crops. The combination of the floods and locusts has impacted food security and livelihoods and left nearly 2.6 million people severely food insecure in at least eight countries (OCHA, 2020c).

The previous month, disaster response efforts in the Pacific following Cyclone Harold were hampered due to COVID-19 lockdowns and quarantines, leading to delays in providing much-needed equipment and humanitarian assistance (Millership, 2020). In Vanuatu, only 20% of households in need had received shelter assistance more than a month after the storm hit (Shelter Cluster Vanuatu, 2020). In Fiji, around 600 people were still displaced as of mid-May (OCHA, 2020b). Likewise, in the Philippines, the pandemic complicated evacuation and response efforts ahead of Tropical Cyclone Vongfong (known locally as Ambo) in mid-May. The storm damaged or destroyed nearly 20,000 homes and caused about 30 million US dollars (approximately 29 million Swiss francs) in agricultural damage (OCHA, 2020d). Some 180,000 people were evacuated, but this was slowed by coronavirus lockdown measures that kept evacuation centres only half filled. The storm also damaged Bicol Region's only COVID-19 testing facility (OCHA, 2020a). Similar challenges also affected wealthy countries – for example in August 2020, Florida, USA was hit by Tropical Storm Isaias. Authorities closed testing sites in preparation for the storm and struggled to ensure physical distancing in evacuation shelters.

Definitions

Climate mitigation is action to reduce levels of greenhouse gases in the atmosphere to limit global warming. An increase in these gases has the effect of wrapping a thick blanket around the earth, raising the average temperature of its atmosphere. One of the main greenhouse gases is carbon dioxide, which is released when burning fossil fuels.

Climate adaptation is what we do to adjust to the changing climate, or in more technical terms "the process of adjusting to the actual or expected climate and its effects…to moderate or avoid harm or exploit beneficial opportunities." Adaptation is not only about measures to deal with longer-term changes such as increased temperatures and sea level rise, but also includes disaster risk reduction in the face of weather- and climate-related events.

The 2020 COVID-19 crisis is a wake-up call that showcases the realities of unprecedented global systemic risks, like the climate crisis, that affect everyone. It is a strong reminder of how risks overlap and exacerbate other risks, and that inequalities create vulnerability – between countries, but also within countries and communities.

At the same time, we are seeing how a crisis in one location can affect everyone everywhere in some way. As local capacities are overwhelmed, global capacities to provide assistance are also overwhelmed by multiple simultaneous crises. And international solidarity is constrained, both by attention directed to crises at home and a lack of resources due to worsening domestic economic situations. All this shines a light on the challenges of a humanitarian system, already stretched to breaking point, struggling to respond to simultaneous crises around the world.

Three of the biggest global threats facing the world in 2020 have been categorized as the potential failure of climate change mitigation and adaptation, the resulting risks of extreme climate- and weather-related events, and subsequent disasters caused by these (World Economic Forum, 2020). Of the ten risks likely to have the greatest impact, five relate to climate change and the environment, and these are also five of the ten most likely risks. A further three of the ten risks with the greatest impact are described as societal, but are also closely related to and often exacerbated by the climate crisis: water crises, food crises and infectious diseases. Similarly, after a year of reflections across the International Federation of Red Cross and Red Crescent Societies (IFRC) network, National Societies identified climate change as one of the greatest humanitarian challenges facing the world, and the top challenge they will address during the next decade in their Strategy 2030.

The role of climate change in driving disaster risk

The overwhelming majority of disasters in the past ten years (83% of all disasters triggered by natural hazards) were caused by extreme weather- and climate-related events, such as floods, storms and heatwaves. The number of such disasters triggered by extreme weather- and climate-related events has been increasing since the 1960s, and has risen almost 35% since the 1990s (see Figure 1.1). The proportion of disasters attributable to climate and extreme weather events has also increased significantly during this time. Even when the total number of disasters flattened in the last two decades, the proportion attributable to climate and extreme weather events, such as floods, storms and heatwaves, continued to rise, from 76% of all disasters during the 2000s to 83% in the 2010s.

These extreme weather- and climate-related disasters have killed more than 410,000 people in the past ten years, the vast majority in low and lower-middle income countries. Heatwaves, then storms, have been the biggest killers (EM-DAT). But this figure is likely to be a significant underestimate, given poor data collection in many countries and for many hazards (see Chapter 2) as well as challenges around attribution, such as for food crises.[1]

A further 1.7 billion people around the world were affected by climate- and weather-related disasters during the past decade – many injured, left homeless or without livelihoods – adding to the burden of an already overstretched humanitarian system and jeopardizing the progress made in sustainable development, everywhere. These numbers are likely to increase significantly if dramatic action is not taken.

1 For example, more recent estimates looking at the 2010 to 2012 drought in Somalia indicate some 250,000 people may have died due to famine exacerbated by drought and long-term conflict (FAO and FEWS NET, 2013).

Bahamas, 2019. The Mudd, an informal settlement in Abaco, was totally demolished by Hurricane Dorian. Weak building structures, lack of sufficient drainage and challenges in accessing basic services often place communities living in informal settlements at greater risk of being affected by disasters.

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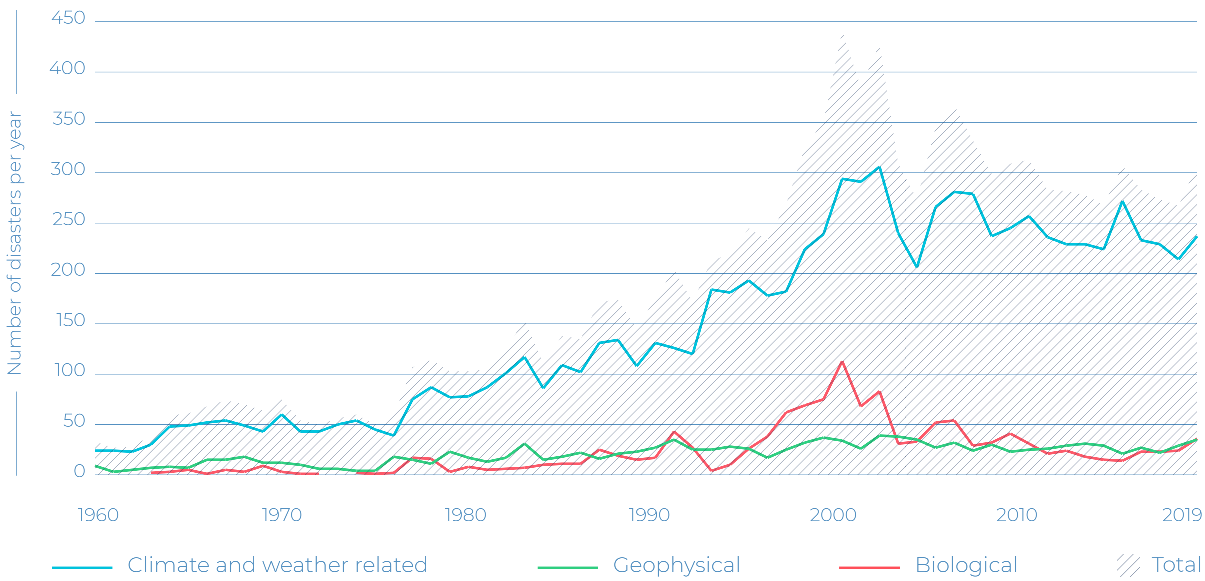
Figure 1.1: Comparison of different types of disasters triggered by natural hazards, 1960–2019



Sources: The data has been compiled using EM-DAT, ReliefWeb, Dartmouth Flood Observatory and IFRC GO

Climate change is a risk magnifier: raising temperatures,[2] negatively impacting ecosystems (Scholes, 2016), sea levels and storm surges, affecting rainfall patterns, but also amplifying the ferocity of extreme weather events, increasing volatility and unpredictability and exacerbating the vulnerabilities of affected communities. And it's not a distant threat: it's increasingly clear that these events are affecting people's lives now.

People around the world are already experiencing these kinds of compounded shocks, and we can expect floods, storms, droughts, heatwaves and wildfires to get worse. As these hazards continue to combine with global heating, sea level rise and increased likelihood of epidemics, this combined with poverty, urbanization and other population trends means that millions of people across all types of countries will be affected.

Of those people affected globally by climate- and weather-related disasters, the IFRC conservatively estimates that some 108 million people needed international humanitarian assistance in 2018, while many more people were affected and needed to rebuild their lives using their own resources, often with support from family, communities and governments. If we couple the projected increases in the frequency and intensity of weather extremes with the growing number of people living in poverty, we could expect some 200 million people a year to need humanitarian assistance by 2050 (IFRC, 2019). And this figure does not include the millions of people around the world affected by conflict, which may well be further exacerbated by climate change.[3]

2 The global temperature is estimated to have risen 1.1°C since 1850, and by 2100 the temperature rise could well be 4°C or more above pre-industrial levels (1850–1900).

3 Countries in situations of armed conflict are disproportionately affected by climate variability and extremes. This is partly because of their geographical location, but mostly because conflicts and their consequences limit capacity of people, systems and institutions to adapt to hazards and changing climates (ICRC, 2020).

Climate change is increasing not just the number of potentially deadly weather events but also their ferocity… existing weather records are being broken by new extremes with every passing year, like the sweltering 42.6°C July 2019 heat in Paris or the staggering 1.26 meters of rain that fell in 24 hours, in April 2018, on the Hawaiian island of Kauai.

Global Commission on Adaptation

At the same time, as the needs in traditional donor nations also grow, including for enhanced social protection to address climate impacts there, we can expect a drop in the funds available for international assistance, meaning there will be nowhere near enough to meet the rising needs…

…unless we start to do more about it. Now.

Frameworks for action

The global community has made some efforts to grapple with the enormity of the climate crisis ahead. Huge strides have been made in recognizing the causes of disaster risk and climate change, how they interact with each other and how they need to be addressed. The Sustainable Development Goals, the Sendai Framework for Disaster Risk Reduction and the Paris Agreement on climate change together set the standards and vision of the world we should create. International commitments emphasize that we must avoid decisions, plans and investments that create risks, act proactively to reduce the risks we face now, and focus on building resilience to shocks and hazards (UNDRR, 2019). Discussions about recovery from COVID-19 are highlighting similar things – in particular the need to build back better and invest in a green, resilient and inclusive recovery (Hepburn et al, 2020; Meige et al, 2020).

Despite these efforts, predictions foresee continued rise in global temperatures, little change in investment in disaster risk reduction, and substantial doubts that we will achieve the resilience and climate goals in the 2030 Agenda for Sustainable Development or the Paris Agreement (UNEP, 2019).

Humanitarian needs have recently become more central to the climate discourse. From the outset, the UN Framework Convention on Climate Change (UNFCCC)'s ultimate objective was around mitigation (preventing climate change); meanwhile adaptation (adjusting to the impacts of climate change) was for a long time seen as an afterthought, or even as giving up. As it was recognized that the climate was already changing and many of the changes were now inevitable, the focus on adaptation to future changes increased, but still from the perspective that these would be challenges in the future. Only in the last few years has it been recognized that the impacts of climate change are already being felt – on people, nature, systems and economies. Understanding is growing of the humanitarian impacts of disasters triggered by extreme weather and climate events and the need to focus on reducing short- and medium-term risks. This is reflected in the evolving loss and damage conversation (see Box 1.1).

BOX 1.1: AN IMPROVED UNDERSTANDING OF HUMANITARIAN IMPACTS THROUGH THE LENS OF 'LOSS AND DAMAGE'

Since 2010, adaptation has been a core component of the international climate agenda and the importance of disaster risk reduction has been explicitly recognized (UNFCCC, 2010). However, capacity and financing remained limited, and of course climate change was only adding to a challenging agenda (as recognized in Sendai).

More and more, people realized that climate change was not only already happening, but also already having real impacts on people and ecosystems. This led to increasing emphasis on what climate negotiators now call 'loss and damage', noting that climate change can include irreversible impacts (such as the death of coral reefs due to warming oceans): 'loss', as well as impacts such as the destruction of infrastructure where reparation is possible: 'damage'. These have been applied to the impacts of extreme events as well as longer-term changes, such as coastal inundation (where sea level rises lead to flooding of infrastructure and risks to safety).

The 2013 UN Climate Change Conference established the Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts. This was set up to address loss and damage associated with the impacts of climate change, including extreme events and slow-onset events, in developing countries that are particularly vulnerable to its adverse effects. Yet no financing was provided to avert, minimize or address loss and damage. Indeed, developed countries, worried about the potential liability for rising damages, even insisted on an explicit recognition that the inclusion of a reference to loss and damage in the Paris Agreement implied no liability or compensation.[4] Since then, the calls for financing of loss and damage – ranging from the most-affected countries seeking compensation from the biggest contributors to climate change, to investment in humanitarian response – have been growing stronger and stronger, supported by developments in attribution science, which is showing more and more clearly the role of climate change in individual hazards that have triggered disasters.

More recently it has been recognized that there are limits to how much it is possible to adapt to the impacts of climate change, and that when these limits are reached, losses and damages will occur. This is because the actions needed to adapt are unaffordable, not physically or technically possible, socially difficult or simply not sufficient to prevent some harm to people, the environment and assets. The higher global temperatures rise, the more likely it is that adaptation limits will be reached.

4 Clause 52 of the 2015 UNFCCC resolution on Adoption of the Paris Agreement.

DPRK, 2019. Farmer Ri Jong Gi says he sees the impact of climate change clearly: "Climate change is the worst enemy for us farmers. But we try our best to build our community stronger and more resilient."

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Climate change is a crisis; it's up to us whether it will also be a disaster

Climate change is already underway. But how far and how fast global temperatures will continue to rise, and other changes will continue to unfold, is still up to us. It is essential for human survival to keep that level of climate change as low as possible. While climate change cannot be stopped, we can address its rate (and thus limit the increase in frequency, likelihood and severity of future hazards, and avoid large-scale irreversible damage to many vulnerable ecosystems) through more ambitious, bold climate change mitigation. This requires a radical shift everywhere and in all aspects of our lives.

However, even the most ambitious mitigation action will not stop the next period being marked by more frequent and intense extreme weather and climate events (The Economist, 2020), as Chapters 2 and 3 show. The changing climate is having real impacts on people and ecosystems now. Further change is inevitable, and some of these impacts will be irreversible, such as loss of biodiversity.

But this does not mean that humanity is helpless in the face of climate shocks and hazards. On the contrary, the impacts of increased climatic events on people will largely depend on reducing people's exposure and vulnerability and ensuring investment in development promotes sustainable, inclusive, equitable and climate-smart growth.

We must adapt to these changes and focus on reducing risks to short-, medium- and longer-term climate- and weather-related hazards. We will also need to prepare for and anticipate events ranging from local emergencies to mega-disasters, from the predictable to the unexpected. And we must be ready to respond to inevitable humanitarian needs. As the world adapts to rising risks, attending to the needs of people in vulnerable situations will be increasingly important.

And crucially, to do this well – to prevent and manage the disasters that are coming – we need real and effective investment and action in adaptation.

$$\text{RISK} = \frac{\text{Hazard} \times \text{Exposure} \times \text{Vulnerability}}{\text{Capacity}}$$

“The conversations are happening in silos. They use different terminology, attend different events and develop parallel frameworks. This results in different priorities being developed; different conclusions being drawn; different areas being perceived as someone else’s responsibility.”

Asking the right questions, identifying the top priorities

While the need is clear, the greater challenge is: who will do this? How? And who will pay for it?

Unfortunately, many of the conversations aiming to answer these questions are happening in silos, with humanitarian, development and climate and environment-focused policy-makers, donors and practitioners having limited engagement with each other. They use different terminology, attend different events and develop parallel frameworks. This results in different priorities being developed; different conclusions being drawn to the core questions of who should do what, when and how; and different areas being perceived as someone else's responsibility without finding a way to meet in the middle. All of this means that people's needs are not adequately addressed at the scale that is called for.

This report looks at the issue of the climate crisis as a phenomenon that results in clear humanitarian needs, affecting people who are already left behind. However, we seek to explore how the humanitarian, development and climate communities (both at global level and within countries and governments) can work together to reduce and address these needs.

The report takes stock of extreme weather and climate events and the disasters they have triggered (floods, storms, heatwaves, fires and droughts) and projected impacts of these types of disasters. It also looks to a lesser extent at the longer-term climate change impacts (such as sea level rise, desertification and glacial retreat) which will trigger other humanitarian needs.

We therefore focus on climate change adaptation – not only measures to deal with longer-term changes to ambient temperature and sea level rise, but also preventing extreme weather events from becoming disasters. We consider how to address the risks, and how to reduce vulnerability and exposure to hazards that turn shocks into disasters. And we recognize that the impacts of 'residual' risk – where resilience, supported by all the best investment in risk reduction and preparedness, is overwhelmed – will in turn largely depend on how well we anticipate, prepare for and respond to inevitable humanitarian needs.

Myanmar, 2019. "I'm able to help others during disasters because of this game," says Kaung Thet Sanóa, a student in Yangon, sharing a fist bump with Red Cross worker Brad Zerivitz. He and his friends play card games at school to learn how to react in the event of a disaster.

A call for action: we can do this

Today's efforts are fragmented and insufficient. Levels of vulnerability and exposure are too high. Our action to date in the face of rising risk is too little and too late.

We cannot wait for disasters to happen and expect communities themselves to pick up the pieces, as poverty and compounded risks will make this harder and harder. Similarly, governments may struggle to address their own national risks, leaving little funds and interest to support others in need. Nor can we expect that humanitarians will always have the capacity to respond, when they become overwhelmed by compounding and escalating risks.

We must instead think about our plan of action to prevent more disasters from happening, to reduce vulnerability and exposure and thereby the impacts on the lives and livelihoods of millions of people. We can do this. All around the world there are exciting developments with local communities leading the way.

- **We must work together** – humanitarians with development and climate/environment practitioners, outside of our comfort zones, collaborating in ways we haven't before, with coherent risk management frameworks that make this possible. This has to happen at all levels – global, national and most importantly, local, where resilience can only be built with and by communities.
- **We need to work smarter**, basing all we do on a thorough understanding of exposure to hazards and vulnerability to those risks, understanding who will be affected and how. We need to be faster and more anticipatory, more effective and more sustainable, recognizing the vital role of nature as a protective force and that damaging the environment exacerbates risks.
- **We have to get our priorities right**, ensuring funding gets to the people who need it most, and defining success by the lives and livelihoods saved.

While a crisis shatters lives, recovering from it can also bring communities together. The COVID-19 crisis has shown how interrelated the world is and that we are only as strong as our weakest links. But it has also shown the incredible potential for international cooperation, for intergenerational responsibility and action.

This report is based on a vision of a coherent and collective surge of effort, where all people – families, communities and those working at national, regional and global level in climate, development, humanitarian and other relevant fields – work together to reduce the current and future humanitarian impacts of these rising risks. This is a vision of a world where people not only survive the climate crisis, but thrive – with increased well-being, especially for the most vulnerable people, reduced risk of shocks coming our way, and in balance with the earth we depend on.

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Turkey, 2020. Flash floods in Giresun province left many people injured, some missing and at least 6 people dead. Since the 1960s, floods have been by far the most significant climate- and weather-related hazards.

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2

HAZARDS EVERY-WHERE

Looking at climate and disaster trends and impacts

Contents

Definitions

Disasters are included based on a 'significance' threshold, defining disasters as incidents where more than 10 people were killed, or more than 100 affected.

This report looks at disasters triggered by **natural hazards** – that is by biological, geophysical and climatological hazards.

Human-induced disasters: Disasters can also be caused by transport or industrial accidents (known as technological hazards). These can include fires, explosions and structures that collapse, or may be connected to leaks of nuclear, biological or chemical materials, including contamination and radiation.[1]

Extreme climatological events are rare for the place where they occur and appear in the top or bottom of the range (in terms of temperature, wind speed, volume of rain and so on) observed for that location. Not all extreme events will lead to a disaster, as this will depend on a variety of factors including location, levels of exposure and vulnerability of the people in the affected area, and whether it occurs simultaneously with other shocks or hazards (IPCC, 2012).

Global data for what can be considered **extreme** is patchy, difficult to compare and tends to be subjective (for example floods are often defined by whether they are of sufficient magnitude to be considered a 5-year, 10-year, 20-year or 100-year flood for that location, based on how regularly such magnitude has been seen previously). Therefore, we have focused mostly on disasters rather than extreme events (thereby including the impacts). Storms, however, do have clear categories (based on their wind speed), and cyclone levels 4 and 5 (based on the Saffir-Simpson Hurricane Wind Scale which is used across regions) can be defined as extreme.

1 An example of how human-induced hazards can cascade following natural hazards was when a tsunami disabled the power supply of the Fukushima Daiichi nuclear reactors in Japan in 2011, leading to a major nuclear accident. Tracking human-induced hazards can be challenging due to the wide variety of typologies, categories and definitions used by different organizations, as well as the potential areas of overlap with disasters triggered by natural hazards.

INTRODUCTION
HAZARDS, EXTREME EVENTS AND DISASTERS

In the past ten years (2010–2019), there have been 2,850 disasters triggered by natural hazards[2] which have killed 10 or more people and/or affected 100 or more people (EM-DAT database).[3] The overwhelming majority of these (83%) were caused by climate- and weather-related extreme events, such as floods, storms and heatwaves.[4]

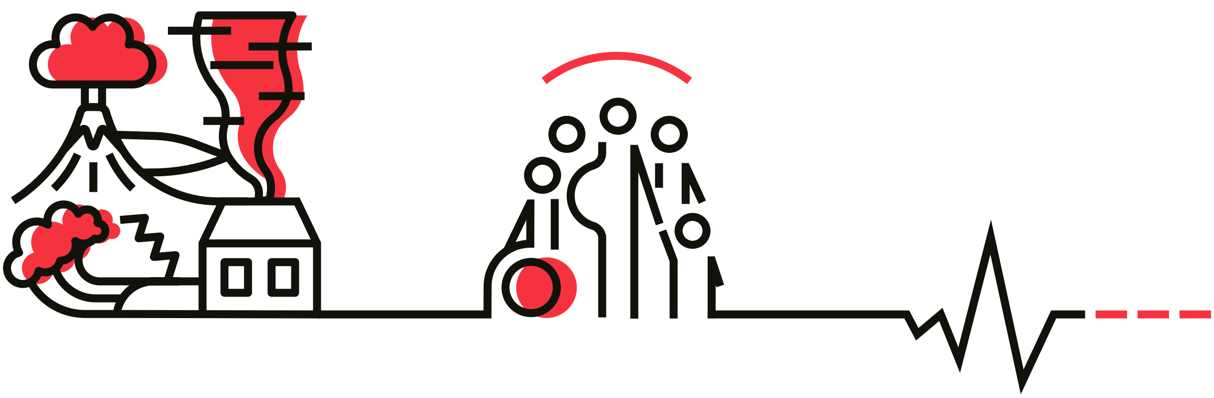
These disasters affected close to 1.8 billion people – many of whom were injured, left homeless or without livelihoods – jeopardizing the progress made in sustainable development and adding to the burden of an already overstretched humanitarian system. Of the almost 1.8 billion people affected, 97% were affected by extreme weather and climate events.[5]

Figure 2.1: 2019 snapshot of disasters triggered by natural hazards

308
disasters triggered by **natural hazards**

97.6
million
people affected

24,396
people have died
as a result

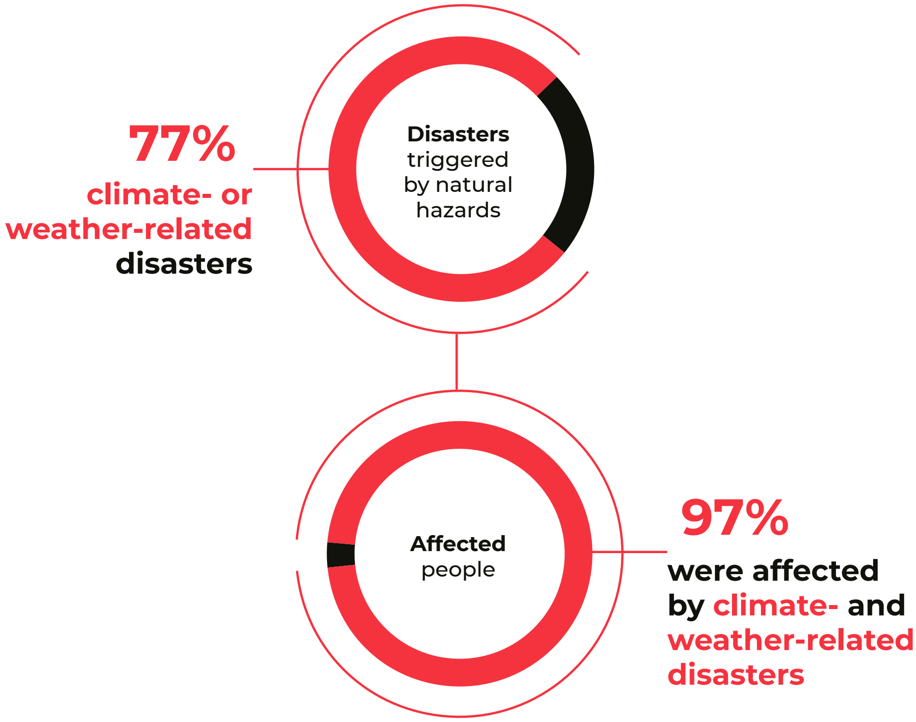


Sources: EM-DAT, FAO/FEWS NET, Dartmouth Flood Observatory, ReliefWeb, Public Health England and IFRC GO

2 Disasters are included based on a 'significance' threshold, defining disasters as incidents where more than 10 people were killed, or more than 100 affected. This report focuses mainly on disasters triggered by natural hazards – that is by biological, geophysical and climate- and weather-related hazards.
3 EM-DAT considers people to be affected by disasters where they require "immediate assistance during a period of emergency, i.e. requiring basic survival needs such as food, water, shelter, sanitation and immediate medical assistance." This therefore includes people displaced, even if only for one day, but also people who lose their houses or sustain life-changing injuries.
4 For a detailed list of definitions see WMO, 2018.

The percentage of disasters attributable to climate- and weather-related events has increased from 73% in the 1990s, to 76% in the 2000s to 83% in the 2010s. These climate- and weather-related disasters have claimed more than 410,000 lives in the past ten years, the vast majority in low and middle income countries.

Figure 2.2: Disasters triggered by climate- and weather-related hazards in 2019



Sources: EM-DAT, FAO/FEWS NET, Dartmouth Flood Observatory, ReliefWeb, Public Health England and IFRC GO

This report focuses mainly on disasters triggered by natural hazards. This chapter looks at the nature, frequency and location of disasters triggered by natural hazards over the past year (2019)[6] as well as the past decade, and compares these with disaster trends back to the 1960s (global disaster data before then is less reliable). Some details of specific events in 2020 have also been included where the data is available. The chapter also notes some of the gaps in the available data, and how this might skew our understanding of today's risk environment.

In addition, the chapter looks at how the climate has changed and how today's trends are expected to evolve in the coming years – by 2030 and 2050 – looking at some best-case and worst-case projections and scenarios, including some of the potential future impacts of disasters triggered by extreme weather and climate events.

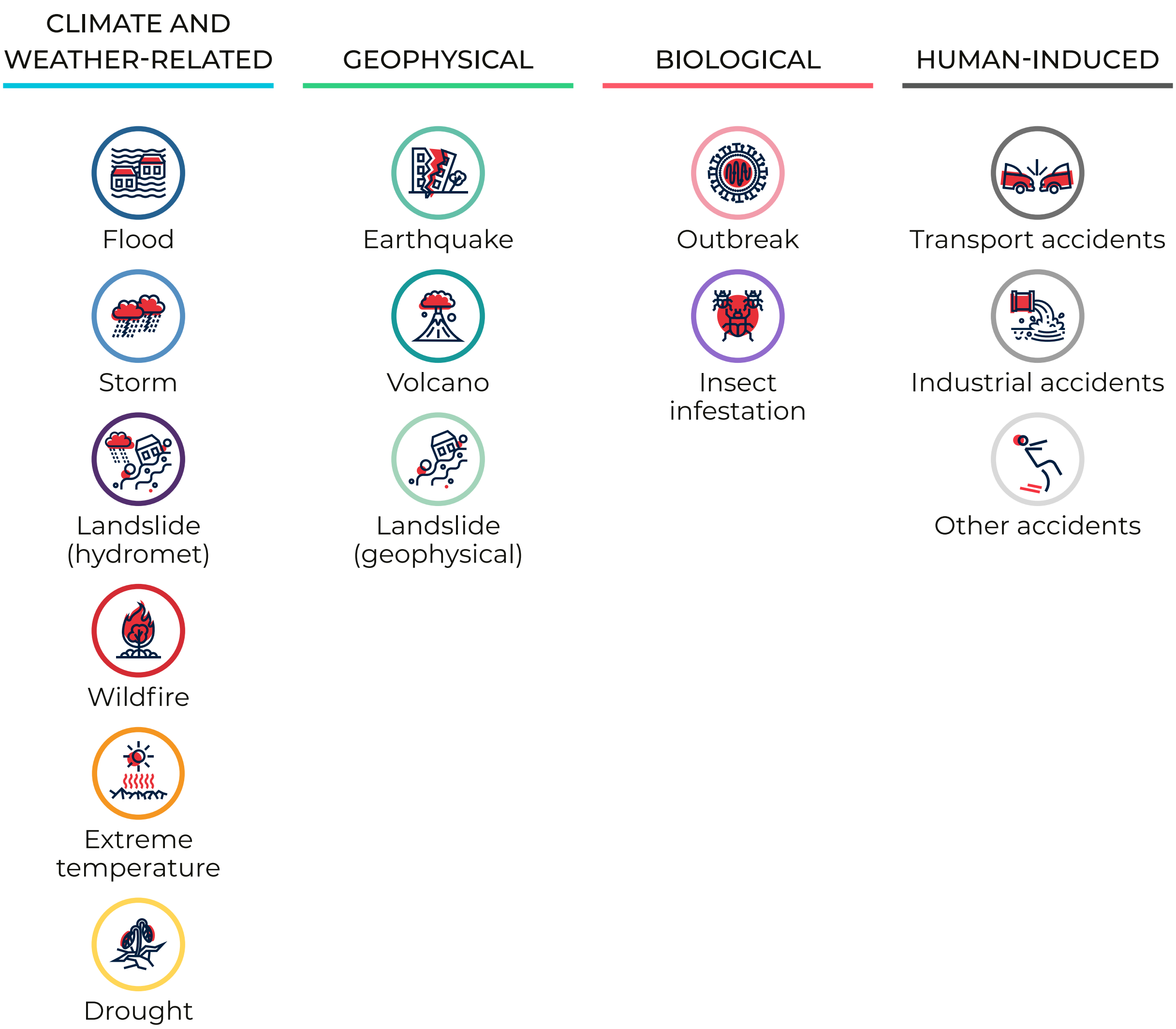
5 Extreme climatological events are rare for the place where they occur and appear in the top or bottom of the range (in terms of temperature, wind speed, volume of rain and so on) observed for that location. Not all extreme events will lead to a disaster, as this will depend on a variety of factors including location, levels of exposure and vulnerability of the people in the affected area, and whether it occurs simultaneously with other shocks or hazards (IPCC, 2012). Global data for what can be considered extreme is patchy, difficult to compare and tends to be subjective (for example floods are often defined by whether they are of sufficient magnitude to be considered a 5-year, 10-year, 20-year or 100-year flood for that location, based on how regularly such magnitude has been seen previously). Therefore, we have focused mostly on disasters rather than extreme events (thereby including the impacts). Storms, however, do have clear categories (based on their wind speed), and cyclone levels 4 and 5 (based on the Saffir-Simpson Hurricane Wind Scale which is used across regions) can be defined as extreme.

6 We also use examples from 2020, but these are not included in statistics.

An important component of understanding disasters is understanding who has been affected, how and why. Not all natural hazards lead to disasters and while the intensity and frequency of hazards is clearly significant, these are not the sole determinants of risk. Disaster risk is a function of exposure to hazards as well as the vulnerability of people to climate-related hazards and their capacity to manage shocks. Chapter 3 looks at how vulnerabilities and exposure are changing and the factors exacerbating them.

While hazards may be natural and inevitable, disasters are not. Disasters occur when a community is "not appropriately resourced or organized to withstand the impact, and whose population is vulnerable because of poverty, exclusion or socially disadvantaged in some way" (Mizutori, 2020). Disasters therefore can and should be prevented. We can seek to prevent hazards from leading to disasters by reducing risks (created by a combination of a hazard, exposure and vulnerability) and promoting resilience.

Hazards and disasters



> **There is no such thing as a natural disaster… Disasters result when a hazard affects human settlement which is not appropriately resourced or organized to withstand the impact, and whose population is vulnerable because of poverty, exclusion or socially disadvantaged in some way.**

Mizutori, UNDRR, 2020

2.1 THE DATA WE HAVE AND THE DATA WE NEED

Data in this report is drawn from multiple sources (outlined at the end of the chapter). However, the data is not always easily comparable, and it is difficult to map events without a standard and globally agreed taxonomy for disasters and or for extreme weather and climate events (Guha-Sapir and Below, 2002).

Furthermore, not all locations or all disasters have robust reporting. Forecasting and reporting capacities differ between and within countries. A number of less developed countries have only "sparse observational networks of climate data", and, for example, heatwaves in sub-Saharan African (including a specific severe event in 1993) appear to be missing from EM-DAT (Harrington and Otto, 2020). Data monitoring is also far weaker for extreme temperatures, disease outbreaks and wildfires than for floods and storms.

Often wildfires and extreme temperature events are not considered disasters but as "environmental events" without recognition of the human consequences. Disease outbreaks or epidemics are sometimes categorized as disasters (recognizing their multiple triggers) and sometimes as health emergencies. IFRC includes epidemics and other major disease outbreaks as disasters in this report due to their significance in terms of their impacts on vulnerable populations, as well as the connection between epidemics and climate change, but notes ongoing challenges in ensuring robust datasets that cover all events.

Longitudinal analysis is also a challenge. The older the disaster data is, the less reliable it is, often with significant under-reporting (Ritchie, 2019). For this reason, this report does not use data from before the 1960s, noting that even this early data may be incomplete and challenging to compare with modern data, given substantial advancements in reporting and recording of events.

Recording of the impacts of disasters has also changed over time. While recent years have seen greater recognition of the multiple and/or cascading effects of disasters, secondary impacts are rarely captured in standard datasets.

Compounding and cascading hazards are also challenging to record and analyse in terms of impacts. For example, Cyclones Idai and Kenneth hit areas already affected by drought, where they triggered floods and later led to a cholera outbreak.

Access to quality data facilitates faster, more effective action with greater reach and impact. Yet there remains a data and digital divide globally. Digital access, inclusion, literacy and processes are necessary components for organizations, including humanitarians, to access timely, accurate data for analysis.

Open source technologies and open data[7] would drastically improve the available data for the humanitarian and development sectors so that we can generate better analysis and trends, and better serve vulnerable communities around the world (see also, Web Foundation, 2020).

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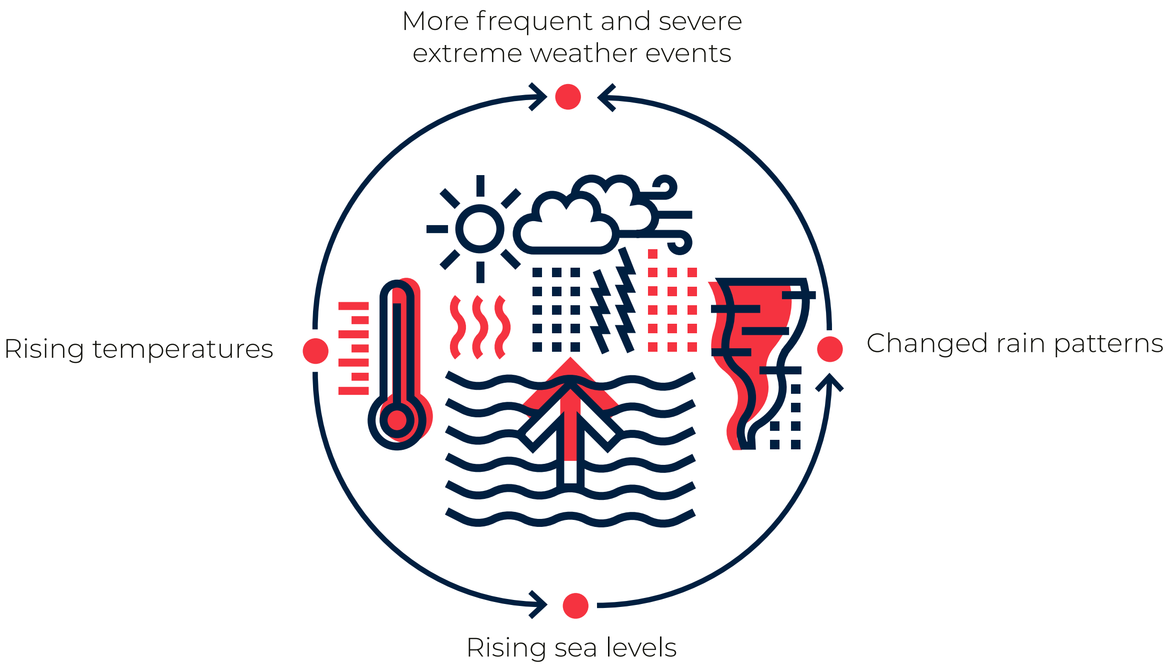
7 For example, see Open Source Initiative, State of Open Data, and Gov Lab.

2.2 CLIMATE AND DISASTERS – A DANGEROUS RELATIONSHIP

2.2.1 How has the climate changed?



Global temperatures have warmed significantly in recent decades. According to the Intergovernmental Panel on Climate Change (IPCC) "Human activities are estimated to have caused approximately 1.0°C of global warming above pre-industrial levels" (IPCC, 2018). One degree may not seem like much, but it represents a massive increase in energy in the atmosphere, and can in some ways be compared with a human who has a fever: a small increase has a big impact on well-being and ability to function.

The changes are being felt in the oceans as well as on land, and are leading to more frequent heatwaves in most land regions (high confidence) and increased frequency and duration of marine heatwaves (high confidence). In addition, the IPCC notes that there is "substantial evidence" of an increase in the frequency and intensity of heavy precipitation events globally (medium confidence – IPCC, 2018).

The five years from 2015 to 2019 are the warmest five on record (NOAA, 2020b), and the first three months of 2020 were second only to the El Niño-influenced start of 2016 for warmth. In general, global temperatures are currently running at or above the level projected by the climate models featured in the IPCC's AR5 (CarbonBrief, 2020).

Similarly, **sea levels** are continuing to rise, driven by the retreat of glaciers, the melting of sea ice sheets and the thermal expansion of warming water (IPCC, 2019a). According to NASA, sea levels have risen 83.5 mm in the last 25 years (see Figure 2.4). The IPCC states that it is "virtually certain" that the global mean sea level is rising and accelerating (high confidence), and that glacier and ice sheet contributions are now "the dominant source" of this (very high confidence) (IPCC, 2019a). It warns that, due to the projected global mean sea level rise, historically rare extreme sea levels – the so-called 'hundred year events' – will become common by 2100 (high confidence), and communities living in low-lying cities and small islands will experience extreme sea levels every year by 2050.

Carbon dioxide is the main driver of human-induced climate change. Carbon dioxide levels have also been rising and in July 2020, the World Meteorological Organization (WMO) announced they had reached a new peak (WMO, 2020).

2.2.2 The role of climate change in extreme weather events

In the past, the effect of climate on extreme events could only be seen in statistics: a trend in the occurrence of extremes based on an analysis of many events over a long period of time. Science has advanced so that it is now possible to determine the role of climate change in some specific extreme weather events (National Academies of Sciences, Engineering and Medicine, 2016). Some types of extreme weather events, such as extreme cold and heat, can be attributed to climate change with higher confidence than others. Thunderstorms, cyclones and compound hazards are more difficult to attribute to climate change because so far the tools to do so are lacking. However, scientists are rapidly developing new methodologies to improve our capability to analyse and understand the role of climate change in these events.

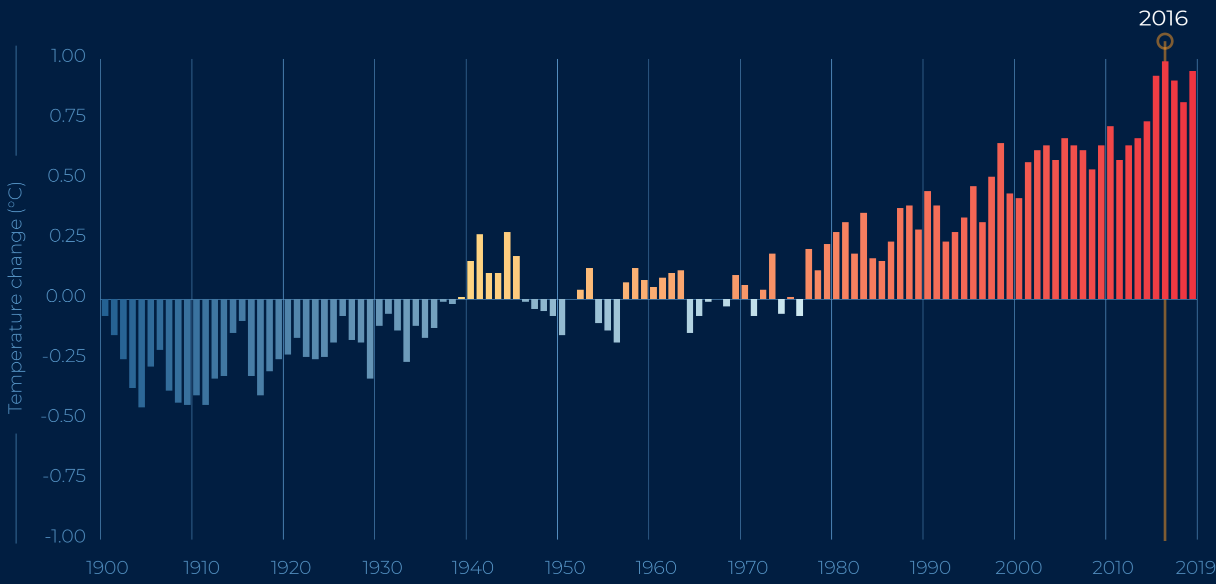
In 2019, scientists concluded that the record-breaking heatwaves in June and July in Europe were made more likely and more intense due to climate change (van Oldenborgh et al, 2020). Scientists came to similar conclusions about the southeastern Australian bushfires in 2019–2020 (van Oldenborgh et al, 2020) (see Box 2.4).

While limited time and lack of data in some regions make it impossible to conduct an attribution study for every extreme event that has occurred during 2019, many of the changes that are expected to occur with climate change are consistent with the disasters and extreme events outlined already. We are seeing climate change in many events around us, every day.

2.2.3 And the climate continues to change

In 2017, the IPCC noted that while the estimated level of human-induced warming had reached around 1°C above pre-industrial levels, many regions and seasons have already experienced warming greater than the global average – with land regions experiencing warming above global average, and most ocean regions warming at a slower rate (IPCC, 2018).

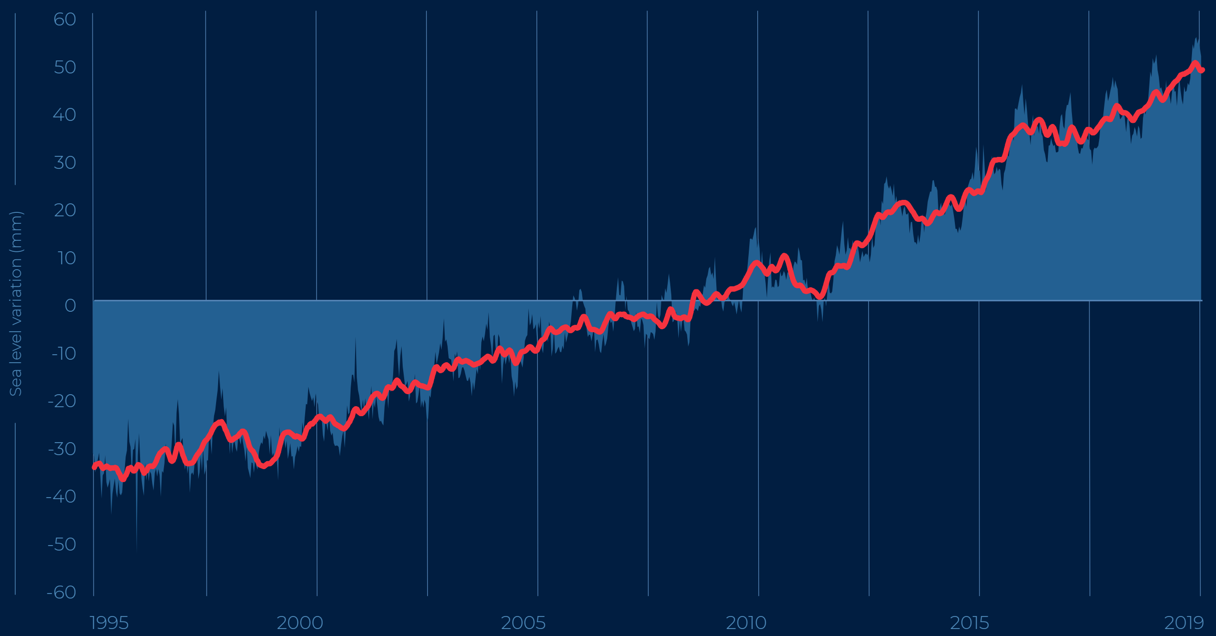
Figure 2.3: Global temperature change in °C, 1901–2019



Source: National Oceanic and Atmospheric Administration (NOAA)

Note: Graph illustrates the change in global surface temperature relative to 1951–1980 average temperatures (zero). This is based on the annual mean temperature anomaly. A cold year is negative and a hot year is positive. The hottest year was 2016 with +0.99°C.

Figure 2.4: Sea level change, 1995–2019



Source: NASA

Note: Sea level variation around 1995–2020 mean based on satellite sea level observations. Line is smoothed 60-day moving average. According to NASA, global mean sea levels have risen by 83.5 mm in the last 25 years.

The report warned that global warming is likely to reach 1.5°C between 2030 and 2052 if it continues to increase at the current rate. We know that different degrees of global warming have different implications for humanitarian needs. IPCC findings indicate that warming of 2°C will have a much greater impact than 1.5°C, and will lead to greater extremes of heat, sea level rise, food insecurity and other climate-related hazards.

While a 2°C or 1.5°C increase may sound like a small change, it is significant because the global average temperature has not changed this quickly in at least the past 10,000 years (Global Monitoring Laboratory, no date) and these changes are occurring on a global scale. 1.5°C and 2°C are also significant benchmarks because in 2015 world leaders agreed to limit long-term temperature warming to below 2°C before 2100, while 'pursuing efforts' towards the much more ambitious limit of 1.5°C (UNFCCC, 2015).

Given current emissions, and even if current pledges under the Paris Agreement on climate change are met, the world is still on track to see a global temperature rise of 3 to 5°C by 2100 (Climate Action Tracker, 2019; UNEP, 2018).

Greece, 2018. Members of the Hellenic Red Cross look for survivors in the town of Mati after devastating wildfires claimed more than 90 lives. Continued global warming is expected to increase heat-related events, as well as droughts and wildfires.

© IFRC

BOX 2.1: GEOENGINEERING: WHAT IF OUR GLOBAL CLIMATE COULD BE MANIPULATED?

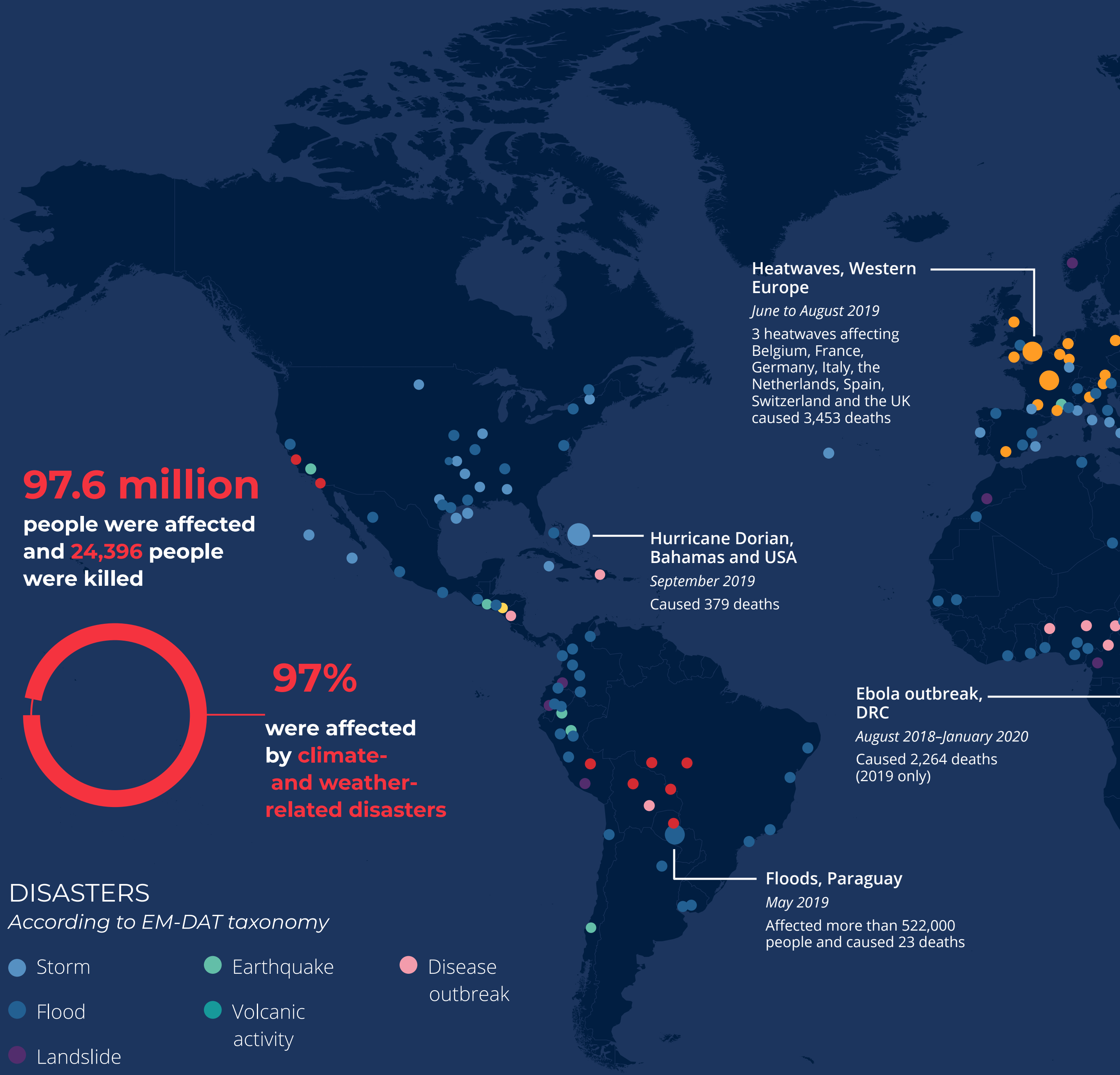
If you put a gigantic umbrella between the sun and the earth, our planet would not warm up as much. Clearly we cannot do that, but what if we deployed billions of tiny umbrellas? What if someone carried planeloads of sulfur dioxide, and released it up above where planes fly? Each particle, like a mini-parasol, casts a tiny shadow and cools our Earth below.

This would be an attempt to intentionally manipulate the global climate. Experts say it could be done, with some billion dollars and some time. The IPCC explains: "Most, but not all, [geoengineering] methods seek to either (1) reduce the amount of absorbed solar energy in the climate system (Solar Radiation Management) or (2) increase net carbon sinks from the atmosphere at a scale sufficiently large to alter climate (Carbon Dioxide Removal)."

There is no treaty, no 'geoengineering governance' in place, to guide how to make such decisions about whether to deploy these types of initiatives, when and where and who is affected. Then who should make these decisions and with what consultation process?

Altering the Earth's climate is an experiment in which every person on our planet is a test subject. If resources must be directed towards exploring geoengineering options, full consideration should be given to the needs and role of the most vulnerable people (Suarez and van Aalst, 2017).

DISASTERS IN 2019



97.6 million

people were affected and 24,396 people were killed

97%

were affected by climate- and weather-related disasters

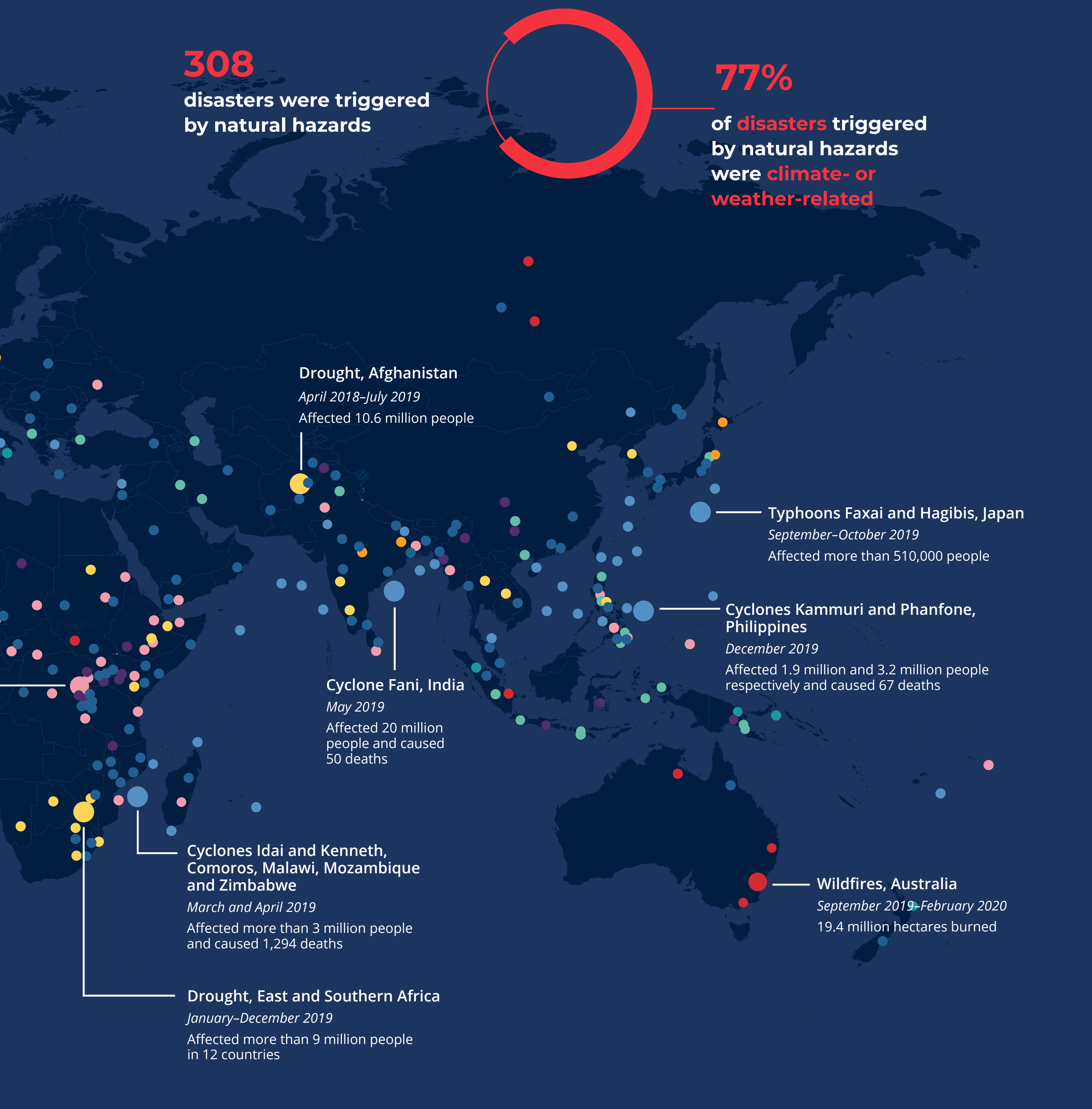
DISASTERS

According to EM-DAT taxonomy

- Storm
- Flood
- Landslide (hydromet)
- Wildfire
- Heatwave
- Drought
- Earthquake
- Volcanic activity
- Disease outbreak

Sources: EM-DAT, NCEI (NOAA), WHO, DFO, FIRMS (NASA), National Hurricane Center, Joint Typhoon Warning Center, IBTrACS (NOAA), ReliefWeb, secondary data review

Note: A selection of major disasters affecting over 250,000 people have been highlighted.



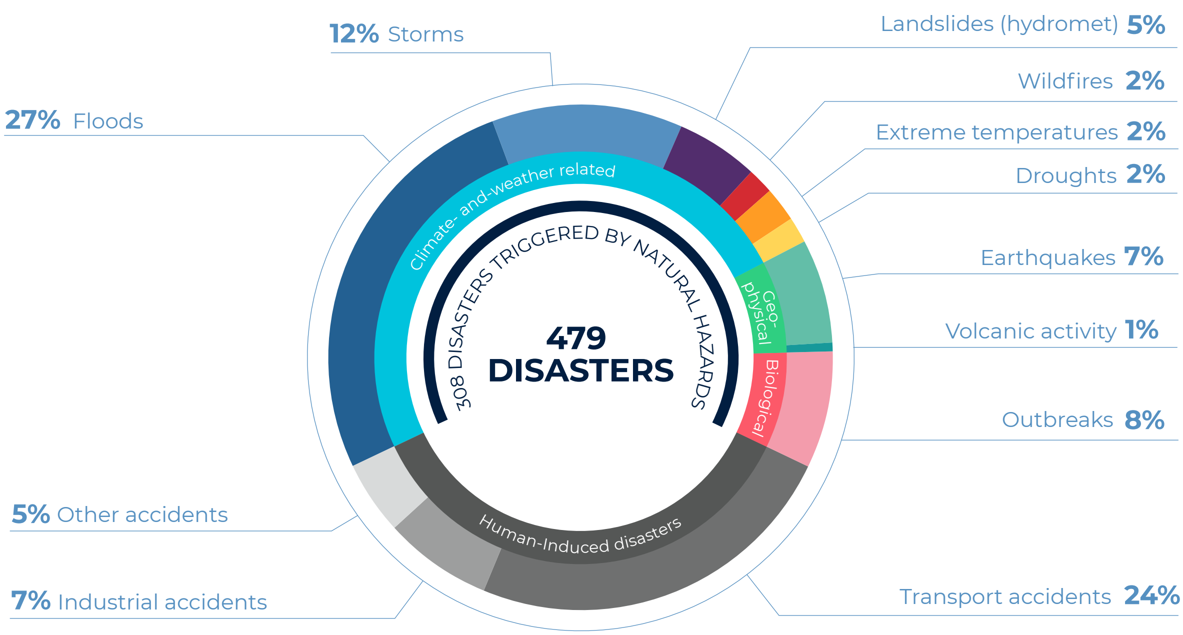
127	59	25	8	10	8	32	3	36
Floods	Storms	Landslides, hydromet	Wildfires	Extreme temperatures	Droughts	Earthquakes	Volcanic activities	Disease outbreaks

2.3 DISASTER TRENDS AND PROJECTIONS

2.3.1 Disasters in numbers

In 2019 there were 308 disasters[8] triggered by natural hazards, affecting 97.6 million people. The most frequent were floods (127), followed by storms (59), disease outbreaks[9] (36), earthquakes (32) and hydrological-related landslides (25). Extreme temperature events (10), wildfires (8) and droughts (8) were less frequent, while volcanic activity was quite rare with only three significant events. In 2019, the vast majority (77%) of these disasters were triggered by climate- or weather-related hazards (storms, floods, droughts, wildfires, extreme temperature or landslides).

Figure 2.5: Disasters in 2019



Sources: EM-DAT, FAO/FEWS NET, Dartmouth Flood Observatory, ReliefWeb and IFRC GO

In the past decade there were 2,850 disasters triggered by natural hazards, and 2,355 of these were climate and weather related. The most frequent were floods (1,298), followed by storms (589).

8 Note that while EM-DAT is country based (so one storm affecting two countries would be counted twice), IFRC uses an events-based analysis, so a hazard that has led to a disaster in one or more countries counts as one disaster.

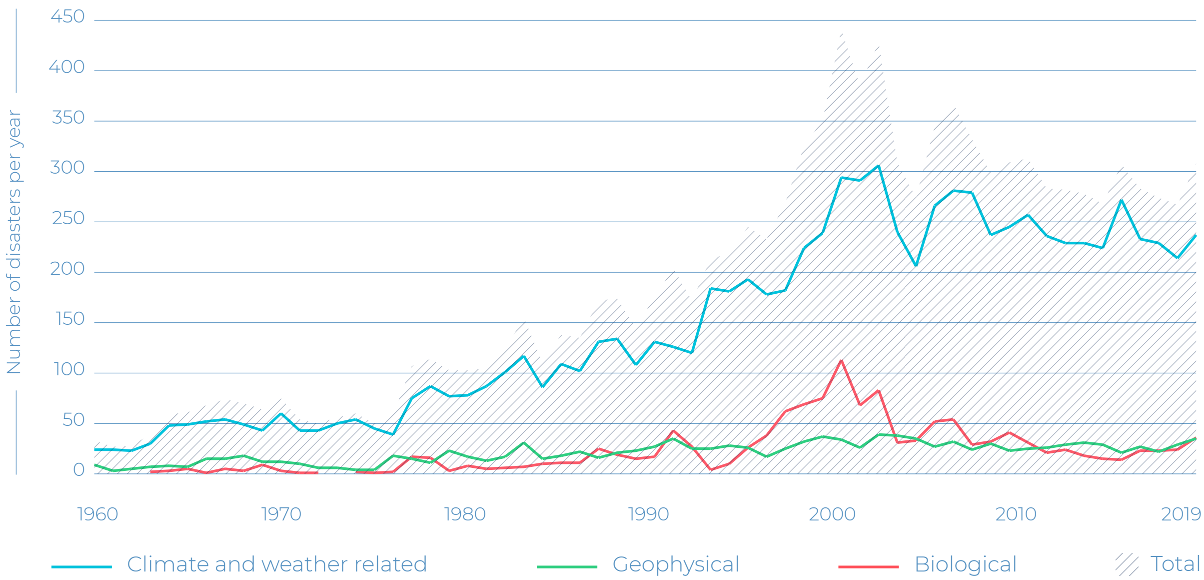
9 This includes disease outbreaks reported as humanitarian disasters through EM-DAT. EM-DAT outbreak data is a compilation of records from UN agencies including WHO, NGOs, insurance companies, research institutes and secondary data review from press agencies. Using this data source allows comparison between all disaster types through the same data collection methodology. But the low data quality of disease outbreak monitoring in some countries, and absence of common definitions for indicators (such as affected people) reduces the quality of the data set.

Since 1960, more than 11,000 disasters triggered by natural hazards have been recorded. The number has also been steadily increasing from an annual total of 33 in 1960 to a peak of 441 disasters in 2000.[10]

Disasters connected to **geophysical or biological hazards**, while rising since the 1960s, have remained relatively stable since the 1980s, with 25 to 50 events each year. The number of recorded **disease outbreaks** has also been rising since the 1960s (see section 2.5) with an apparent peak (according to EM-DAT data) between 1997 and 2002.[11]

The overall number and proportion of **disasters that were triggered by climate- and weather-related hazards** has increased most significantly. While in the 1960s, 76% of reported disasters were climate and weather related, this proportion rose to 83% during the past decade (2010–2019). This is explored in more detail hazard by hazard in section 2.4.

Figure 2.6: Comparison of different types of disasters triggered by natural hazards over time, 1960–2019



Sources: EM-DAT, FAO/FEWS NET, Dartmouth Flood Observatory, ReliefWeb and IFRC GO

Since the 1960s, **floods** have been by far the most significant of the climatological hazards, and the proportion of floods has steadily increased. **Storm events** have been relatively stable in number and have even decreased slightly as a proportion of all extreme weather events during the past three decades, however the number of the most intense storms has increased (see section 2.4). In contrast, and recognizing the poor level of monitoring for both cold and heatwaves, the number of **extreme temperature events**

10 Some of the increases may be attributable to improved recording of events in various countries and regions (in particular improved recording of disease outbreaks over recent years), rather than an increase in the number of hazards. It may also be partially attributable to increases in population and urbanization (discussed further in section 2.5), meaning that more people may be affected by each hazard. However, these factors do not lead to increased numbers across all hazards, which might be expected.

11 Note that data for biological disasters is often less robust, especially because definitions differ between countries, and because diseases are dynamic events where multiple factors promote or contain the spread at different times. Also, reporting numbers of people who are killed or affected by ministries of health may be incomplete or not include cause of death or illness.

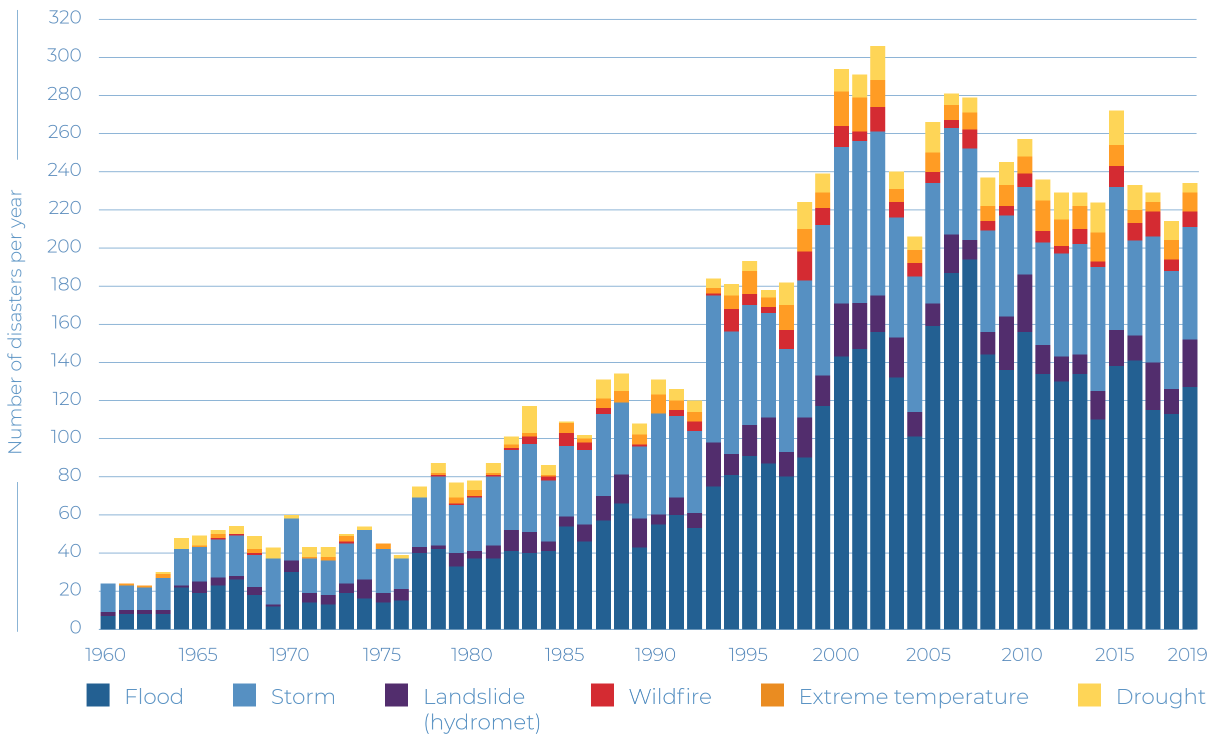
that triggered disasters appears to have increased in the 2000s from the decades before, but has remained relatively stable since then.[12]

Global warming has already led to reduced glaciers, polar sea ice and snow cover, and increased permafrost thaw. This is projected to continue due to increases in the surface air temperature (IPCC, 2019a). Similarly, further acidification of the oceans and increased ocean temperatures are "virtually certain". This will destroy coral reefs, reduce the global biomass of animals across marine ecosystems and diminish the productivity of fisheries, affecting the livelihoods, income and food security of communities that rely on the ocean (IPCC, 2019a).

On land, projected warming is expected to shift certain climate zones in the direction of the poles, and increase heat-related events, droughts, wildfires and pest outbreaks. This will also lead to increased water scarcity in dryland areas, reduced crop and livestock production in certain areas and unstable food supplies. It will also lead to increased land degradation due to a combination of more intense storms and sea level rise (IPCC, 2019b).

Hazards, such as storms, floods, heatwaves, droughts and wildfires, are projected to increase in number, intensity and variability. While some regions will face higher risks, others will face new risks that have not been experienced or anticipated before (IPCC, 2019b; 2019a). Section 2.4 outlines how these disasters will change.

Figure 2.7: Annual numbers of climate- and weather-related disasters by hazard, 1960–2019



Sources: EM-DAT, FAO/FEWS NET, Dartmouth Flood Observatory, ReliefWeb and IFRC GO

12 These numbers do not reflect the severity of the extremes, numbers of people affected or the overall average temperatures, which have been increasing over time, with 2016 and 2019 described as the two hottest years on record (WMO, 2020). Further, the regions that are predicted to see the highest increase in extreme temperatures, such as Africa and the Americas (in particular certain countries in South America), are also those that are monitored the least and lack coping capacities (ESRI, no date).

Figure 2.8: Disasters and their triggers, 1960–2019

	Since 1960		2010–2019		2019
	Total	Annual average	Total	Annual average	Total
CLIMATOLOGICAL	**8,781**	**146**	**2,355**	**236**	**237**
Flood	4,435	74	1,298	130	127
Storm	2,638	44	589	59	59
Landslide (hydromet)	686	11	178	18	25
Wildfire	243	4	75	8	8
Extreme temperature	353	6	109	11	10
Drought	426	7	106	11	8
GEOPHYSICAL	**1,260**	**21**	**274**	**27**	**35**
Earthquake	1,021	17	231	23	32
Volcanic activity	197	3	38	4	3
Landslide (geophysical)	42	1	5	<1	–
BIOLOGICAL	**1,319**	**22**	**221**	**22**	**36**
Disease outbreak	1,315	22	220	22	36
Insect infestation	4	<1	1	<1	–
TOTAL	**11,360**	**189**	**2,850**	**285**	**308**

Sources: EM-DAT, FAO/FEWS NET, Dartmouth Flood Observatory, ReliefWeb and IFRC GO

United States of America, 2020. Hurricane Delta hit areas already damaged by Hurricane Laura six weeks earlier. Since 1960, the USA has been the most-affected country with 341 storms.

2.4 SPOTLIGHT ON CLIMATE- AND WEATHER-RELATED HAZARDS

2.4.1 Heatwaves: the silent killer

Heatwaves are periods of time when temperatures are unusually high and hazardous to human health and well-being.[13] Extreme heat is most acutely felt in cities, where the urban heat island effect[14] exacerbates extreme temperatures and densely built neighbourhoods with little or no green space tend to be even hotter.

In 2019 the most severe heatwaves (seven of them) were recorded in Europe[15] and in India and Japan and killed almost 4,000 people in total. These heatwaves killed 3,453 people across 8 countries in Western Europe, with the highest numbers of deaths in France (1,435) and the UK (892). In India and Japan heatwaves killed 112 and 173 people, respectively, in 2019.[16]

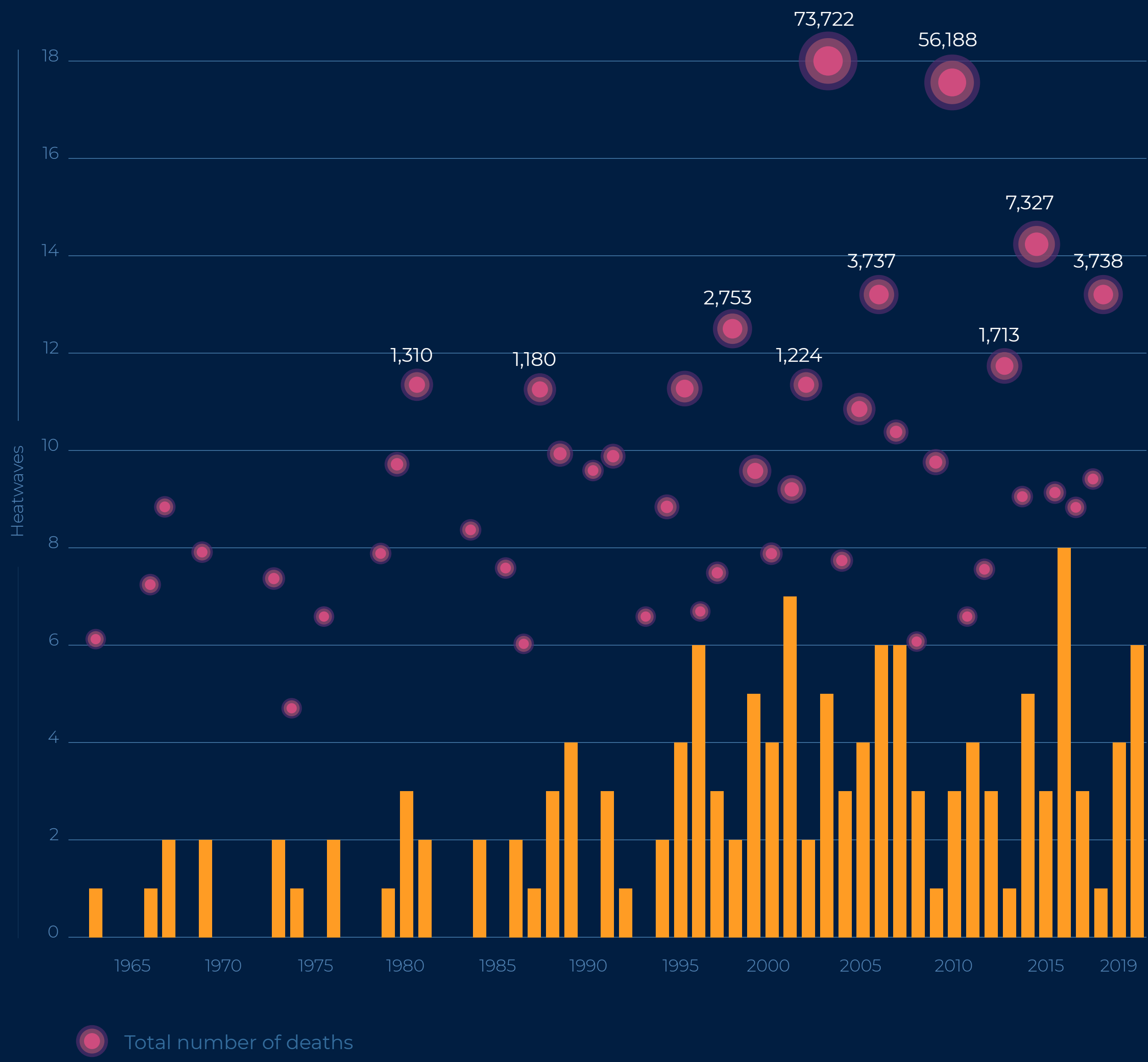
In the **last decade**, EM-DAT recorded 38 heatwaves killing 70,409 people (55,736 in Russia alone in 2010, due to a combination of extreme heat and wildfires). In 2015, 2,500 people died during an extreme heatwave in India, and at least 3,800 people died during an 8-day heatwave in Bangladesh in 2008.

The number of recorded heatwaves per decade has been steadily rising since the 1960s, reaching a peak of 40 in the 2000s. While longer-term data is poor,[17] there have been some particularly notable heatwaves in recent decades, such as in 2003 when 72,250 people died in Europe during one particularly deadly summer. A severe heatwave also affected Africa between January and April 1992 where in some countries in Southern Africa the maximum daily temperature was more than 3°C above average repeatedly over a 4-month period. This coincided with a significant drought affecting 86 million people, but the numbers of people who were affected or died due to the heat is not recorded (Harrington and Otto, 2020).

Heatwaves can put a strain on health systems by exacerbating pre-existing medical conditions, energy systems can be overwhelmed leading to blackouts and transportation can be disrupted. Heatwaves are most dangerous to certain groups including older people; people with pre-existing medical conditions such as heart disease, respiratory illness and diabetes; people who are isolated; young children; pregnant women; people who work outdoors during the hottest times of the day; people who are overweight or obese; and people who are homeless. Low socioeconomic status can further compound vulnerability by limiting access

13 The temperature that will be considered a heatwave varies based on what is considered abnormal for the location. Definitions also commonly vary in: whether or not humidity is included, whether daytime and/or night-time temperatures are considered and how long the conditions need to last before a heatwave is declared.
14 The urban heat island effect refers to cities being hotter than surrounding rural areas. This is largely due to density and building materials which absorb and retain heat, as well as concentrated human activity which generates heat.
15 Regional data in this report used a continental breakdown of Africa, Asia, Americas, Europe and Oceania, as this is the breakdown used in EM-DAT, although this differs slightly from the regions usually used by IFRC.
16 Data is compiled from EM-DAT and Public Health England (2019). Heatwave mortality is calculated by using excess mortality correlated with heatwave timespan. Public Health England data is for the UK only and was published several months later, hence is not included in EM-DAT for 2019.
17 Note that heatwave monitoring has historically been poor, and particularly so in certain subregions such as sub-Saharan Africa (See Harrington and Otto, 2020). Heatwave monitoring as a 'disaster' improved after the major heatwaves in Europe and North America in 2003 (WMO and WHO, 2015).

Figure 2.9: Heatwaves, 1960–2019



Sources: EM-DAT and Public Health England

Notes: Heatwave monitoring has historically been poor, particularly in certain regions such as in parts of Africa (See Harrington & Otto, 2020). Heatwave monitoring as a 'disaster' improved after the major heatwaves in Europe and the USA in 2003 (WMO, 2015). Public Health England published additional data for 2019 which has been included to address gaps in EM-DAT data.

to cooling options. As with many hazards, people with limited literacy and non-native language speakers also face heightened risk as they may not be able to understand advisories or read health advice.

The IPCC has high confidence that hot extremes will increase in all inhabited regions due to climate change. In addition, the rising temperatures will exacerbate the urban heat island effect and lead to more heat-related health problems as well as an increase in energy demand for cooling (IPCC, 2018).

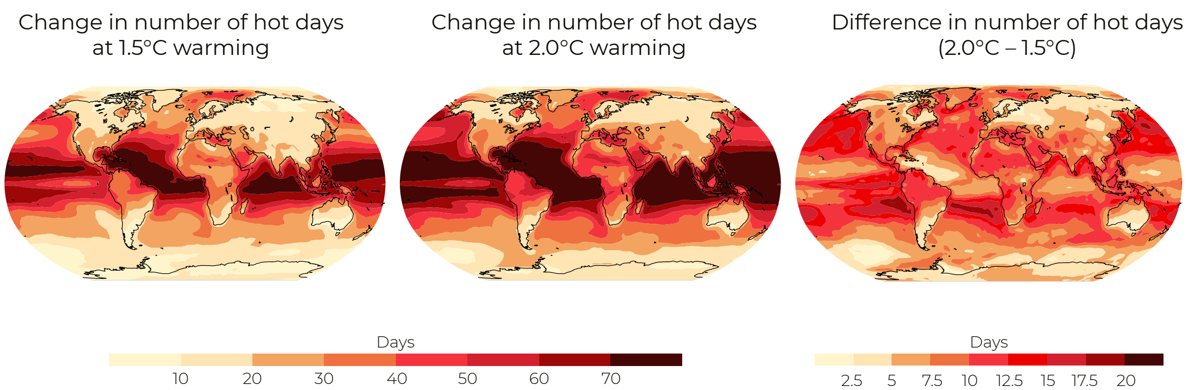
People living in urban areas are among the hardest hit when a heatwave occurs because these areas are hotter than the surrounding countryside. Over half the world now lives in urban areas, and this is projected to increase to two-thirds by 2050.

Some 30% of the global population is already estimated to be exposed to extreme heat (defined as temperatures above 37˚C) for at least 20 days every year. The projections for future impact are sobering: in a scenario with drastic reductions in emissions, in 2100, this number might rise to around 48% of the population. In a scenario with no reductions, and continued growth in greenhouse gas emissions, as many as 74% of the population could be exposed to extreme heat in 2100 (Mora et al, 2017).

Globally, as more and more people live in cities, expanding the built environment as well as the size of informal settlements, their exposure to heat risks is expected to rise. C40 Cities projected that, by 2050, more than 970 cities could experience average summertime temperature highs of 35˚C (C40 Cities, 2018). This is nearly triple today's numbers: as yet only 354 cities are this hot. The number of people exposed to this risk is also projected to rise to some 1.6 billion by 2050, an 800% rise from today.

The rise in the number of cities at risk poses additional risks in terms of inadequate infrastructure, poor heat management processes and emergency response systems in countries that are less used to managing the risks of extreme heat. An example is the more than 70,000 deaths linked to the 2003 heatwave in Europe (C40 Cities, 2018).

Figure 2.10: Projections of heatwave risk (date and degree of global warming)



Sources: Hoegh-Guldberg et al in IPCC, 2018

Note: Based on IPCC projections, of warming of global mean surface temperature compared to the pre-industrial period (1861-1880).

> By 2100, 48% of the global population may be exposed to extreme heat (defined as temperatures above 37˚C) for at least 20 days every year – if we drastically reduce emissions. If we don’t, that could reach 74%.

2.4.2 Floods: impacting millions of people each year

Floods affect more people globally each year than any other disaster. **In 2019**, 127 floods affected 69 countries, killed 1,586 people and displaced 10 million more (IDMC, 2019). The highest numbers of floods in 2019 were in Asia with 42 floods across 22 countries while Africa experienced 38 floods across 21 countries. The country most affected by floods was Iran with over 10 million people impacted in 2019, followed by Malawi (991,648 people) and Paraguay (521,191 people). India is the country with the highest flood frequency: in 2019 8 flood-related disasters flooded over 1.2 million km^2, impacting 236,750 people and killing at least 96 people. This was followed by Indonesia, where 7 significant floods killed 136 people and impacted 301,442 more, as well as the USA where 4 significant floods affected 790,199 km^2 and impacted more than 14,000 people (Dartmouth Flood Observatory, 2019).

From 2010 to 2019, 46% (1,298) of disasters triggered by natural hazards were floods, with more than 673 million people affected (EM-DAT, 2020). The economic toll of floods is also significant: in the first half of 2019 alone, flood losses were estimated at around 33.7 billion US dollars (approximately 33 billion Swiss francs) (Aon, 2019).

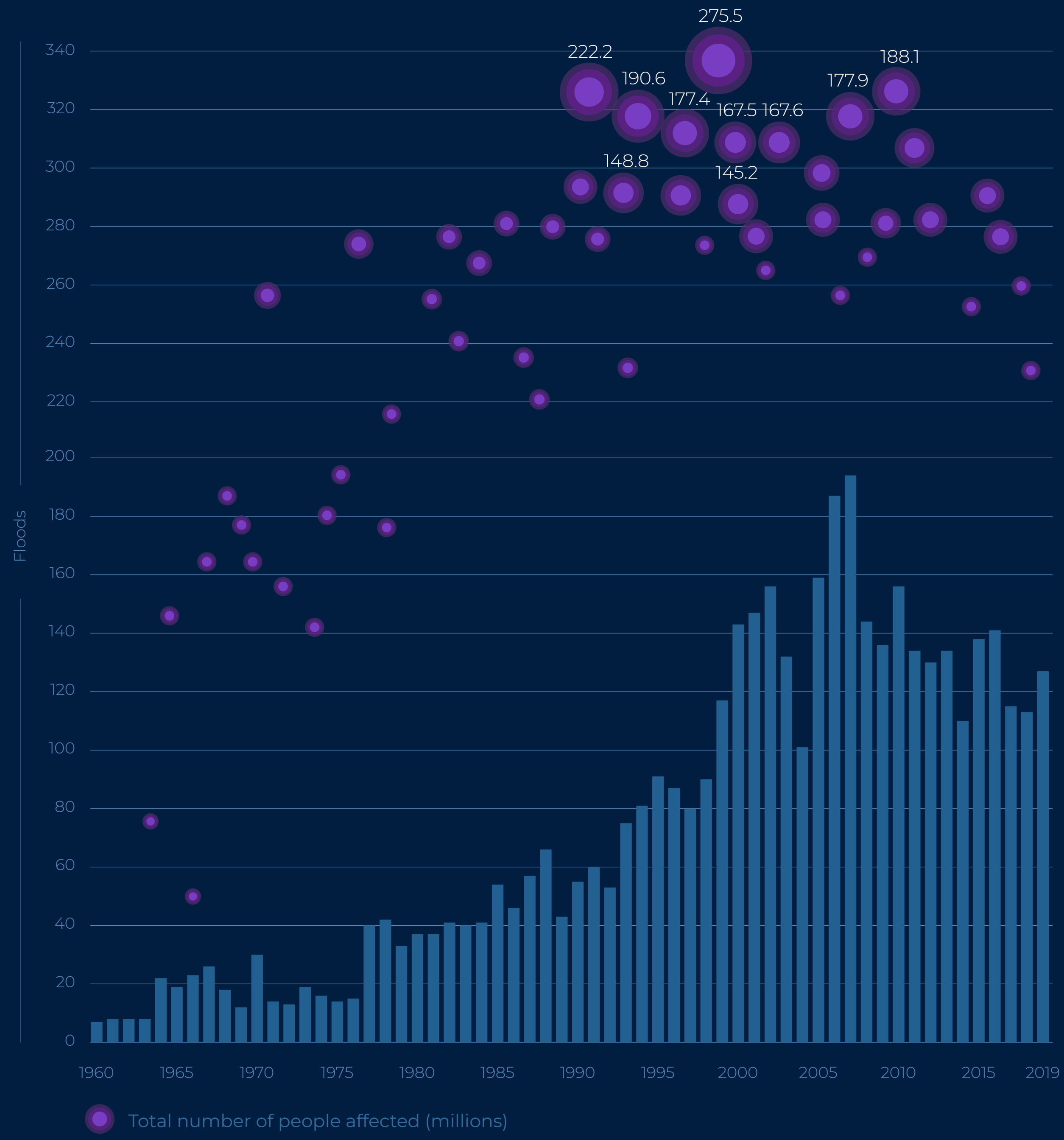
The number of floods increased significantly between the **1960s and the 2000s**. Only 151 disasters caused by floods were observed between 1960 and 1969 rising to 1,499 between 2000 and 2009. Since 2000, flood numbers have remained high with an annual average of more than 128 per year, however, the number of affected people has actually declined.

Floods can cause widespread damage and devastation including injury, death, loss of livelihoods, ruined or destroyed structures and infrastructure, lost assets and fracturing or uprooting of communities. Flooding can also have wide-ranging direct and indirect health impacts. These include immediate impacts such as drowning, injuries and hypothermia, as well as indirect effects in the medium and long term such as food insecurity leading to a rise in malnutrition (FAO, 2018), increased waterborne infectious diseases, mental health problems, respiratory diseases and allergies. Recurrent flooding may also discourage long-term investments by governments and the private sector as these investments are continually, and literally, washed away.

Of the more than 17 million people at risk of being displaced by floods each year, more than 80% live in urban and peri-urban areas (IDMC, 2019). This urbanization coupled with poverty is increasingly resulting in people living in flood zones with limited alternatives or resources for reducing their exposure.

However, it is important to note that while the number of flood events has been high, the number of people affected by floods has decreased since the 2000s. While this may be attributed to various factors, the increased investment in disaster risk reduction/climate adaptation is likely a significant contributor.

Figure 2.11: Flood events, 1960–2019



Sources: EM-DAT, Dartmouth Flood Observatory, ReliefWeb and IFRC GO


NIGERIAN
RED CROSS

Nigeria, 2018. Floods in Anambra state caused widespread devastation. John came back from a displacement camp to see what was left of his home and farmland, and found his home completely submerged.

© IFRC

BOX 2.2 / CASE STUDY
KERALA FLOODS REQUIRE LONG-TERM DISASTER RISK REDUCTION

In August 2018, Kerala, in India's southwest, witnessed floods that broke the 100-year record. Between June and August, the state witnessed very heavy rainfall, averaging 42% above normal. All its 44 rivers were flooded, numerous landslides created blockages and the gates of most of the 80 small and medium dams had to be opened to let the swelling waters out. About 23 million people were affected, more than 500 people died, 220,00 people were rendered homeless and 60,000 hectares of cropland were destroyed. While the state was still trying to recover, a fresh wave of floods affected 13 districts in August 2019, triggered by the heaviest rainfall in that month since 1951. Another 180 people lost their lives, 109,896 people were evacuated, more than 16,000 houses were damaged and 13 hectares of cropland were washed away.

The Indian Red Cross Society (IRCS) responded by air lifting relief material for quick response, evacuations and search and rescue of survivors, providing affected communities with first aid and relief items such as food, water, tarpaulins, mosquito nets, linen and kitchen supplies. IRCS volunteers reached many of the remote worst-hit communities cut off by the rising water levels. Clean drinking water became a priority: water purification units were installed to provide potable water and the National Society cleaned hundreds of family wells.

Kerala is accustomed to continuous and heavy precipitation during the six months of its two monsoon seasons. Yet, in recent decades, development linked land-use changes have resulted in massive clearing of forests, over-exploitation of groundwater and reclamation and encroachment of wetlands, changing the natural cycles of its rivers and reducing the absorption capacities of excess water, leaving it more at risk of flooding. Efforts are needed to reduce Kerala's risk to floods.

IRCS follows weather alerts closely, especially for floods and cyclones. Before these strike the National Society endeavours to access emergency funds, mobilize volunteers and pre-position stocks. In February 2019, IRCS headquarters signed a Memorandum of Agreement with the Indian Meteorological Department to expand training of volunteers on weather forecasts and climate shocks. A major recommendation made after the Kerala response was to invest in long-term interventions to mitigate disasters and to construct a preparedness index at IRCS branch level.

Sources: Government of India, Central Water Commission, 2018; Government of India, Ministry of Environment Forest and Climate Change, 2017; Government of India, Ministry of Environment and Forests, 2013; Government of Kerala, Department of Environment and Climate Change, 2014; Hunt and Menon, 2020; Mishra and Shah, 2018; Ramachandran and Reddy, 2017.

From a climate perspective, rainfall is changing, with an increase in extreme precipitation. In time, it is very likely that extreme precipitation events will be more frequent and more intense, particularly in the mid-latitudes and wet tropical regions of the world (IPCC, 2014b). The IPCC indicates that increasing warming may result in a larger fraction of the global population being affected by major river floods (IPCC, 2014b). And there is very high confidence that coastal ecosystems and low-lying areas will experience more coastal flooding events. With more and more people and assets concentrated in coastal areas, the IPCC expects increasing exposure to coastal risks such as flooding, erosion, sea level rise and submergence (IPCC, 2014b). Regionally, the IPCC indicates that flood hazards are likely to increase in parts of Asia (in particular in south and Southeast Asia), in Africa (mostly in tropical areas), in Europe (in particular in far north eastern countries) and in the Americas (in particular in South America), while they are likely to decrease in other parts of the world (IPCC, 2014b).

Looking at population increase in areas vulnerable to flooding, the IPCC predicts large rises in the number of people at risk in all populated regions from 1970 to 2030: in Africa (from 850,000 to 3.6 million people), Asia (29.7 million to 77.6 million people), the Americas (from 1.26 million to 2.85 million people) Oceania (30,000 to 60,000 people), and Europe (1.65 million to 1.87 million people) (Handmer et al, 2012). The Aqueduct Floods model estimates that 147 million people will be affected by riverine and coastal floods by 2030 (Kuzma and Luo, 2020).

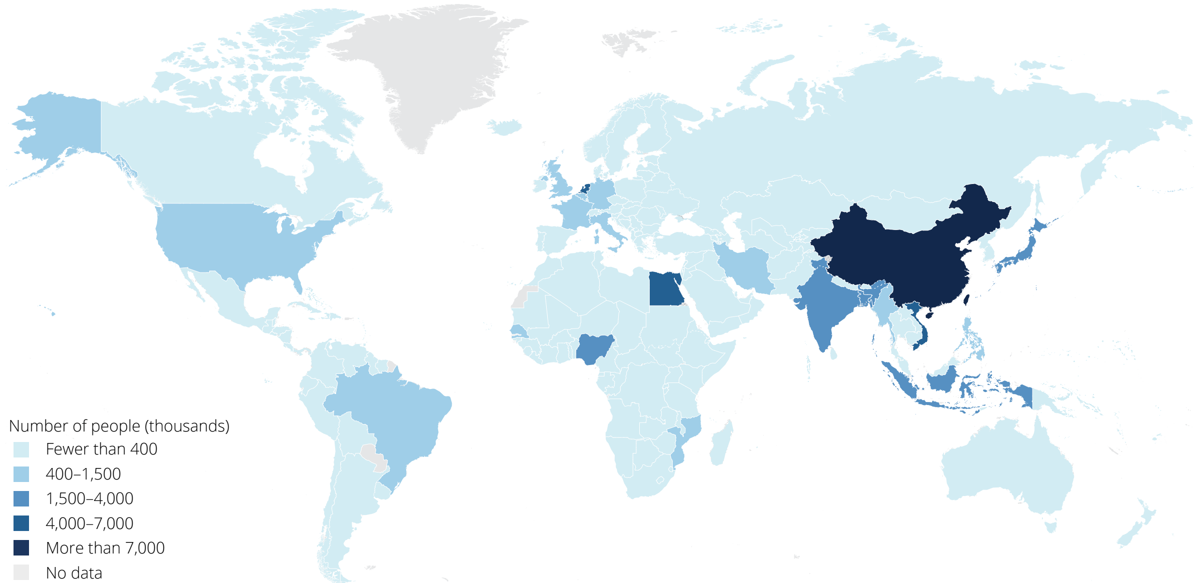
The impacts of future floods will depend on what is done about them. In coastal cities for instance, flood risks are likely to increase so much that doing nothing will be impossible, as some cities would get flooded several times each decade. Therefore the key question is how adaptation, including upgrading city coastal water defences, will take place: proactively or reactively, and in a way that protects the most vulnerable people or one that exacerbates disparities?

Iraq, 2017. Iraqi Red Crescent Society volunteers helped communities to prepare for the potential collapse of Mosul Dam. Flood preparedness is just one aspect of the comprehensive disaster-related work the Iraqi Red Crescent Society has carried out over the past decade.

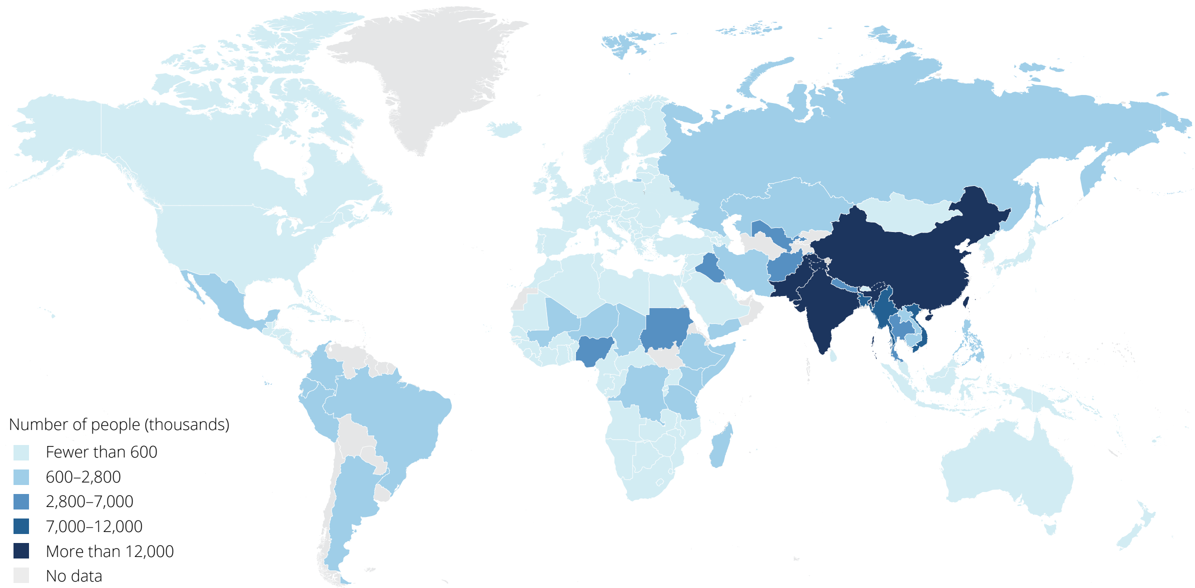
© Iraqi Red Crescent

Figure 2.12: Projections of flood risk

Absolute population exposed to coastal floods in 2050s under SSP3 scenario



Absolute population exposed to river floods in 2050s under SSP3 scenario



Source: INFORM

Notes: INFORM risk projections are based on GAR2015 exposed population, expected annual exposed population based on GLOFAS hazard maps (Dottori et al, 2018, 2016), probabilistic coastal flood simulations of extreme sea level and Standardized Precipitation Evapotranspiration Index from CMIP5 simulations.

SSPs are "Shared Socioeconomic Pathways" which are used by the IPCC to model different future scenarios based on demographic and economic trends. SSP3 is a scenario with high challenges for mitigation and adaptation, meaning slow development, persisting high inequalities and continued competitive and regionalized land and energy policies.

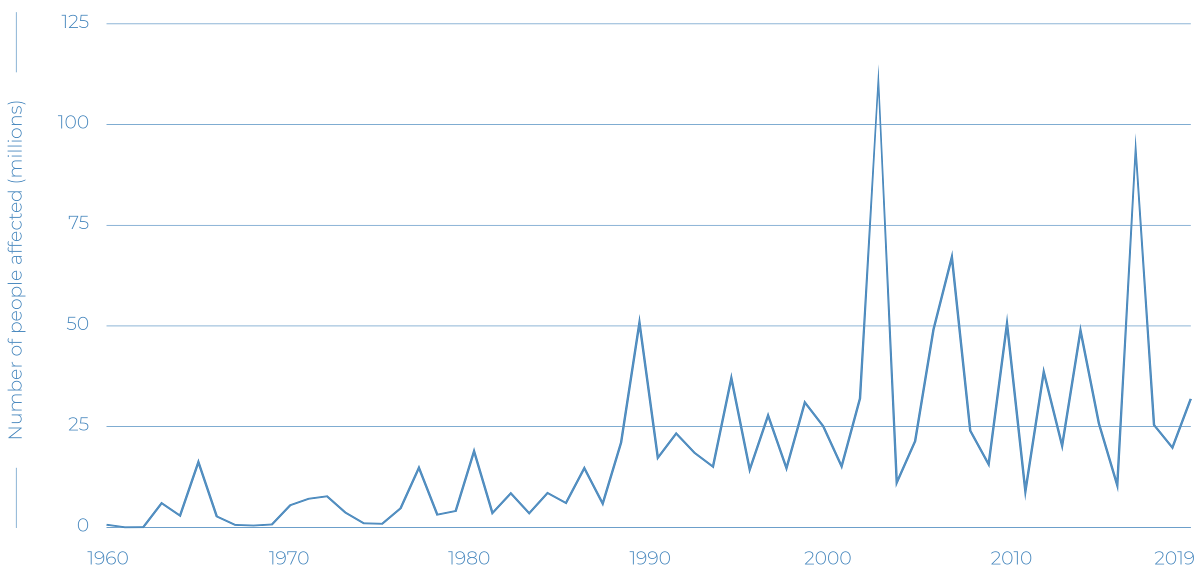
2.4.3 Storms and extreme sea level events: increasing in intensity and impact

Storms are the second most significant type of weather-related disaster (and indeed of all disasters). In **2019**, 59 storms (mostly tropical cyclones[18] and convective storms[19]) affected 37 countries and killed 2,764 people, impacting 31.9 million people. The USA, the Philippines and India were the most-affected countries. In the **past decade**, tropical cyclones and extratropical storms caused 293 disasters while convective storms caused another 289, together killing 27,183 people and affecting an estimated 324 million more.

Since the 1960s, 2,638 storm-related disasters have been recorded, including 1,443 tropical storms,[20] 204 tornadoes and 135 winter storms.

Geographically, disasters triggered by storms have most affected Asia (in particular Southern and Southeastern Asia) and the Americas. Since 1960, the USA has been the most-affected country with 341 storms, followed by the Philippines (333) and China (276), with the latter two affected by cyclones. In Asia, the most-affected countries have been the Philippines, China, India (168) and Bangladesh (159). In the Americas, the USA, Mexico (95) and Haiti (36) have been most affected, while in Africa Madagascar (56) was most affected. In Oceania, Australia (55) and Fiji (31) have been most affected while in Europe the most-affected countries have been France (27) and the UK (22).

Figure 2.13: Number of people affected by storms 1960–2019



Sources: EM-DAT, ReliefWeb and IFRC GO

18 These may be called cyclones, hurricanes or typhoons depending on the region.
19 EM-DAT's definition of convective storms includes derecho, hail, lightning/thunderstorm, rain, tornado, sand/dust storm, winter storm/blizzard, storm/surge, wind, severe storm (more details in Methodology).
20 Tropical storms comprise tropical cyclones and extratropical storms.

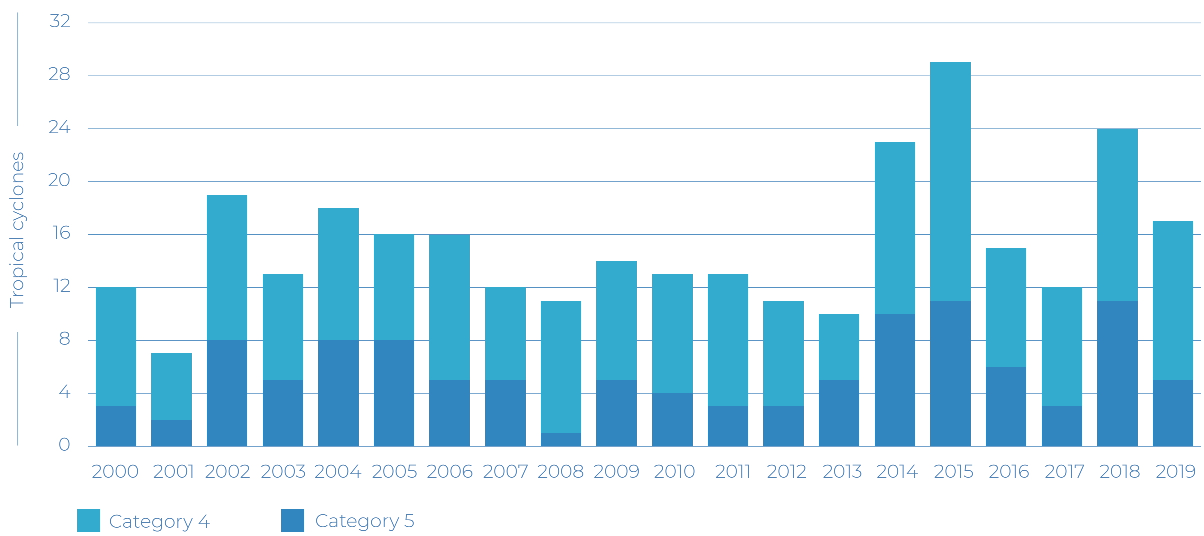
“The average intensity of tropical cyclones, including winds and rainfall, is likely to continue to rise. The proportion of category 4 and 5 tropical cyclones is predicted to rise, with impacts exacerbated by higher sea levels.”

The number of disasters triggered by storms has been relatively stable over the past three decades, possibly due to increased investment in disaster risk reduction efforts, including storm preparedness. However, due to recent advancements in science and data availability, evidence suggests a rise in the intensity of tropical cyclones between 1982 and 2009, meaning we are seeing more intense tropical cyclones globally (Knutson et al, 2019a; Kossin et al, 2018). The frequency of category 4 and 5 cyclones has also increased (see Figure 2.11). The level of damage that tropical cyclones inflict is, in part, determined by how quickly or slowly they move across a region: the slower they move the more problems they cause due to a longer duration of intense rainfall and wind. Scientists have observed that this 'translation speed' is slowing down globally, resulting in more rain falling locally during a given storm (Kossin et al, 2018). And there is further evidence to suggest that in some ocean basins (such as the north Pacific), there has been a northward shift in tropical storm tracks meaning that new regions are now in the pathway of tropical cyclones (Kossin et al, 2016; Nakamura et al, 2017).

Tropical cyclones combined with higher sea levels can result in higher storm surges: the deadly wall of water that storms often bring onto land as they make landfall. For example, during Hurricane Sandy which made landfall near New York City, scientists found that due to sea level rise the storm surge was 20cm higher than it would have been otherwise, and this resulted in 11.4% more people and 11.6% more homes being affected than would have happened otherwise (Leifert, 2015).

Certain subregions have been particularly affected, given cyclones are by nature formed in areas of warm water. Northwestern Pacific Ocean has frequently been affected by category 5 cyclones with a peak between 2015 and 2016. The Americas have been affected by category 4 cyclones, which increased significantly in the northeastern Pacific, in particular Mexico. Oceania observed an increase of category 4 cyclones, especially in the Central Pacific basin. The number of category 4 and 5 cyclones in Africa has been relatively stable in the past 20 years. Europe has historically been only rarely affected by category 4 or 5 cyclones, though a category 5 cyclone hit the Azores islands and Portugal in late 2019.

Figure 2.14: Number of category 4 and 5 Tropical cyclones, 2000–2019



Sources: National Hurricane Center, Joint Typhoon Warning Center and NOAA.

Note: Classification according to Saffir-Simpson Hurricane Wind scale: Category 4: 209–251 km/h and Category 5 at least 252 km/h.

Mozambique, 2019. Cyclone Idai particularly affected people in densely populated poor areas as these were ill prepared for its magnitude. People living in informal settlements tend to be at increased risk of being affected by disasters.

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BOX 2.3 / CASE STUDY
CYCLONES IDAI AND KENNETH – INTENSE STORMS AFFECTING LIVES AND LIVELIHOODS

In March and April 2019, two tropical cyclones – Idai and Kenneth – battered the African east coast, affecting Comoros, Madagascar, Malawi, Mozambique and Zimbabwe. With wind gusts of up to 220 km/h, Kenneth became the strongest cyclone to ever hit the African continent. These two storms brought torrential rains, storm surges and winds, and affected communities already suffering from conflict, drought, weak health systems and food insecurity.[21] The impacts included flooding that damaged or destroyed homes and health facilities, power outages, damage to key transportation routes and bridges and a cholera outbreak.

While Kenneth was the stronger storm, more lives were lost and more people affected by Idai as it hit densely populated poor areas that were ill prepared for its magnitude (Norton et al, 2020). Meanwhile, the lower death rate can most likely be attributed to people reacting positively to the warnings as a result of trauma previously experienced and the lesson learned during Cyclone Idai.

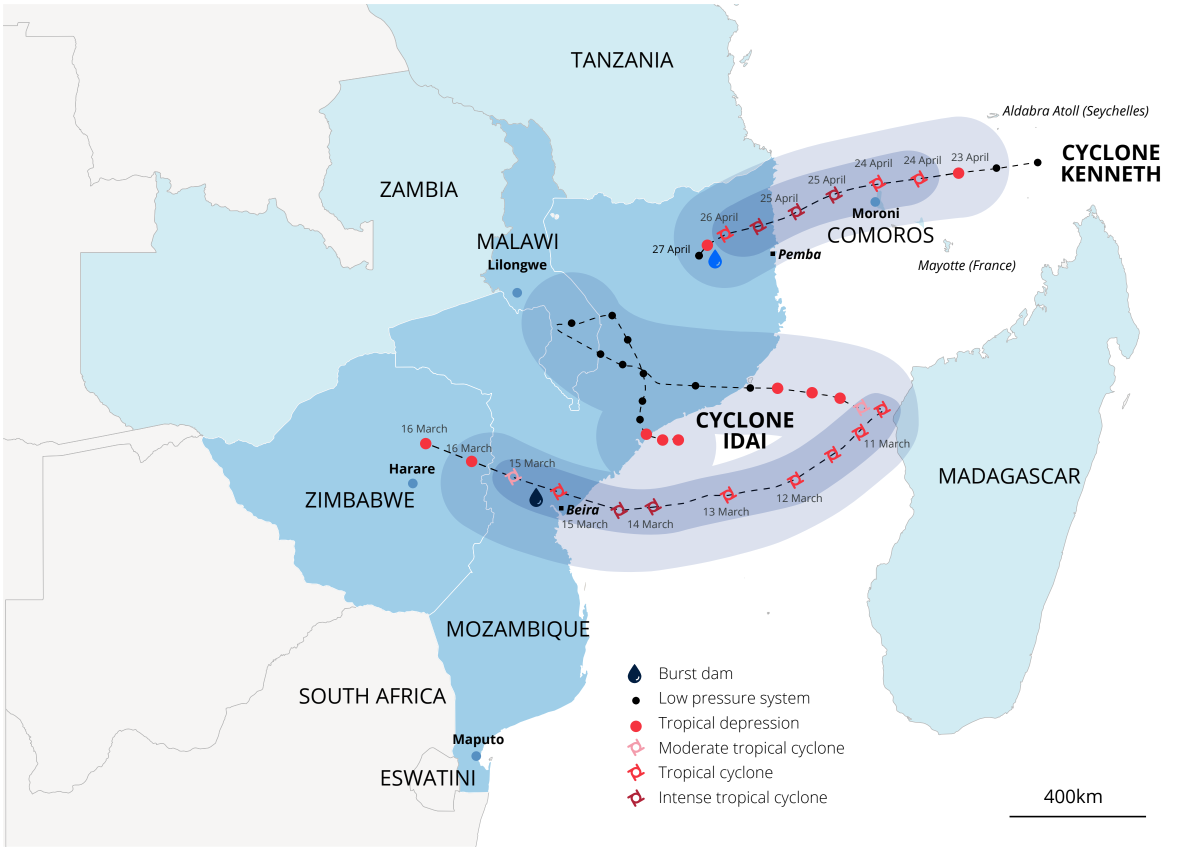
The two storms also massively exacerbated existing food insecurity. In Mozambique, 715,000 hectares of crops were destroyed by Cyclone Idai, while Cyclone Kenneth affected nearly 55,500 hectares of crops in Mozambique, leaving many smallholder farmers without a harvest to sell or on which to subsist. Damaged roads and transport infrastructure also severely limited access to external markets, causing a 100% increase in food prices and leaving 814,700 people severely food insecure (OCHA, 2019; EM-DAT, 2019).

Mozambique, 2019. Matemo island, which lies just off the coast of northern Mozambique, bore the full force of Cyclone Kenneth.

© IFRC / Matthew Carter

21 Both cyclones occurred in areas suffering from chronic undernutrition related to drought affecting Mozambique and Zimbabwe during the 2018–2019 lean season (five districts were in IPC Acute Malnutrition Phase 2). It is observed that countries facing more recurrent and severe droughts are consequently highly impacted by torrential rains, tropical storms and cyclones.

Figure 2.15: Impacts of Cyclones Kenneth and Idai



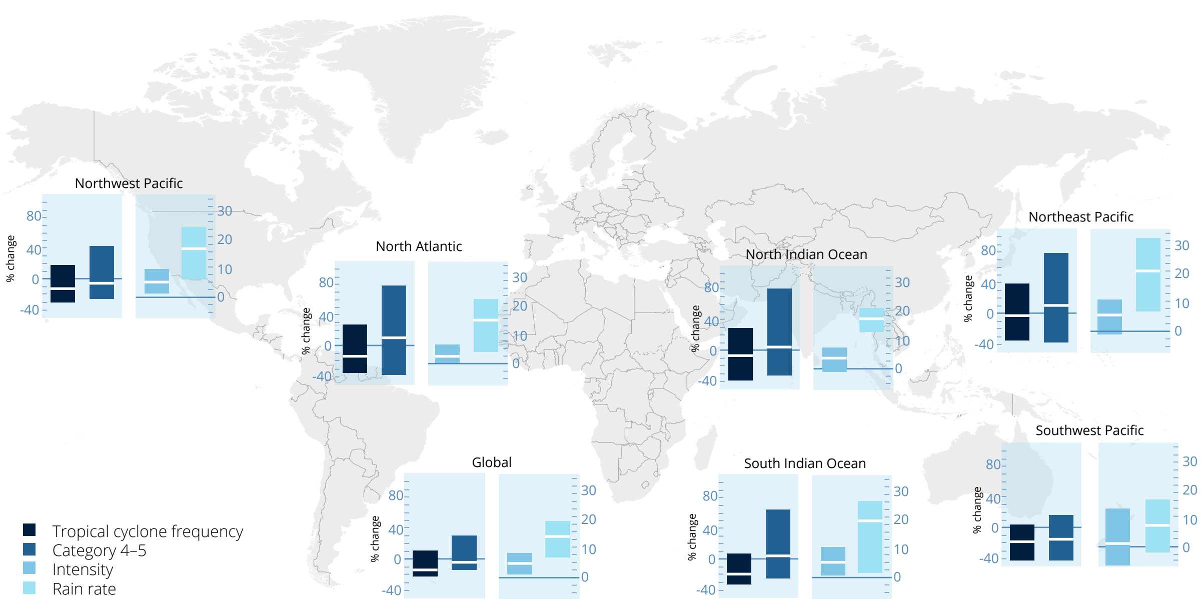
Source: OCHA, 2019

Note: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the UN. Creation date: 18 March 2019

IPCC projections indicate that the average intensity of tropical cyclones, including winds and rainfall, are likely to continue to rise, as are the proportion of category 4 and 5 tropical cyclones (IPCC, 2019a; Knutson et al, 2019). It predicts with very high confidence that rising mean sea levels will contribute to the higher extreme sea levels linked to cyclones. There is medium confidence that existing coastal hazards will be exacerbated by more intense tropical cyclones and an increase in the storm surges and precipitation rates associated with them. Extreme waves and storm surges are projected to increase in particular across the Southern Ocean, tropical eastern Pacific and Baltic Sea, although they may decrease in the North Atlantic and Mediterranean Sea (GDFL, no date; IPCC, 2019a).

Annual coastal flood damage is also expected to increase, and communities in atoll island (those encircled by coral reefs) and low-lying Arctic locations will be especially affected (IPCC, 2019a). In particular, the IPCC notes that: “extreme sea level events that are historically rare (once per century in the recent past) are projected to occur frequently (at least once per year) at many locations by 2050…especially in tropical regions” (IPCC, 2019a).

Figure 2.16: Predicted increase of category 4 and 5 storms

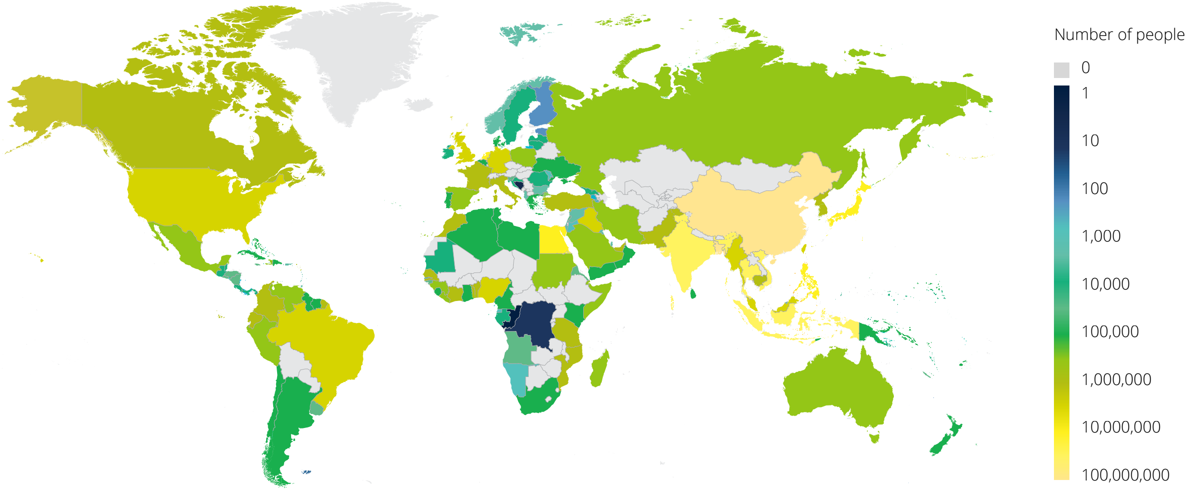


Source: Knuston et al, 2015

Notes: Summary of tropical cyclone (TC) projections for a 2°C global anthropogenic warming. Shown for each basin and the globe are median and percentile ranges for projected percentage changes in TC frequency, category 4–5 TC frequency, TC intensity, and TC near-storm rain rate. For TC frequency, the 5th–95th-percentile range across published estimates is shown. For category 4–5, TC frequency, TC intensity, and TC near-storm rain rates the 10th–90th-percentile range is shown. Note the different vertical-axis scales for the combined TC frequency and category 4–5 frequency plot vs the combined TC intensity and TC rain rate plot.

These changes are likely to impact millions of people. Scientists estimate that nearly 190 million people now occupy land below projected high tide lines for 2100 (Kulp and Strauss, 2019) under a low emissions scenario. In a high emissions scenario this number could be closer to 340 million people by 2050 and 630 million people by the end of the century (Kulp and Strauss, 2019).

Figure 2.17: The number of people on land exposed to high tides by 2050 globally based on RCP4.5



Source: Kulp and Strauss, 2019

Notes: This is based on current population who are living on land below the projected mean higher high water level in 2100. Based on a scenario of intermediate carbon emissions (RCP4.5) and relatively stable Antarctic ice sheets (sea level model K14). Estimates based on coastal digital elevation model.

Bahamas, 2019. Hurricane Dorian (a category 5 tropical cyclone) caused widespread flooding. The average intensity of tropical cyclones, including winds and rainfall, are likely to continue to rise, as are the proportion of category 4 and 5 tropical cyclones (IPCC).

© Bahamas Red Cross / Robyn-Ryann Barnett

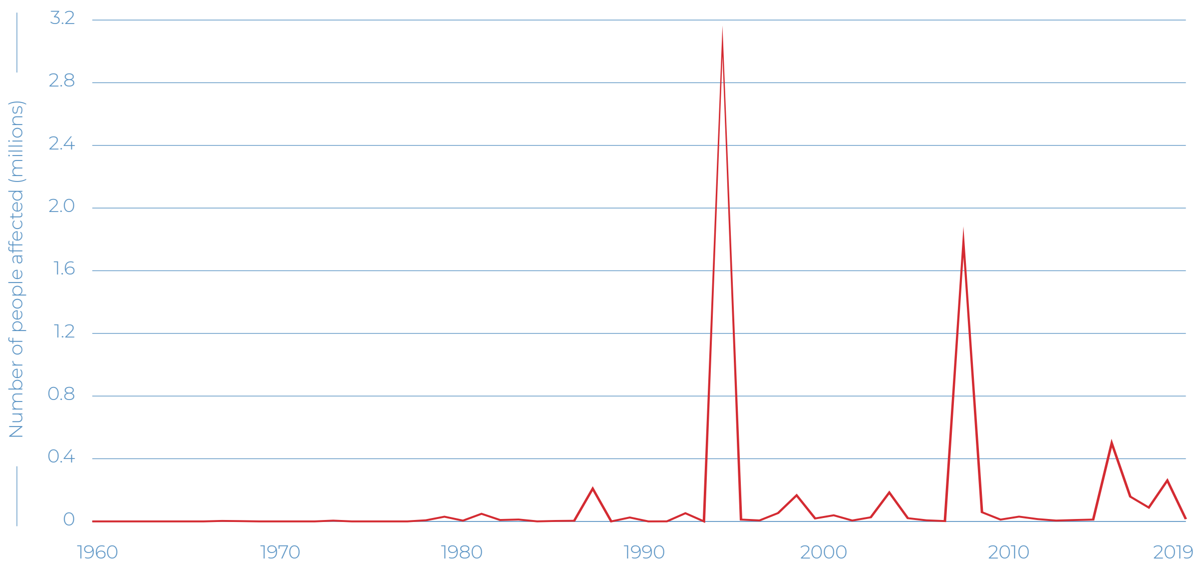
2.4.4 Wildfires: increased heat and destruction

Wildfires have direct physical impacts in terms of deaths and injuries, destruction of buildings and goods, and deaths of livestock and other animals. Fires can have major public health impacts due to fine particle air pollution which affects eyes and lungs, exacerbating existing conditions and creating new ones. They can also have mental health impacts as they create major trauma. They have ongoing impacts on biodiversity due to destruction of forest-based ecosystems and pollution of others, including rivers, lakes and even coral reefs. And they contribute to greenhouse gas emissions, not only by burning trees, but also removing trees that would otherwise be consuming carbon dioxide, creating a "climate feedback loop" (UNEP, 2020).

In 2019, 14,569 people were affected by wildfires around the world. More than half of these people (9,510) were in Australia. In total, 382,600 km^2 (equivalent to the size of Japan) have been burned mainly in Australia (19.7 million hectares), Russia (17 million hectares) and the Amazonian basin (1.3 million hectares). However, in Brazil and Russia, forest fires affect marginalized populations which are frequently under-reported or missed from official reports. For example, in Brazil, local organizations estimated that forest fires affected 148 indigenous territories within the Amazon. The Amazon is home to 306,000 indigenous people, but none are recorded as affected in official reports or in EM-DAT (The Atlantic, 2019; Correa et al, 2019).

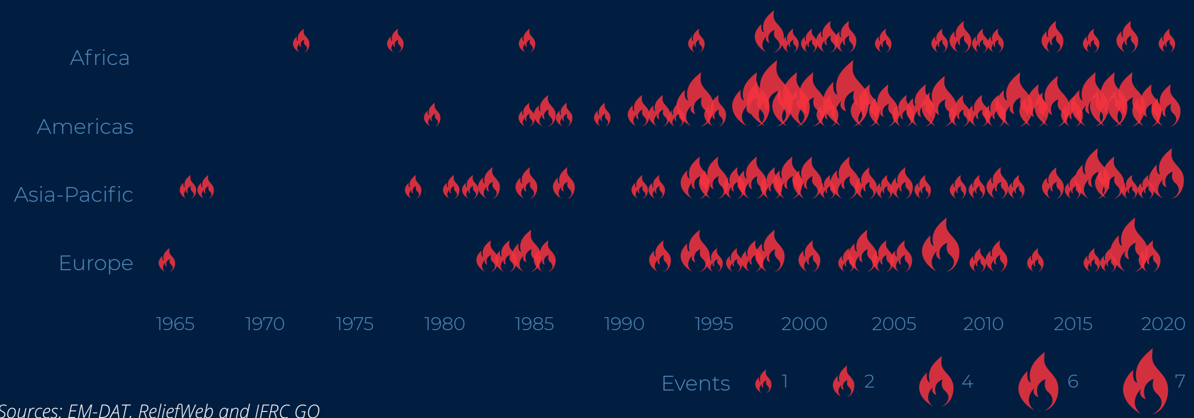
During the **past decade**, 75 severe wildfires occurred, with the highest numbers in the Americas (37), followed by Europe (12) and Oceania (11). The USA was the most-affected country with 24 significant disasters related to wildfires, which killed 198 people and affected 300,342 more. In Asia, Indonesia was hit by only one wildfire that impacted 409,664 people and killed 19 in Sumatra island.

Figure 2.18: Number of people affected by wildfires 1960–2019



Sources: EM-DAT, ReliefWeb and IFRC GO

Figure 2.19: Frequency of wildfires by region since the 1960s



Sources: EM-DAT, ReliefWeb and IFRC GO

Note: Total wildfires reported as disasters by IFRC since 1960.

Figure 2.20 The 5 wildfires that affected the most people, 1960–2019

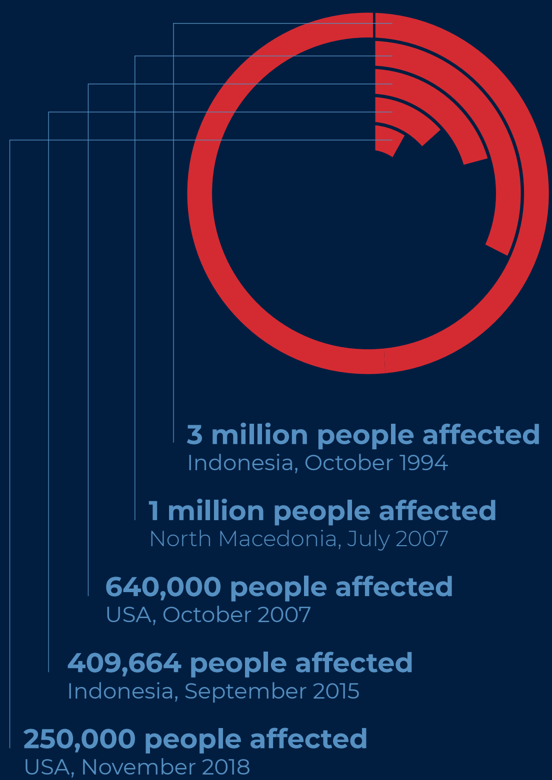
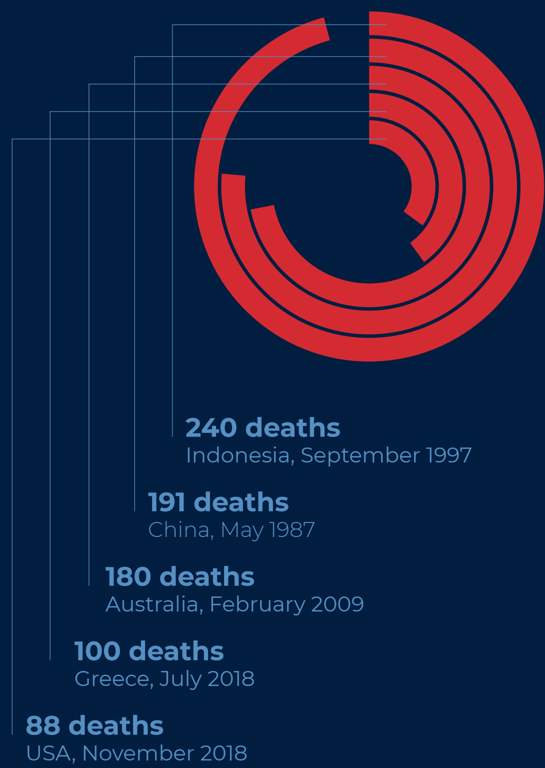


Figure 2.21 The 5 deadliest wildfires, 1960–2019



Sources: EM-DAT, ReliefWeb and IFRC GO

Since the 1960s the Americas has been the most-affected region with 105 wildfire-related disasters. The USA has been the country most affected (65), followed by Australia (24), Canada (17), Spain (10) and Russia (10). In 1994, 3 million people were affected in Indonesia when 5 million hectares burned and caused smog in Sumatra, Kalimantan islands and neighbouring Malaysia (Paton et al, 2014).

The number of wildfires has increased over time. There were only 24 reported disasters related to wildfires in the 1980s, increasing significantly to 64 disasters in the 1990s and 74 disasters between 2000 and 2009.

As time goes on, the situation is likely to get worse. Scientists estimate that in a 2ºC hotter world, the risk of the same intensity of fires would be at least four times more than it was in the 1900s, and this is likely to be an underestimate. Many regions are expected to be increasingly vulnerable to, and affected by, wildfires including the Americas, Europe (in particular around the Mediterranean), Africa (in particular countries in southern Africa) and Asia (in particular Central Asia) (IPCC, 2019b). In China, grassland fires are becoming a bigger risk due to economic development and population growth, whereas droughts, drainage of rice fields and the growth of oil palm plantations are raising the risk of peatland fires in tropical parts of Asia. Droughts are linked to increased wildfire activity in the Americas, and anthropogenic warming has been identified as a contributor to increased wildfires in Canada in particular (IPCC, 2018).

Australia, 2019. Extreme temperatures, dry conditions and winds combined to cause or escalate hundreds of bushfires across five states. Australia's 2019–2020 bushfire season was the most destructive on national record with more than 15,000 bushfires.

© Australian Department of Defence

BOX 2.4: 2019–2020 AUSTRALIAN BUSHFIRES

Following years of prolonged drought and a summer of extreme heat – with record temperatures and extensive thunderstorm activity – Australia's 2019–2020 bushfire season was the most destructive on national record. More than 15,000 bushfires affected the country, beginning in Queensland and northern New South Wales in July 2019 and extending to all states and territories by November. The Bureau of Meteorology found that the fire season in parts of eastern Australia has lengthened by almost four months since the 1950s and attributes this change to a large extent to climate change (Hannam et al, 2020).

When the season finally ended in March 2020, bushfires had burned through about 19.4 million hectares (47.9 million acres) of the country (Huf and Mclean, 2020) – an area more than double the size of Austria. The fires destroyed 3,094 homes and 7,000 outbuildings, and damaged thousands more (Australian Broadcasting Corporation, 2020a Richards and Brew, 2020). They killed 34 people and more than a billion animals, while another 11.3 million Australians are suspected to have been negatively impacted by bushfire smoke (2020, Australian Broadcasting Corporation, 2020b Richards and Brew). The cost of the bushfires was immense, with 1.3 billion US dollars (approximately 1.2 billion Swiss francs) due to direct impacts and 2.4 billion US dollars (2.3 billion Swiss francs) of total impact (CDP, 2019).

Scientists concluded that the bushfires were made more likely and more intense due to climate change. They looked at the Fire Weather Index, a rating that indicates the intensity of a fire, and found that the likelihood of an index score as high as observed during that fire season has increased by at least 30% since the 1900s due to human-caused climate change (van Oldenborgh et al, 2020).

A team of 1,965 Australian Red Cross staff and volunteers provided relief to over 47,000 people during the crisis, thanks to the support of generous community members who donated money and time. Informed by longitudinal research, which emphasizes the long-term mental health and psychosocial impacts of bushfires and the need for long-term recovery support, the Australian Red Cross response focused on assisting the psychosocial recovery of affected people and communities, and supporting and advocating for community-led recovery. This included providing direct cash grants to help address the anticipated relief and recovery needs over immediate-, medium- and long-term time frames, including an allocation for future unmet community requirements. The 30-strong Australian Red Cross recovery team (as at May 2020), includes Indigenous recovery officers and is based in bushfire-affected communities.

2.4.5 Droughts: cascading impacts

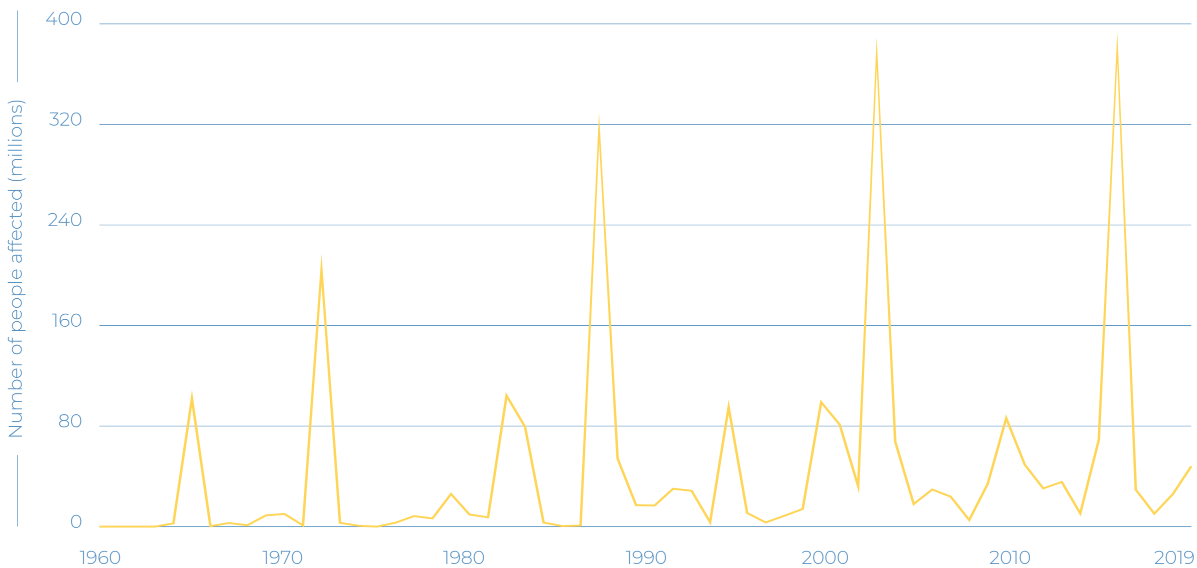
In 2019 there were 8 drought-related disasters affecting 16 countries and impacting 48 million people. In the last decade 106 disasters triggered by droughts affected 66 countries and some 690.2 million people (EM-DAT). Between 2010 and 2011, Somalia, Ethiopia, Kenya and some parts of Djibouti were hit by the deadliest drought in the past ten years. EM-DAT reported 20,000 direct deaths while Food and Agriculture Organization (FAO) and Famine Early Warning Systems Network (FEWS NET) research indicated a far higher number with a further 258,000 deaths attributable to the drought in southern and central Somalia (FAO et al, 2013). In total, 22 million people were affected.

Since the 1960s, a total of 426 disasters driven by droughts in 117 countries killed over 2 million people and affected an average of 46 million people every year.

The IPCC projects that the frequency and intensity of droughts will continue to rise, particularly in Africa (especially in southern Africa) and in Europe (the Mediterranean region). Using a climate scenario that includes medium growth across population and income with only a gradual reduction in inequality, and assumes a continuation of trends in production, consumption and technological progress, it states that "the dryland population vulnerable to water stress, drought intensity and habitat degradation is projected to reach 178 million people by 2050 at 1.5°C warming, increasing to 220 million people at 2°C warming, and 277 million people at 3°C warming" (IPCC, 2019b).

People and communities affected by drought can expect to face related challenges in food and water security, threats to their livelihoods such as the death of livestock, and health risks such as cholera and malaria. Drought can also lead to an increased risk of forest fires and their associated damage to the landscape as well as increased carbon emissions (IPCC, 2012).

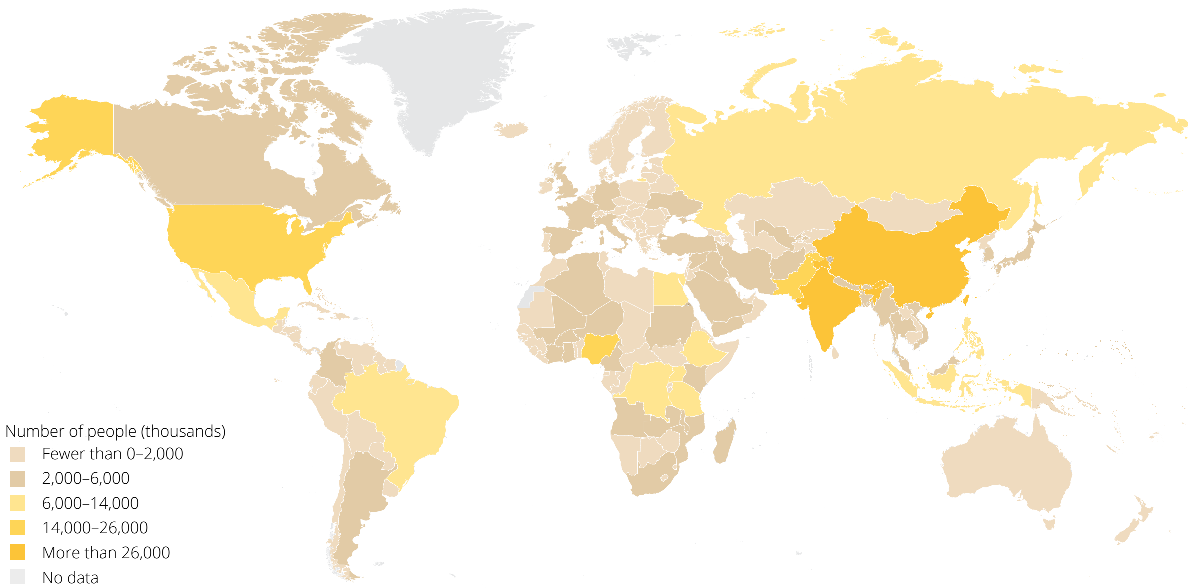
Figure 2.22: Number of people affected by droughts 1960–2019



Sources: EM-DAT, FAO/FEWS NET, ReliefWeb and IFRC GO

Figure 2.23: Projections of drought risk, 2050

Absolute population exposed to droughts in 2050s under SSP3 scenario



Source: INFORM

Notes: The extended INFORM Risk Index considers riverine floods and storm surge for projected climate change via:

1. Exposure due to amplified climate-related hazards – by adding projections of climate-related hazards

2. Risk due to amplified hazard and exposure – by adding projections of future population

SSPs are "Shared Socioeconomic Pathways" which are used by the IPCC to model different future "pathways" based on demographic and economic trends. SSP3 is a scenario with high challenges for mitigation and adaptation, meaning slow development, persisting high inequalities and continued competitive and regionalized land and energy policies.

Zambia, 2019. In Zambia a local dam dried up when rains were delayed – with no sign of filling with water after two months. The IPCC projects that the frequency and intensity of droughts will continue to rise, particularly in Africa and Europe.

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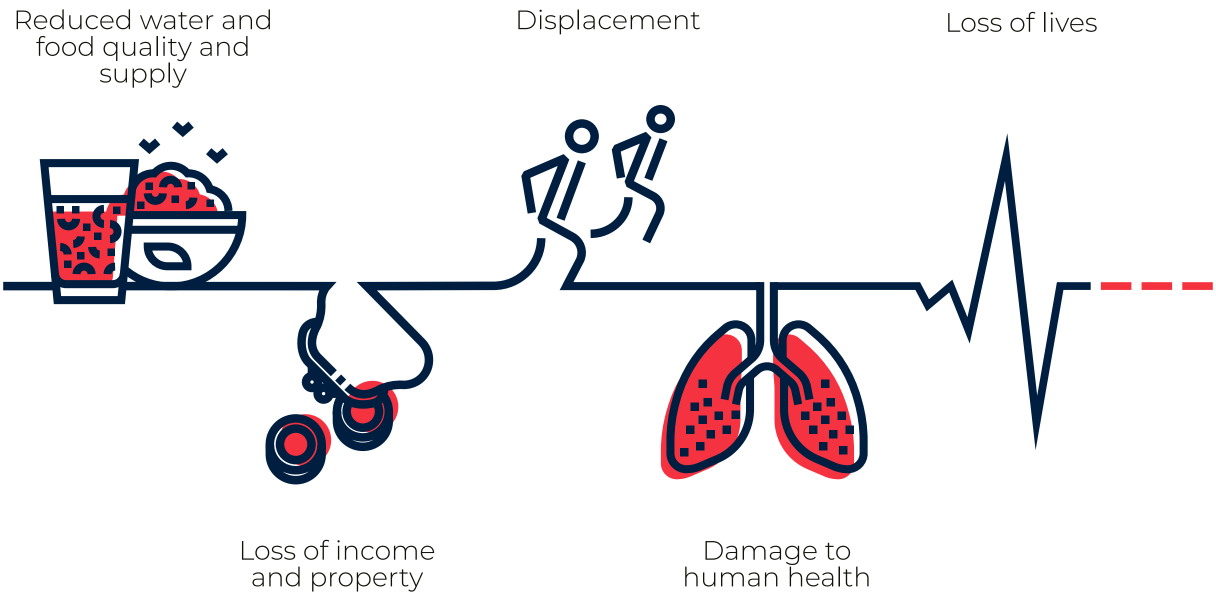
2.5 IMPACTS OF DISASTERS – AFFECTING MILLIONS OF PEOPLE NOW AND IN THE FUTURE



Disasters can have multiple impacts – death, injury and health impacts, displacement, damage to homes and goods, deaths of livestock, food insecurity, disrupted livelihoods and more. The 308 disasters triggered by natural hazards that occurred in 2019 together affected around 97.6 million people and killed 24,396 more across 128 countries.

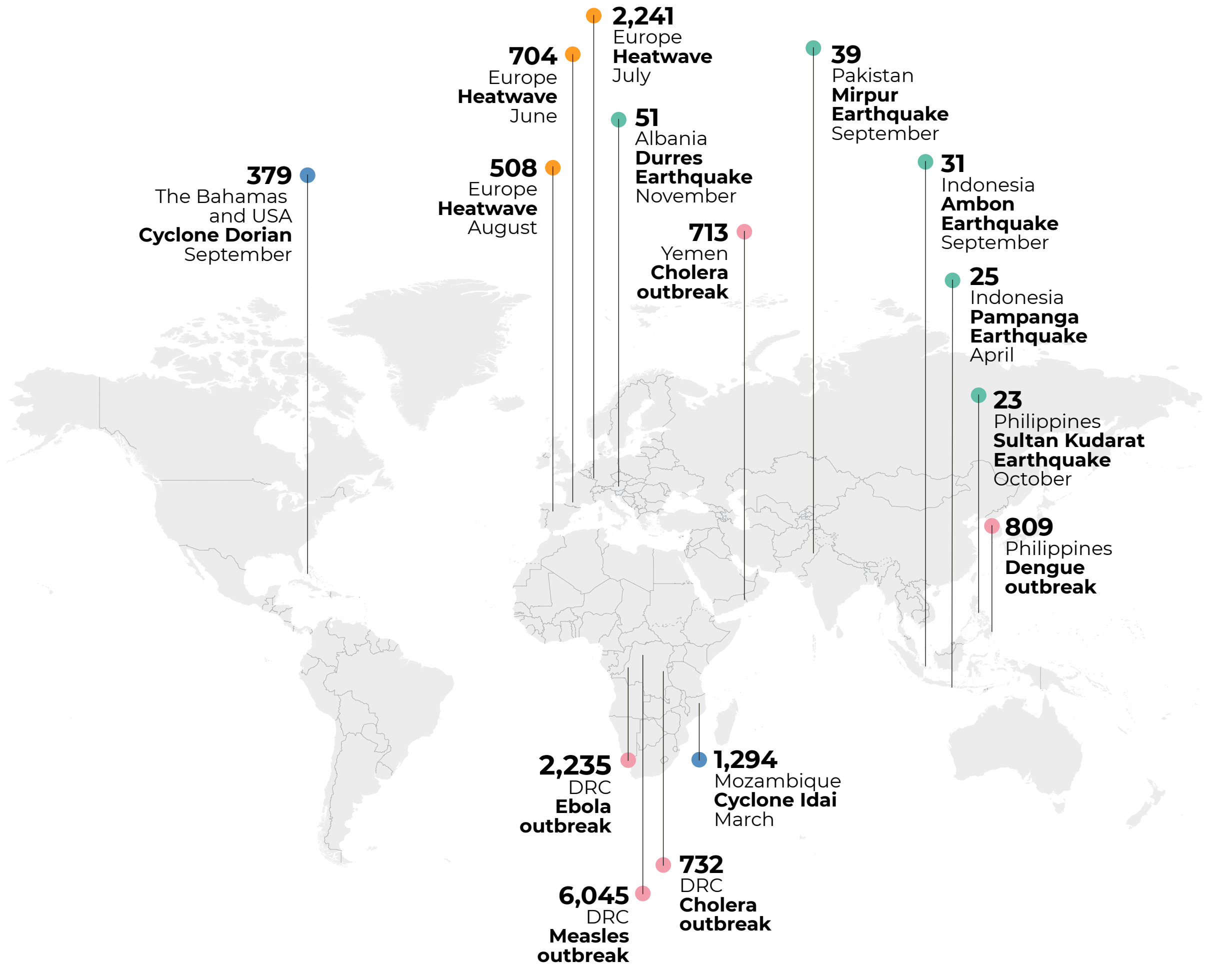
2.5.1 The deadliest disasters

Tracking deaths from disasters is not as simple as it sounds. Some people may be killed directly during the disaster itself, for example drowning in a flood; others may be affected when electricity is cut in a hospital or suffer longer-term health impacts due to smoke inhalation from a wildfire. Disasters can undermine food security or access to healthcare over a period of time which also increases mortality. EM-DAT mortality statistics focus largely on direct deaths, and therefore underestimate the significant secondary impacts of disasters on mortality.

In 2019, more than 24,000 people died due to disasters triggered by natural hazards, and of these people, over 9,000 were killed by climate- and weather-related disasters. Disease outbreaks proved to be the deadliest of natural hazards, killing 15,080 people in total, while heatwaves killed 3,738 people, storms killed 2,806 and floods (despite being the most common disaster) killed 1,586 people.

The measles and Ebola virus disease outbreaks in the Democratic Republic of the Congo (DRC) in 2019 resulted in 310,000 people being infected and 6,045 killed by measles (WHO, 2020), and 3,395 people being infected and 2,235 killed by Ebola[22] in the country's east (WHO, 2020). Of the non-disease related disasters, the heatwaves affecting 8 countries in Europe were the deadliest, killing cumulatively more than 3,400 people, followed by Cyclone Idai which killed 1,294 people in Madagascar, Mozambique and Zimbabwe.

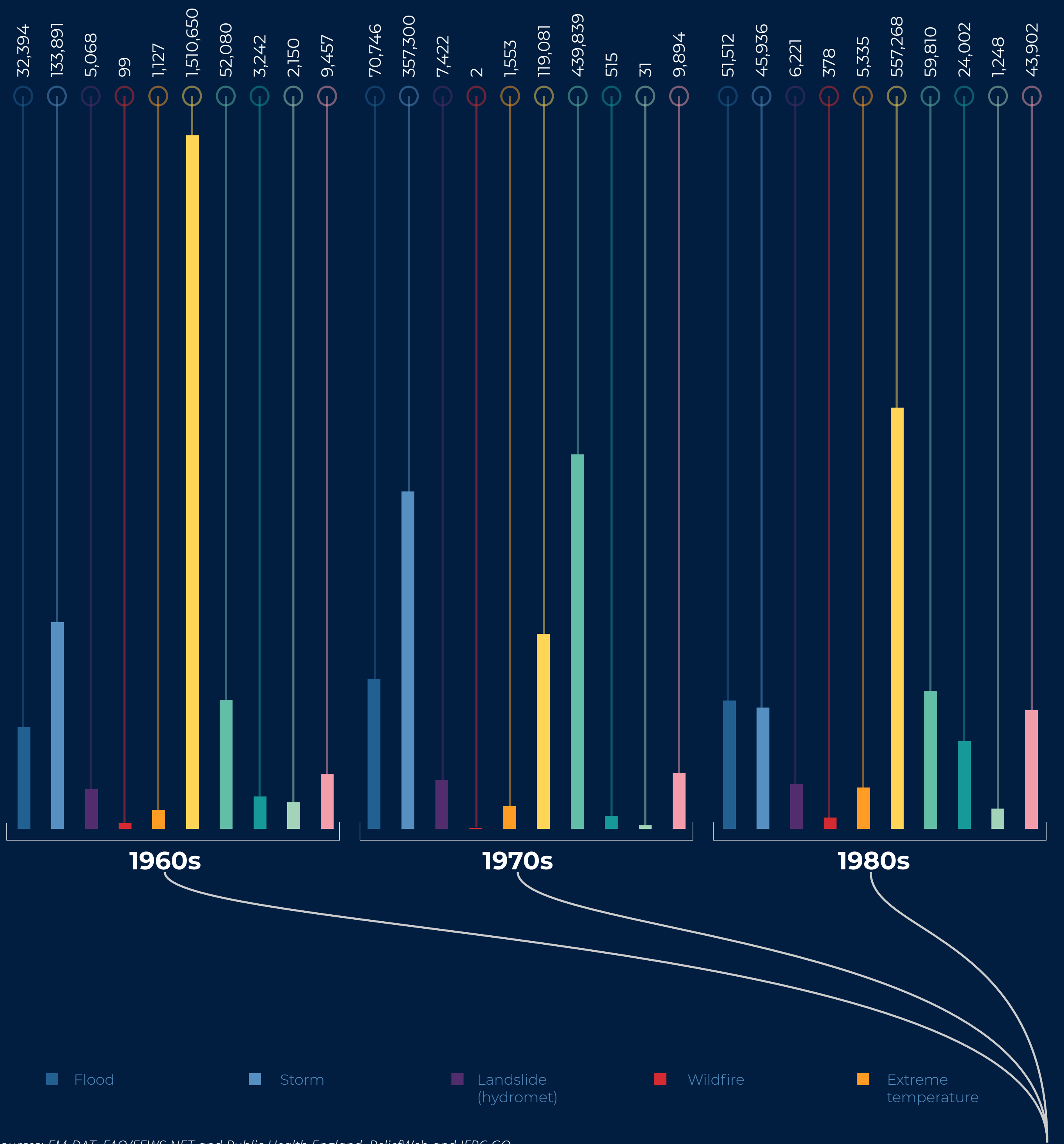
Figure 2.24: The deadliest disasters in 2019



Sources: EM-DAT, FAO/FEWS NET, Public Health England, ReliefWeb and IFRC GO
Note: Map shows the five deadliest climate- and weather-related, biological and geophysical disasters for 2019 and provides the number of people killed in each disaster

22 From 2018 to 2020, the DRC Ebola outbreak infected 3,476 and killed 2,998 people across DRC and Uganda.

Figure 2.25: Total deaths by disaster type, 1960s–2010s



Sources: EM-DAT, FAO/FEWS NET and Public Health England, ReliefWeb and IFRC GO
Note: Bars use a non-linear scale.

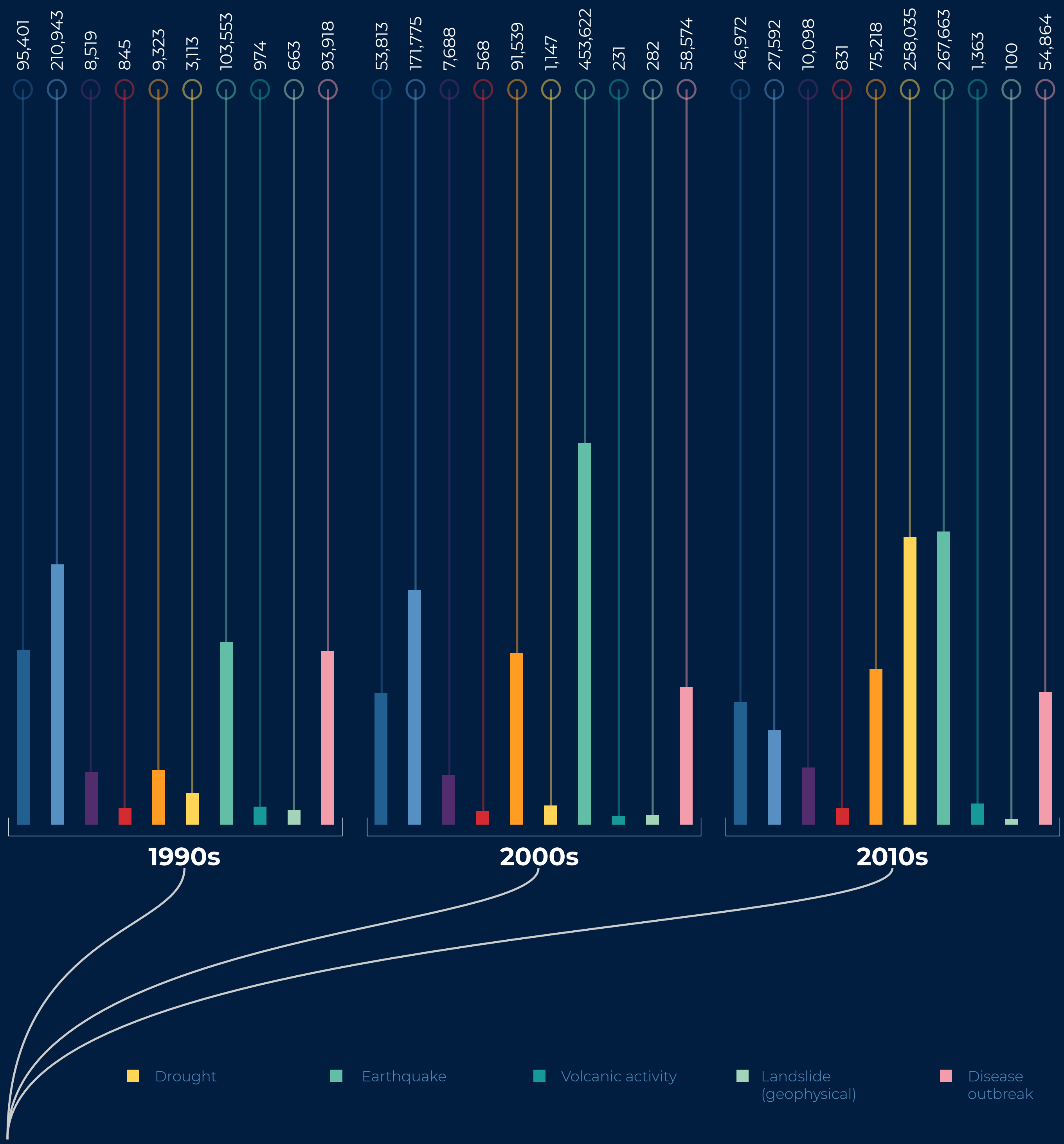
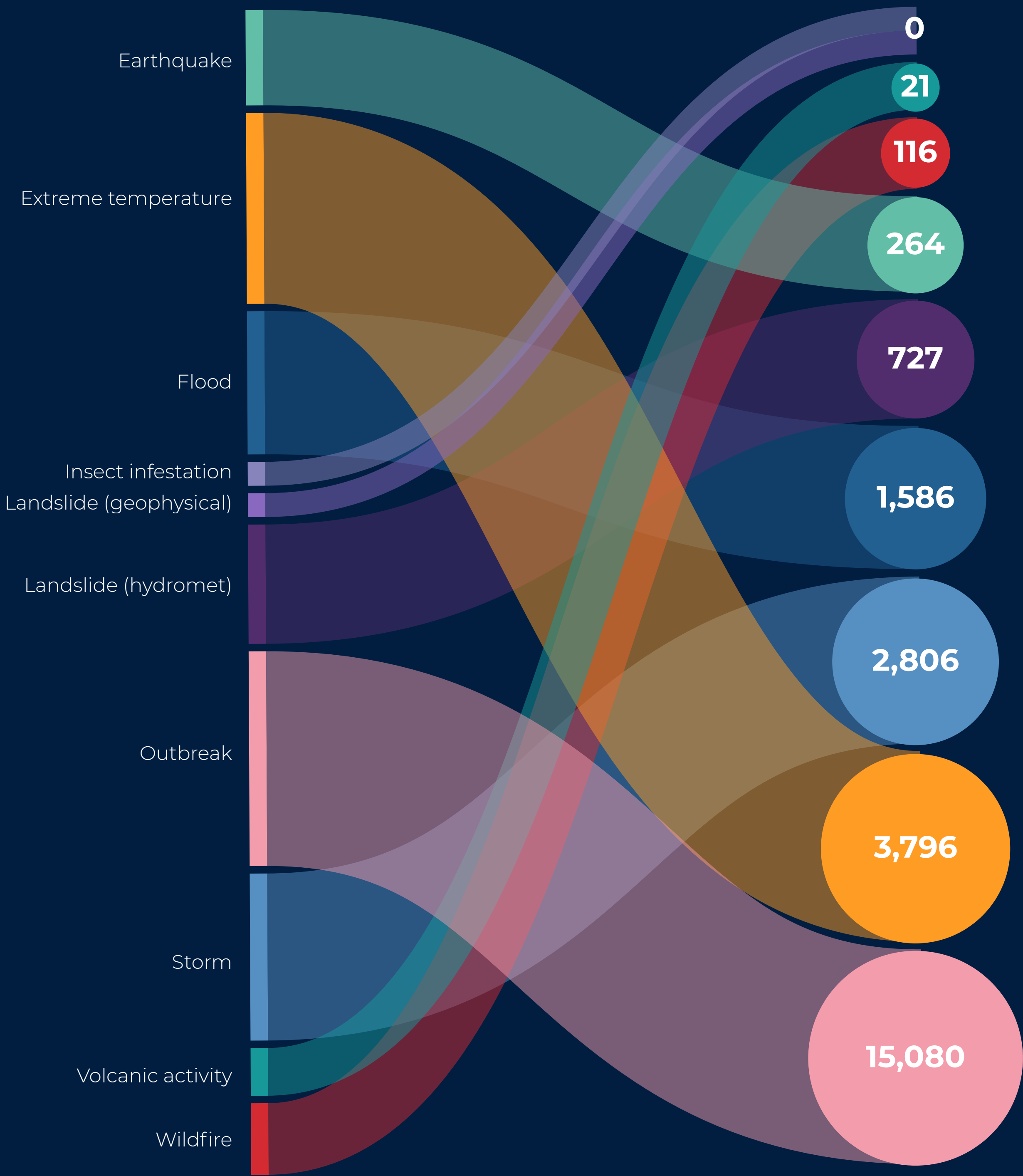

95,401
210,943
8,519
845
9,323
3,113
103,553
974
663
93,918
53,813
171,775
7,688
568
91,539
1,147
453,622
231
282
58,574
46,972
27,592
10,098
831
75,218
258,035
267,663
1,363
100
54,864
1990s
2000s
2010s
Drought
Earthquake
Volcanic activity
Landslide (geophysical)
Disease outbreak

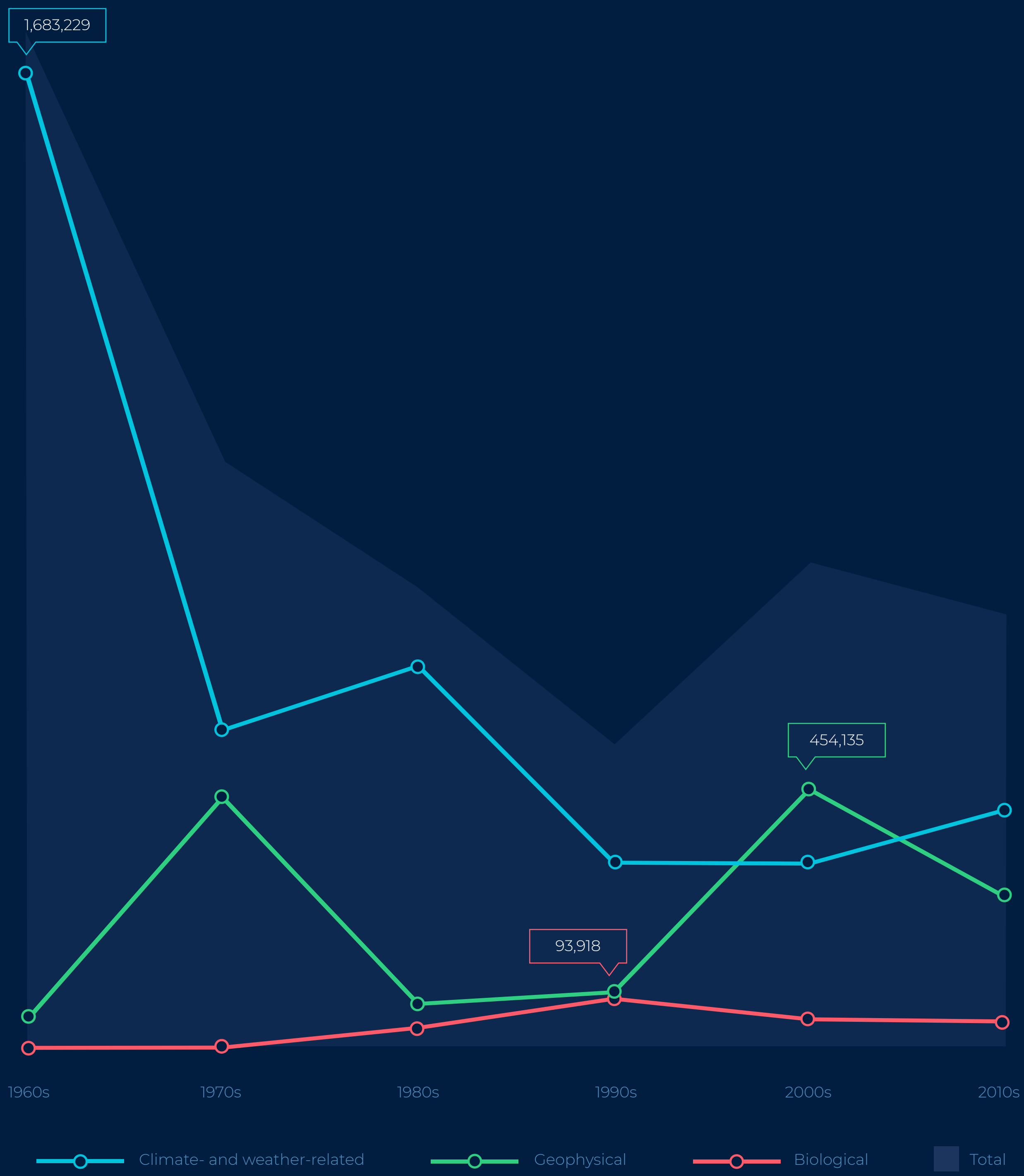
Figure 2.26: Total deaths by disaster type, 2019



Sources: EM-DAT, FAO/FEWS NET and Public Health England, ReliefWeb and IFRC GO

Note: For a full table showing the number of deaths due to each hazard for each decade, see Data tables in the annexes.

Figure 2.27: Number of deaths by disaster group, 1960s–2010s



Sources: EM-DAT, FAO/FEWS NET and Public Health England, ReliefWeb and IFRC GO

In the past decade, 740,000 people died due to disasters triggered by natural hazards, while more than 410,000 people were killed by climate- and weather-related disasters. The greatest number of people were killed by earthquakes (267,663 people) and droughts (258,000 people – all in Somalia as a result of the intersection of drought, conflict and famine).[23] This was followed by extreme temperatures (75,218) – mostly heatwaves – and public health emergencies such as infectious disease outbreaks (51,950).[24]

Since the 1960s, deaths caused by floods and storms have declined, while deaths related to extreme temperatures, disease outbreaks and landslides have increased. For example, in the 1960s, 1,127 deaths were recorded due to heat and cold waves, while in the 2000s more than 90,000 deaths were recorded. Deaths connected to droughts decreased, until the Somalia famine in 2010, triggered by a combination of drought and conflict (which impacted on food security and humanitarian access), reversed this trend.

Overall, the number of people killed by disasters has dropped significantly, in particular those connected to climate- and weather-related hazards. Overall deaths dropped from 1.75 million in the 1960s to less than 0.75 million in the last decade. This is particularly significant given the number of disasters has increased approximately six times since the 1960s and the world population has at the same time increased dramatically. While this may be attributable to many factors, it appears to indicate that efforts at disaster risk reduction, climate adaptation, poverty alleviation and other important initiatives are working.

In the future, the climate crisis is predicted to cause additional deaths, in particular in connection to health factors. WHO estimates 250,000 additional deaths due to climate change between 2030 and 2050 connected to malnutrition, malaria, diarrhoea and heat stress (Rettner, 2018). This does not include deaths due to storms, floods or other extreme events.

2.5.2 People affected by disasters

EM-DAT considers people to be affected by disasters where they require "immediate assistance during a period of emergency, i.e. requiring basic survival needs such as food, water and sanitation, shelter, sanitation and immediate medical assistance." This therefore includes people displaced, even if only for one day, but also people who lose their houses or sustain life-changing injuries.

Yet in practice, the assessment of how people are affected by a given disaster differs over time and between countries, so numbers are difficult to compare. For example, where there are overlapping threats (such as conflict and drought) leading to food insecurity, causality is tricky. Similarly when droughts lead to an increase in food prices, which affect everyone, it can be a challenge to identify who is affected and needs assistance.

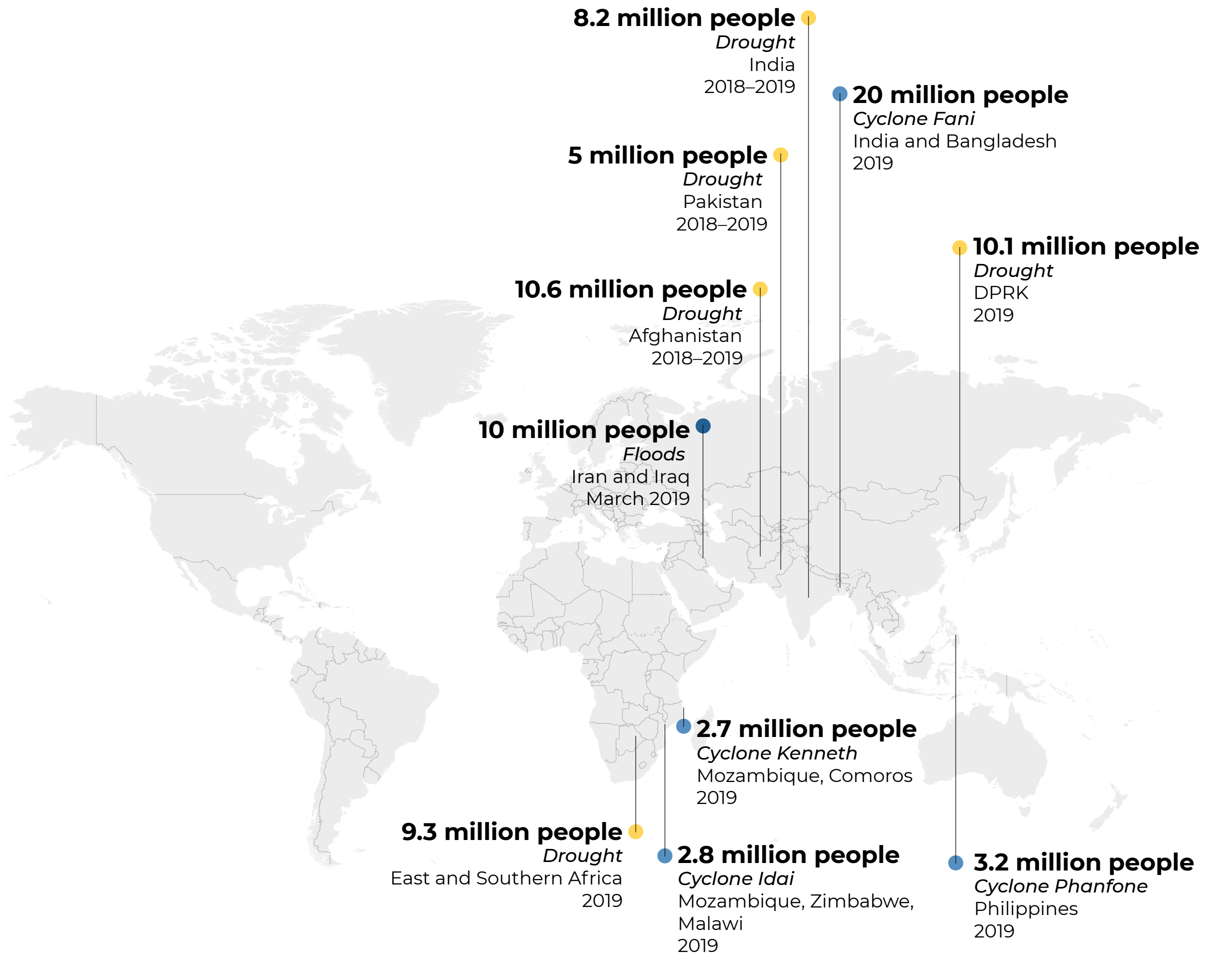
The total number of people affected by disasters in **2019** reached 97.6 million according to EM-DAT and supplementary sources. Droughts affected the greatest number of people at 48 million, while storms affected 32 million people and floods 14 million. Outbreaks of infectious diseases also exerted a major impact, with 1.8 million people affected.

23 Note this data does not show up on EM-DAT, potentially due to the delay in analysis and reporting, but also given that attributing deaths is challenging when multiple factors have contributed.

24 Note this does not include events not captured in EM-DAT due to limited data, poor or late reporting or where attribution is a challenge. However, where some clear and sizeable irregularities have been identified, we have supplemented EM-DAT with additional sources. For example, a striking omission from EM-DAT is the 2011–2012 drought in Somalia, which has been added based on FAO/FEWS NET figures.

In 2019, 75 million people in Asia were affected by disasters, while 20 million people were affected in Africa and 1 million in the Americas. Of any single disaster in 2019, Cyclone Fani affected the most people, with over 20 million people affected across parts of India and Bangladesh, followed by droughts in Afghanistan and DPRK and floods in Iran. All of the ten disasters that affected the most people were climate and weather related.

Figure 2.28: The 10 disasters that affected the most people in 2019[25]

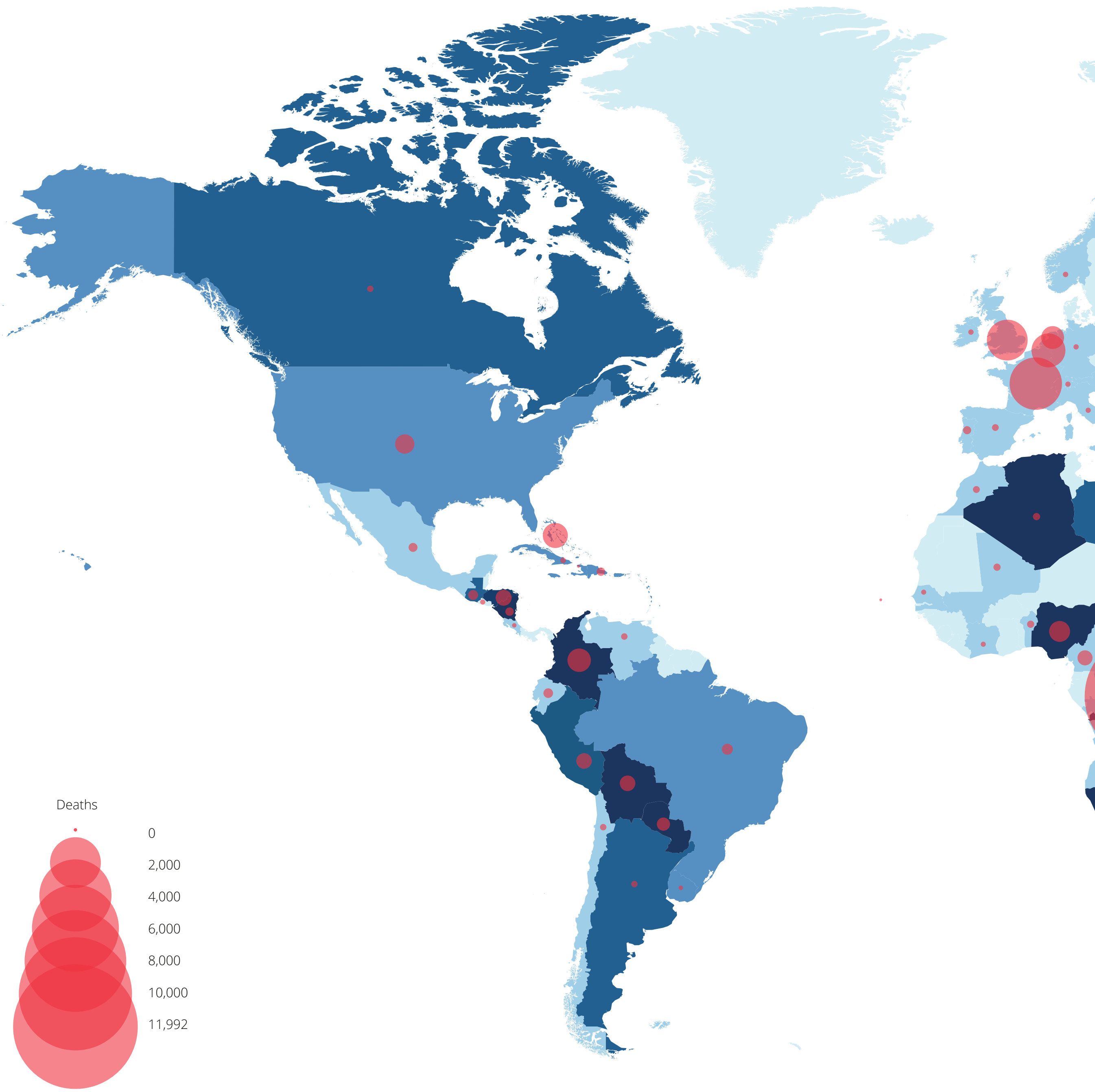


Sources: EM-DAT, FAO/FEWS NET, Dartmouth Flood Observatory, ReliefWeb and IFRC GO

Note: The drought in East and Southern Africa affected 12 countries: Angola, Botswana, DRC, Eswatini, Lesotho, Malawi, Mozambique, Namibia, South Africa, United Republic of Tanzania, Zambia, Zimbabwe.

25 Note that in the case of disease outbreaks, numbers of people affected are not systematically collected nor compiled, although cases and deaths may be.

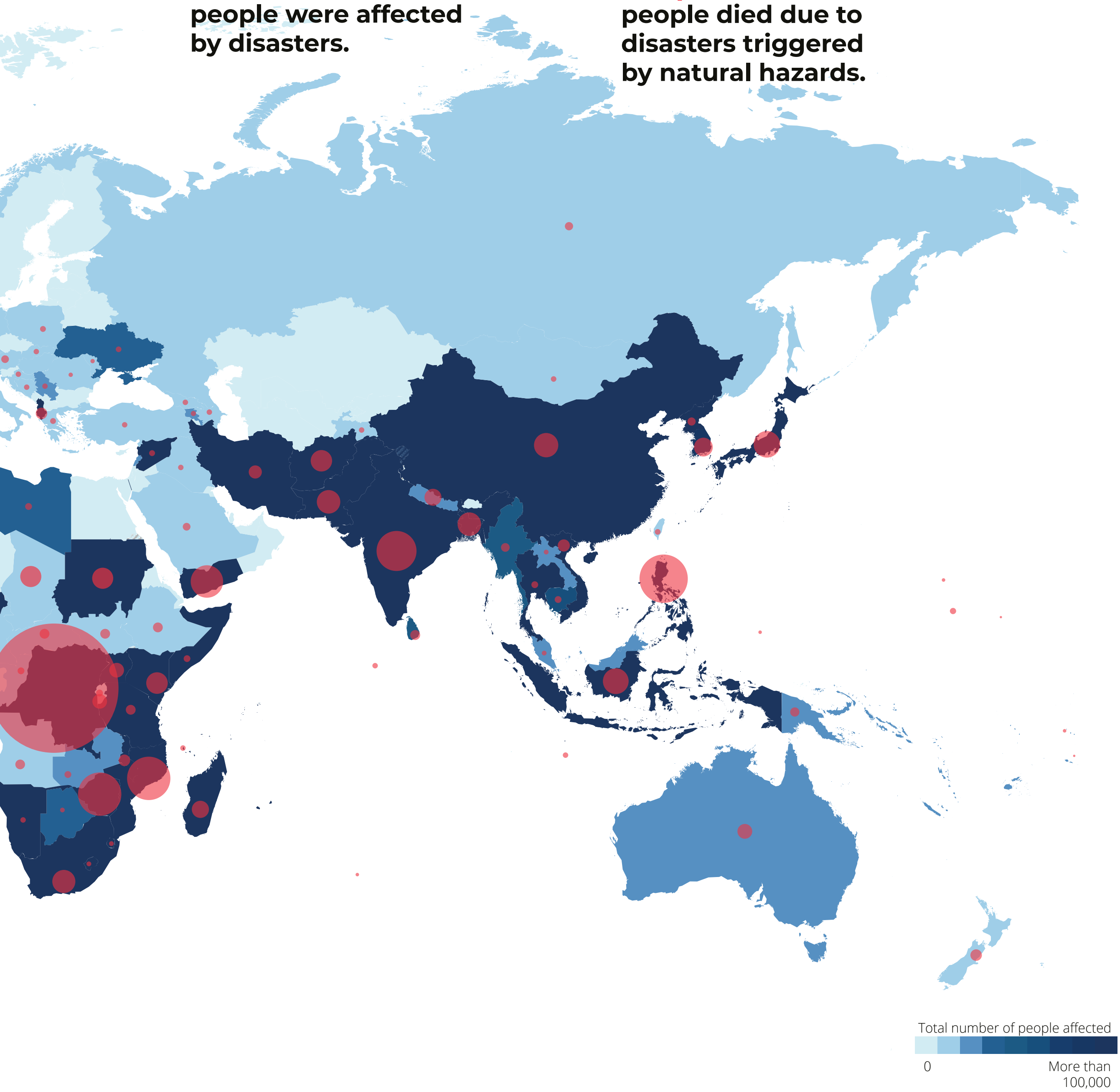
Figure 2.29: Number of people affected and killed by disasters in 2019



Sources: EM-DAT, FAO/FEWS NET, Dartmouth Flood Observatory, ReliefWeb and IFRC GO

In 2019
97.6 million
people were affected by disasters.

More than
24,000
people died due to disasters triggered by natural hazards.



Over the **past decade**, a total of almost 1.8 billion people were affected by disasters, with an average of 175 million people per year. Of these, an average of 170 million people were affected each year by climatological disasters.

Since the 1960s, the number of people affected each year by disasters has risen substantially, from 2.8 million people per year in 1960 (200 million for the decade) to a peak of 659.3 million in 2002 (over 2.3 billion for the decade). The figures then came down to 97.6 million people in 2019 (out of almost 1.8 billion affected this past decade, with a high of 429.7 million in 2015).

Floods, droughts and storms have together accounted for 95.5% of people affected by disasters since the 1960s.

2.5.3 Displacement due to disasters and climate change

Millions of people are displaced each year due to disasters. Disaster displacement can vary significantly across countries, communities and in the context of different hazards – whether sudden or slow onset, weather related or geophysical. Displaced people may flee to evacuation centres, temporary or makeshift settlements, camps and collective centres, or to the houses of relatives and host communities. Displacement may take the form of short-term evacuation (perhaps a matter of hours or days) or longer, prolonged or protracted displacement.[26] It may take place across urban and rural settings and within national borders (internal displacement) or across borders. Although disaster displacement is diverse, the vast majority takes place within national borders and is connected to weather-related hazards.[27]

Displacement is not always entirely negative. Mobility (a more positive framing that indicates greater agency) is a coping strategy that households can activate for their well-being in the context of both sudden- and slow-onset disasters. Conversely, a lack of mobility can be a factor of vulnerability (see Chapter 3). Mobility helps many communities (such as pastoralists) adapt to natural cycles and diversify their livelihoods, while at the same time protecting land and other ecosystems from over-exploitation.

Existing data also shows that, on average, more than 22 million people are newly displaced by disasters every year and 5.1 million people are in prolonged or protracted displacement connected to disasters (IDMC, 2019).

In 2019 almost 25 million people were displaced due to disasters, close to 24 million of whom were displaced due to climate- and weather-related events, with the greatest number due to floods, followed by storms.

26 Prolonged or protracted displacement tends to occur where there are regulatory or physical barriers to return, or to other durable solutions. For example, barriers connected to recurrent risk and declarations of 'red zones' or 'no build zones' or physical barriers such as the permanent loss of land due to river bank erosion.
27 In 2019, around 96% of all disaster displacement was weather related (IDMC, 2019).

Figure 2.30: Total number of people affected by disasters triggered by natural hazards, 1960s–2010s

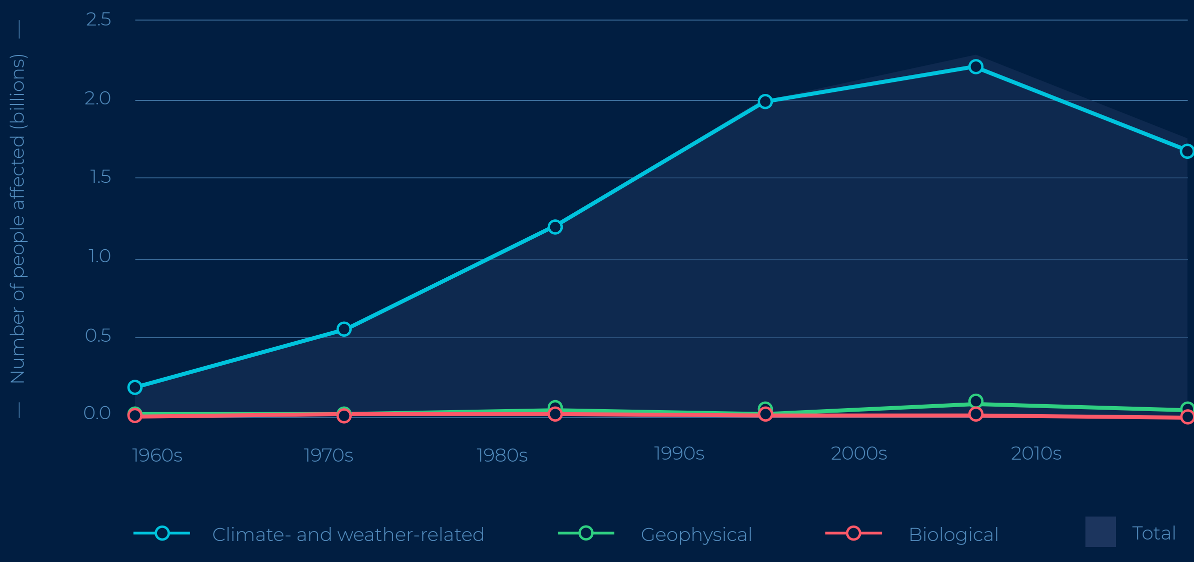
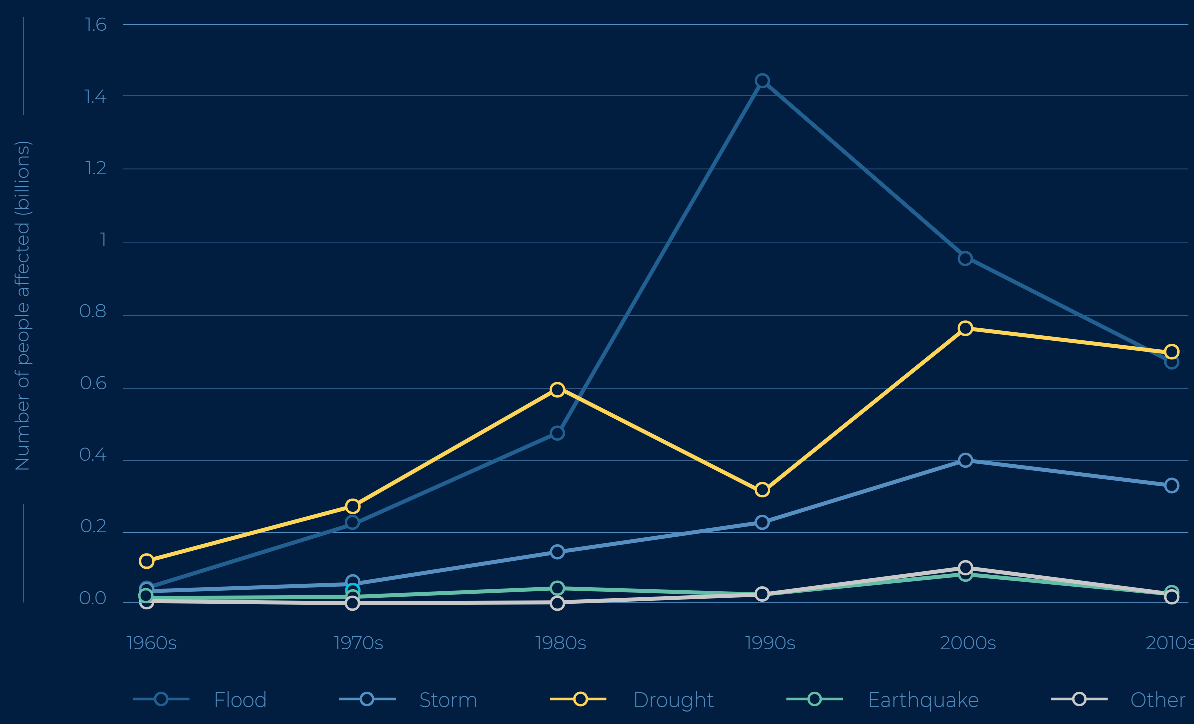


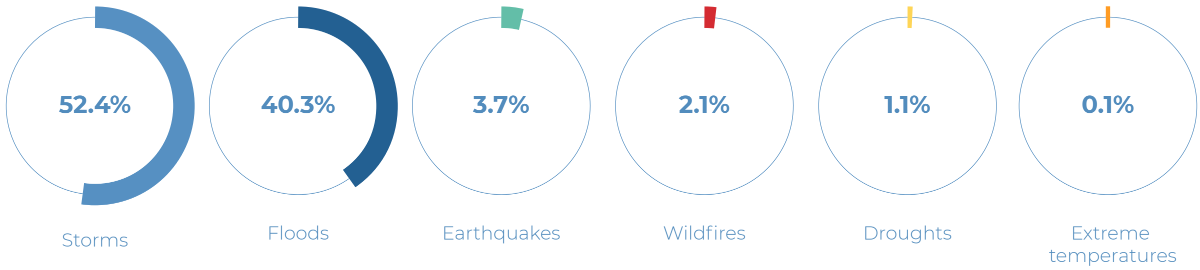
Figure 2.31: Number of people affected by disasters triggered by natural hazards, by type, 1960s–2010s



Sources: EM-DAT, FAO/FEWS NET, Dartmouth Flood Observatory, ReliefWeb and IFRC GO

Malawi, 2019. Gift Amos, 11, is living in a camp in Mwalija after her home village was completely destroyed by flooding. More than 22 million people are newly displaced by disasters every year and 5.1 million people are in prolonged or protracted displacement connected to disasters..

Figure 2.32: Share of disaster-related new displacements by hazard, 2019



Source: IDMC

Note: Landslides (0.6% of displacements) are included in floods.

The World Bank predicts that "by 2050, up to 143.3 million people or 2.8 percent of the population of Sub-Saharan Africa, South Asia and Latin America could be internal climate migrants under the pessimistic reference scenario" (World Bank, 2018).

2.5.4 Health impacts of disasters and climate change

Climate change and disasters can have various types of impacts on human health. Rises in temperatures and the occurrence of extreme weather or climatic events can take a heavy toll on human lives, in addition to causing anxiety and other psychological disorders. Disasters can contribute to the deterioration of chronic health conditions among affected people, while pre-existing health conditions such as respiratory diseases, certain forms of diabetes, kidney diseases and cardiovascular diseases may be compounded by high temperatures over extended periods. The 2019 *Lancet Countdown* report noted that in the past 30 years, the number of "climatically suitable days for Vibrio bacteria that cause much of diarrhoeal disease globally have doubled" due to climate change (Watts et al, 2019).

There are many examples of possible indirect physical health consequences of disasters and climate change, from a deterioration in air and water quality, to changes in biodiversity and landscape use patterns. Disaster-related disruptions in food and agricultural systems can contribute to increases in malnutrition and associated illnesses. Damage to water supply systems following disasters can result in unsanitary conditions and lead to outbreaks of waterborne diseases like cholera. Displacement, poor quality shelter and communal shelters can contribute to the spread of pneumonia and other respiratory infections. Disasters also affect health systems, for example by cutting the electricity and water needed to provide services and reducing people's ability to access them. While Hurricane Maria in Puerto Rico in 2017 directly claimed the lives of 64 people, more than a thousand additional deaths were attributable to the hurricane over the following months due to subsequent gaps in the health system (Shuman, 2010).

Disasters further affect the social, economic and environmental determinants of health, impacting crop and fishery yields, population nutrition, migration, conflict, health system resilience and so on. Nutrition-related factors contribute to over a third of children's deaths under five years of age worldwide, and are a leading risk factor for child deaths of infectious diseases including pneumonia, diarrhoea and malaria (OECD, 2018).

Climate change may also have an impact on infectious diseases.

Rising temperatures and increased floods and droughts all influence the ecology of disease transmission. We are likely to see a change in geographical distribution of vector-borne diseases, such as those transmitted by mosquitoes, that may be more active in warmer temperatures. Human behaviour in extended dry seasons, such as gathering and keeping water in stored containers, which draws other animals closer, creates breeding conditions for some species of mosquito (Gould and Higgs, 2009, Shuman, 2010). WHO estimates that if the globe warms by 2–3°C as expected, the population at risk for malaria will increase by 3 to 5% and will cause an additional 60,000 malaria deaths annually from the 2030s onwards (WHO, 2014). The changing frequency of floods and droughts can also impact waterborne diseases. By 2030 there is predicted to be a 10% increase in diarrhoeal disease as a result of climate change (Shuman, 2010, WHO, no date).

Long-dormant pathogens can re-emerge through climate change, such as the 2016 outbreak of anthrax in a warming Siberia, and through changes in agricultural practices, disruption of health services and population movement, all of which are among the causes of epidemic transmission.

Climate change is also likely to impact the risk of zoonotic diseases, such as COVID-19, which are infectious diseases caused by a pathogen (such as a bacteria, virus or parasite) that have jumped from an animal to a human. Increased frequency of zoonotic spillover can be attributed to population growth, shifting habitats due to both climate and environmental changes, and changing behavioural patterns (such as storing water in bins during prolonged droughts or increased animal–human interactions). It is estimated that an average of three new zoonotic infections are recognized annually (Johnson et al, 2015, Jones et al, 2008). We are therefore likely to continue to see an increase in emerging or re-emerging infectious diseases with epidemic potential.

Climate change is even creating its own mental health challenges in the form of eco-anxiety, described as "a specific form of anxiety relating to stress or distress caused by environmental changes and our knowledge of them". This can inspire activism, but can equally cause such despair that people become intensely anxious and feel unable to act (Usher et al, 2019). The Red Cross Red Crescent Climate Centre is working with partners to explore the growing area of what has been labelled "climate grief" among other terms. The long-term goal is to alleviate human suffering and promote the well-being of communities at risk, humanitarian workers, researchers and journalists, climate activists, young people and others confronting the risk of emotional darkness and eco-anxiety linked to our changing climate (Climate Centre, 2020).

BOX 2.5: AIR POLLUTION, CLIMATE CHANGE AND HEALTH

Air pollution is the fifth leading risk factor for death worldwide, causing 4.9 million deaths annually (Health Effects Institute, 2019). Fossil fuel combustion is the leading driver of air pollution – and thus meeting the goals set by the Paris Agreement has the added benefit of significantly reducing annual deaths through reductions in air pollution alone (by 1 million annually by 2050). The effects of air pollution are estimated to contribute to a significant percentage of non-communicable diseases including chronic obstructive pulmonary disease, lower respiratory infections, diabetes, stroke, lung cancer and ischaemic heart disease. Ozone in particular has been linked as a major risk factor in causing asthma (14% of children between 5–18 years old have asthma) and increased severity of respiratory illnesses and was linked to close to half a million early deaths worldwide (Health Effects Institute 2019, WHO, 2018). Levels of air pollution in 2019 were estimated to reduce life expectancy globally by 1 year and 8 months, with the highest burden of loss of life expectancy in low and middle income countries with poor air quality.

In addition to external air pollution, household air pollution from wood, charcoal and biomass cookstoves contributes to 50% of pneumonia cases of children five years of age or under, and 1.6 million deaths (2017) (Health Effects Institute, 2019). The burden of poor health outcomes due to air pollution falls disproportionately on populations already at risk, and communities in low and middle income countries who lack access to clean energy.

Poor air quality may be further exacerbated by heatwaves, which are occurring more frequently because of climate change. Heatwaves increase surface temperatures, which decreases the ability of vegetation to absorb ozone, resulting in poorer air quality and heat-related deaths. In some studies levels of ozone increased by more than 50% with increased temperatures. High levels of ozone are linked to several health risks including cardiovascular and respiratory diseases (the burden of which are also experienced by lower-income or marginalized communities) (Kalisa et al, 2018, WHO, 2008, Zhang et al, 2019).

2.5.5 Climate and disaster impacts on water and food security and livelihoods

Climate change and extremes are already harming agricultural productivity, food production and cropping patterns and contributing to shortfalls in food availability. This is increasing the risk of food insecurity for the populations at greatest risk, as well as affecting feeding, caregiving and health practices. Climate extremes are often followed by food price spikes and volatility, often combined with losses in agricultural income, reducing access to food and negatively affecting the quantity, quality and dietary diversity of food consumed. Gender inequalities are further exaggerated by climate-related hazards, which for women result in higher workloads, occupational hazards indoors and outdoors, psychological and emotional stress, and higher mortality compared with men.

Food security and rural livelihoods heavily depend on agriculture and the natural resource base and are therefore particularly vulnerable to climate change and variability. The Grantham Centre for Sustainable Futures suggests that the planet has lost around a third of its arable land over the past 40 years, in large part due to climate disasters and poor conservation, and every year more trees and soil are lost due to climate change.

Higher temperatures, water scarcity, extreme events like droughts and floods, and greater CO_2 concentrations in the atmosphere have already begun to affect staple crops around the world. According to FAO (2019), the unpredictable yield for cereal crops in semi-arid regions of the world (like the Sahel region of Africa) is at least 80% the result of climate variability.

The IPCC has noted that changes in climate, water consumption and the spatial distribution of population growth relative to water resource have already had a profound impact (IPCC, 2014a). In the 1900s, 14% of the global population lived with water scarcity (0.24 billion people). In the 2000s, that figure had skyrocketed to 3.8 billion, 58% of the global population. Of this number, some 1.1 billion people (17% of the population) were subjected to serious water shortages and high water stress in the 2000s, mostly in Asia and Africa (IPCC, 2014a).

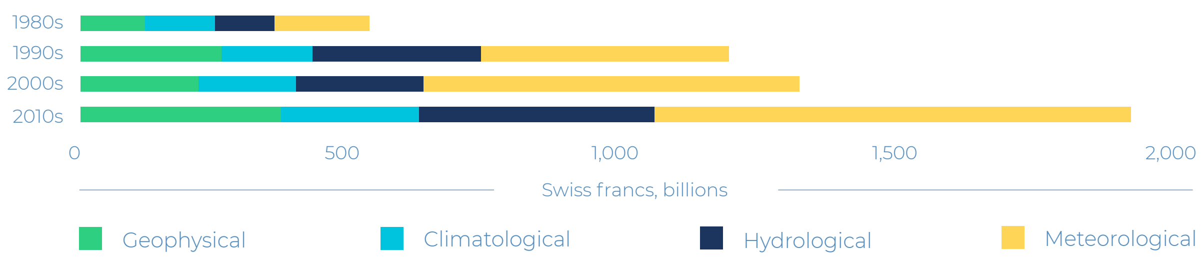
The IPCC warned that food security will be increasingly affected by future climate change, particularly in terms of the rising costs of staple foods, which would hit the world's poorest people the hardest. A projected rise of up to 29% in the price of cereal by 2050, for example, risks putting as many as 183 million more people at risk of hunger. Climate change may also lead to a lower nutritional quality of the food that is available, and damage crop production in many regions due to a change in the distribution of pests and diseases (IPCC, 2019b).

The Global Commission on Adaptation also warned of a potential future where, if no ambitious climate action takes place today, yields may decline by up to 30% by 2050, even as global demand for food is expected to increase by 50%. At the same time, the number of people who may lack sufficient water for at least a month each year could soar from 3.6 billion today to more than 5 billion by 2050 (GCA, 2019).

2.5.6 Financial impacts of disaster losses

The total estimated cost of disaster losses in 2019 was 150 billion US dollars (approximately 147 billion Swiss francs). 39.5 billion US dollars (136.7 billion Swiss francs) was attributed to climatological disasters. For the past decade the estimated cost was 1.92 trillion US dollars (1.88 trillion Swiss francs).[28]

Figure 2.33: Damages by disaster type, 1980s–2010s[29]



Source: MunichRe, 2020

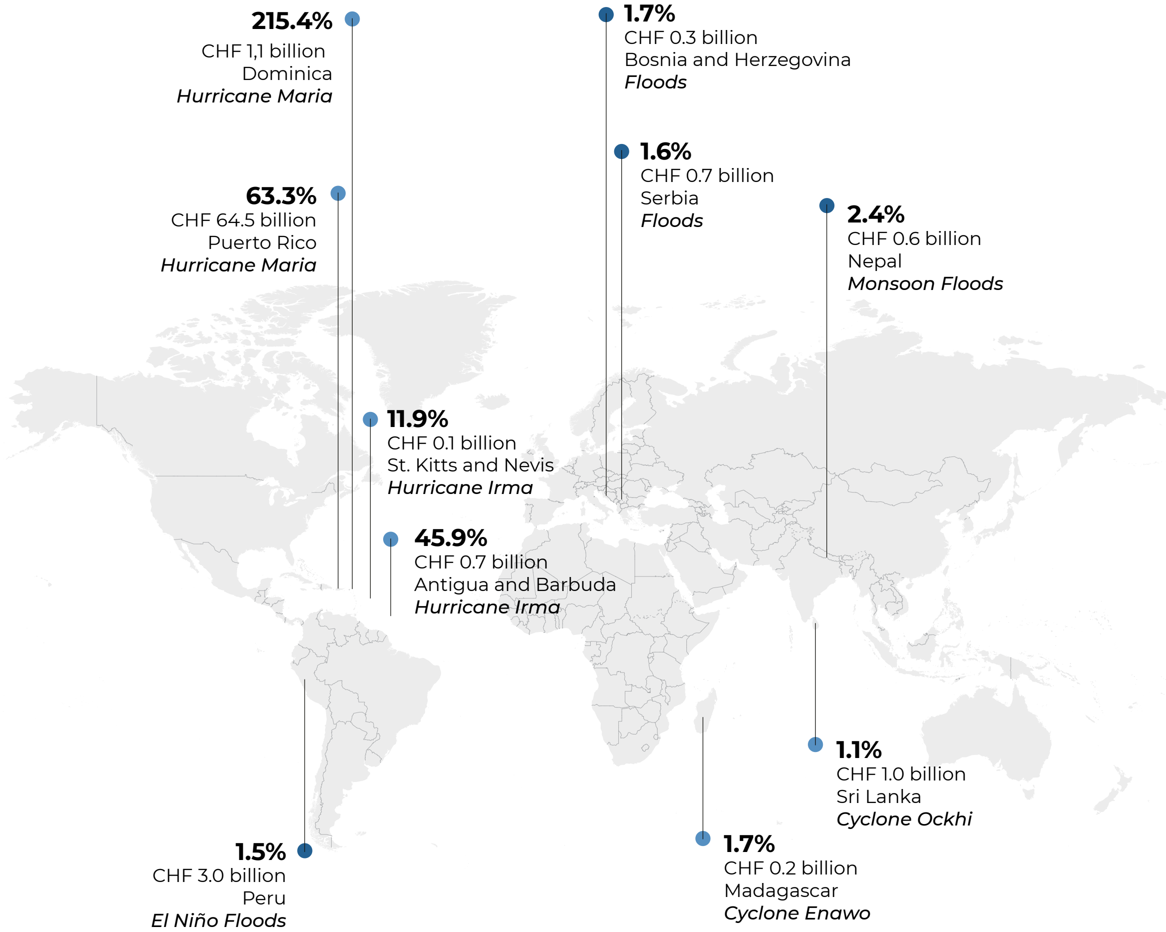
Note: This only includes disasters triggered by natural hazards. Categories are as used by MunichRe.

The data indicates that the highest value of losses are found in high income countries, such as the USA or Japan. It is important to note however, the massive difference between costs and real impacts – for example property in the USA may be valued significantly higher than property in poorer areas of poorer countries. Yet the impact of losing a house in such circumstances may be far greater. Factors such as savings, access to social protection and existence (or not) of insurance are key. Damages as a percentage of GDP are therefore more telling: when national economic losses due to disasters are expressed as a percentage of GDP, the substantial effect of smaller-value losses is clear, particularly in small island developing states.

28 Economic loss assessment is a critical but challenging aspect of disaster analysis (OECD, 2016). There is no centralized data collection process in a harmonized framework, and economic assessments are not undertaken in many countries or for specific hazards (such as heatwaves). Indirect losses, including social and environmental costs, are rarely included. Global economic loss assessments are mainly done by insurance companies such as MunichRe or SwissRe, while EM-DAT undertakes secondary data review from press and official reports.

29 Note that as this only includes physical destruction of property, epidemics do not show up. However all disasters, including epidemics, can have significant impacts in terms of loss of income, productivity and more.

Figure 2.34: Highest disaster damage cost by country as a percentage of GDP, 2017



Sources: .Global Climate Risk Index, Germanwatch

Notes: More recent data is not currently publicly available. CHF: Swiss francs.

2.6 COMPOUNDING AND SYSTEMIC RISKS

As disasters increase in frequency and intensity, we can expect not only less time to recover between them, but that multiple disasters will happen at once, in a manner described as compounding shocks. For example, the dangers of cyclones, flooding, drought and heatwaves did not retreat while the world was adapting to the COVID-19 pandemic.

Disasters and conflicts themselves also play a major role in driving vulnerability and exposure to future hazards. Disasters can keep people in, or return people to, poverty and other situations of vulnerability. Estimates for 89 countries show that if we could prevent all natural hazards from becoming a disaster over the course of a year, we would reduce the number of people living in extreme poverty (less than PPP$1.90/day) by 26 million (Hallegate et al, 2016).

When hazards combine, they can multiply each other's impact in ways governments, civil society and the humanitarian sector have not faced before. These include not only rising climate- and weather-related threats, but also other shocks, such as pandemics and epidemics, earthquakes and financial crashes. For example, in May 2020, countries in Africa were affected by what IFRC described as a 'triple disaster' – heavy flooding that killed more than 300 people and slowed down not only the ongoing humanitarian response to the region's worst locust infestation for decades, but also the life-saving work to prevent the spread of the COVID-19 pandemic. While flooding is a recurrent threat in Africa, the combination of flooding, locusts and a pandemic stretched community coping mechanisms and disaster management capacities in Ethiopia, Kenya, Rwanda, Somalia, South Sudan, Tanzania and Uganda.

That same month, India was hit by heatwaves, with temperatures up to 50°C, and India and Bangladesh were both affected by Cyclone Ampham, described as one of the strongest storms in the Bay of Bengal this century. More than 3 million people were evacuated in the two countries, more than 100 people were killed and thousands of houses were damaged or destroyed.

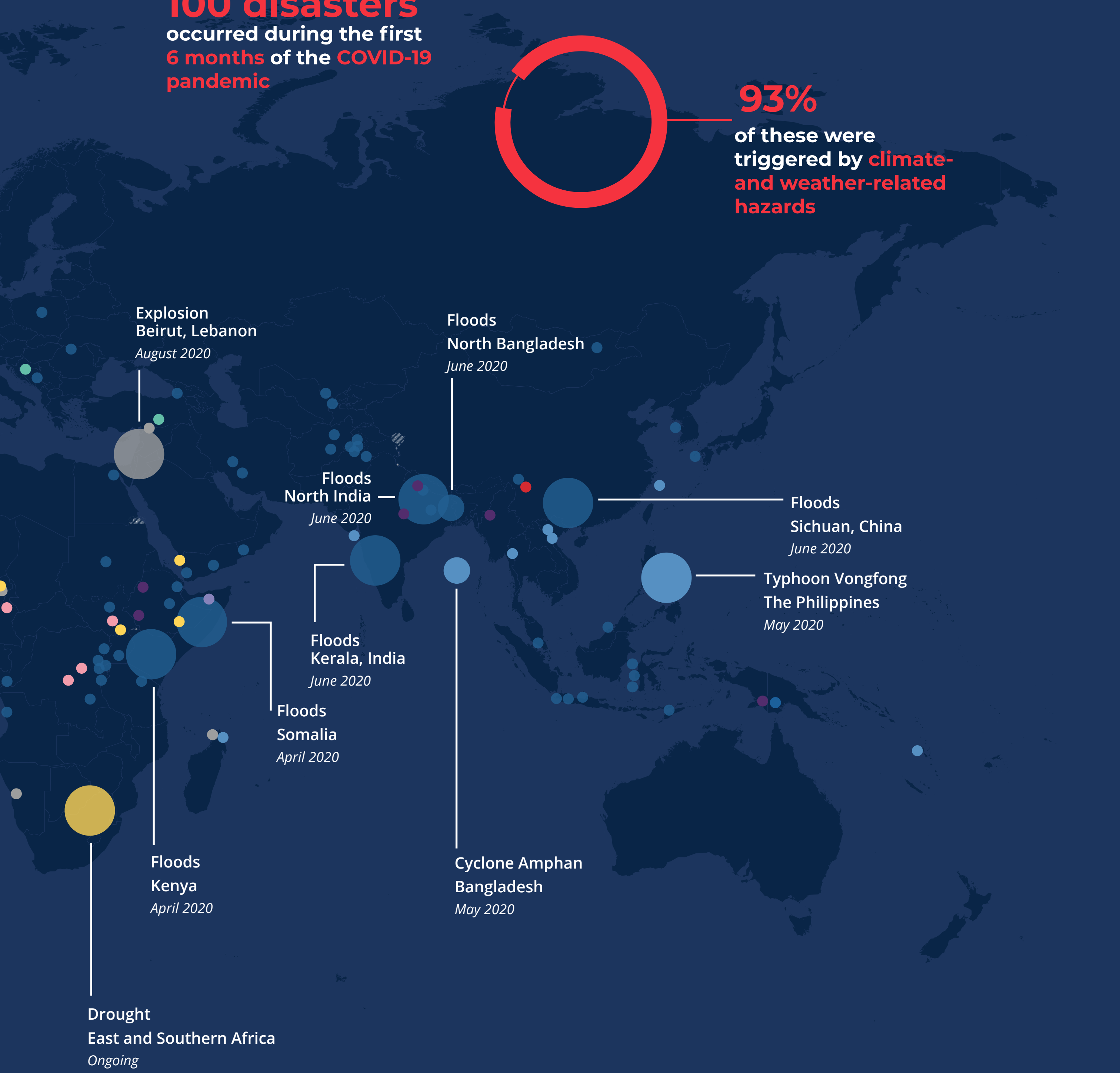
The map on the next page shows only a snapshot of disasters that took place from the beginning of the month when the epidemic was declared (March 2020) for a six-month period. Over 100 disasters occurred during this period and affected over 50 million people. There were also a number of ongoing crises, including measles in DRC and droughts in parts of east and southern Africa.

DISASTERS DURING THE COVID-19 PANDEMIC

More than

100 disasters

occurred during the first **6 months** of the **COVID-19 pandemic**



Sources: EM-DAT, FAO/FEWS NET, Floodlist, ReliefWeb and IFRC GO

Notes: This is a snapshot only and includes disasters affecting over 1,000 people. This is preliminary data only, based on what is already available in EM-DAT and IFRC GO, supplemented by additional sources. Final data for a given year is not generally available until the following year. High impact disasters are those with more than 250,000 people affected. WHO declared COVID-19 a pandemic on March 11, hence the first 6 months is calculated from March.

2.7 CONCLUSIONS

The number of disasters is generally increasing and has been for the past 80 years. Climate- and weather-related events are responsible for the vast majority of disasters, and the proportion of events triggered by such climatological events is increasing.

Not only is the frequency of events increasing, but so too is the intensity of extreme events, with more category 4 and 5 storms, more heatwaves breaking temperature records and more heavy rains. At the same time, we see extremes hitting new areas, such as Cyclone Kenneth, the strongest recorded storm to hit the continent of Africa. These events do not occur in isolation; instead, we are seeing significant incidences of compounded risks – such as communities dealing with the impacts of the COVID-19 pandemic, floods and a locust invasion at the same time. A number of these extreme weather events – including the heatwaves in summer 2019 in Europe, the Australian bushfires in 2019–2020 and certain category 4 and 5 storms – have been made more likely by climate change and are therefore likely to increase. The same is true of disease outbreaks – with population growth and the impact on habitats of climate and environmental changes, we are likely to continue to see an increase in emerging or re-emerging infectious diseases with epidemic potential.

The number of people affected by disasters also continues to rise, as more and more floods, storms and droughts in particular wreak havoc on lives and livelihoods, displacing millions of people each year. On a positive note, while the number of disasters has increased, the deaths from these disasters have decreased. This is a good indication of the impact of efforts of disaster risk reduction and climate adaptation, most likely combined with other economic and social developments. There have indeed been significant successes in reducing the impacts of particular hazards, such as floods and droughts. There has been less success at reducing the impacts from hazards such as heatwaves and those with increased intensity such as category 4 and 5 storms in areas not used to these.

Looking to the future, the poorest, the most marginalized and the most at-risk people are the most affected by climate- and weather-related disasters, through loss of life, greater susceptibility to disease, economic setbacks and erosion of livelihoods. But no country or community will be shielded from the effects of climate change in the future.

The projections are sobering. Climate change may push more than 100 million people back into poverty in the coming decade, with the brunt being borne by people in the world's poorest countries. By 2050, more than 140 million people across Africa, Asia and America may be internally displaced as the result of climate change (World Bank, 2018). According to WHO, we can expect there to be 250,000 additional deaths due to climate change between 2030 and 2050.

We do not have complete data, but even with the limited data we have, we know that we have a lot of work to do. Chapter 3 explores how climate change acts as a risk multiplier and can increase vulnerability and exposure, and discusses how these impacts may be experienced by certain groups of people at risk. The following chapters will explore in more detail what we can and must do now to reduce these impacts on lives and livelihoods all over the world. Some hazards are inevitable. But they do not have to become disasters that kill and destroy livelihoods, infrastructure and the environment.

Main data sources used in this chapter

Hazard and impact data is taken mostly from EM-DAT and IFRC GO. EM-DAT is the Emergency Events Database from the Centre for Research on the Epidemiology of Disasters (CRED) at the Université catholique de Louvain. It collects and compiles information on disasters from UN agencies, non-governmental organizations, insurance companies, research institutes as well as secondary data from press agencies. EM-DAT data does not include war, conflict or conflict-related famine as disaster events. Using this data source facilitates a comparison of disasters through the same data collection methodology.

IFRC GO is a publicly available data source that provides information on disasters that have triggered an IFRC Disaster Relief Emergency Fund, emergency appeal or Red Cross Red Crescent Movement-wide appeal. It also contains plans of action, field and situation reports and more, displayed in an easy-to-use interface as well as through maps, charts and infographics. The IFRC launched the GO platform in 2018 to channel emergency operations information across the Red Cross and Red Crescent network.

Risk data is drawn from the INFORM database for disaster risk and the Notre Dame-Global Adaptation Index (ND-GAIN) database for climate risk. **INFORM** quantifies disaster risk based on a model which looks at the interplay between the exposure to hazards, vulnerability and the coping capacity of a country (including institutional components connected to governance, infrastructure and disaster risk reduction investment) (EC, no date). **ND-GAIN** is "a free open-source index that shows a country's current vulnerability to climate disruptions and… readiness to leverage private and public sector investment for adaptive actions." Vulnerability is calculated as a combination of exposure, sensitivity and adaptive capacity, while readiness incorporates economic, governance and social components (Chen, 2015).

Climate science data and projections come mostly from the **Intergovernmental Panel on Climate Change (IPCC)**. The IPCC is a key source for climate science. It is a UN body that requests eminent scientists from its 195 member countries to provide regular assessments of the scientific basis of climate change, its impacts and future risks, and options for adaptation and mitigation. The IPCC does not conduct its own scientific research, but rather assesses the published literature. Each report includes a summary for policy-makers prepared by the scientists based on the underlying assessment, and approved line-by-line by the member governments in an intergovernmental meeting. It thus represents the state of the science as endorsed by all governments, facilitating negotiations in the UN Framework Convention on Climate Change (UNFCCC) and other discussion on climate action around the world.

The IPCC issues **assessment reports**, the latest of which is *Fifth Assessment Report* (AR5) (IPCC, 2014a), as well as **special reports** on topics requested by policy-makers (such as *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation* (IPCC, 2012), commissioned because of increasing concern about the role of climate change in disasters).

In cases where specific climate projections are cited, to indicate a range of possible futures we include projections for RCP 4.5,[30] which represents a medium stabilization scenario (where greenhouse gases in the atmosphere stabilize due to a substantial reduction in emissions) and for RCP 8.5, which represents a high emissions scenario. Where relevant, we indicate the IPCC confidence levels (very high, high, medium, low and very low) in how correct or likely a given projection is, based on the level of evidence and degree of scientific agreement.

30 RCP stands for a representative concentration pathway – this a projection of greenhouse gas concentration with a trajectory over time as adopted by the IPCC. The IPCC uses four pathways for climate modelling based on different potential levels of greenhouse gas emissions over time.

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South Sudan, 2018. Mary and her neighbours in Yambio used to fetch dirty water from a stream a half-hour walk away. Now, clean water is on her doorstep. The region has suffered floods, drought, locusts and conflict in the last year. More than half a billion children worldwide live in areas with extremely high flood occurrence and 160 million children live in high or extremely high drought severity zones.

3

CLIMATE AS A RISK MULTIPLIER

Trends in vulnerability and exposure

Contents

INTRODUCTION

Climate change is a global threat that affects everyone, but will not affect everyone equally. This chapter focuses on the places and people who will be affected more than others by disasters related to climate change.

Every region and country has already borne some of the brunt of rising risks, but Asia is bearing the largest burden and this is likely to continue – and to accelerate. Exposure to climate change can vary enormously between countries and even within a single city, between coastal and interior neighbourhoods, between rural and urban areas, and between urban slums and wealthy suburbs.

Different people also experience climate-related disasters differently. For example, persons with disabilities, older people, women and girls, urban poor people, people with diverse sexual orientation or gender identity, migrants and refugees and indigenous people are disproportionately more at risk of climate-related harms and face specific challenges during and after disasters. Different people and communities also hold a great variety of solutions for coping with these risks based on their diverse experiences and challenges.

It is in our power to address these challenges of inequity, further develop local and new solutions and ensure that all people at risk have the support they need to reduce or eliminate the impacts of disasters and crises. But this work will need to be resourced. Even before the COVID-19 pandemic, national and international humanitarian organizations and systems were struggling with an increase in the number and intensity of disasters related to climate change with no corresponding rise in the resources available to prevent them, respond to them and help communities to recover from them (International Red Cross and Red Crescent Movement, 2020).

This chapter addresses these challenges and the implications for policy-makers and humanitarians as the risks continue to rise.

3.1 UNDERSTANDING RISK, VULNERABILITY AND EXPOSURE

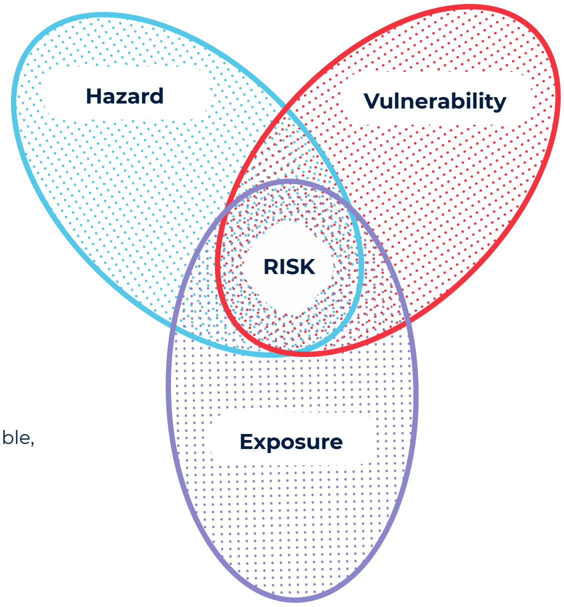
The major causes of disaster risks are trends in exposure and vulnerability (IPCC, 2012). Figure 3.1, developed by the Intergovernmental Panel on Climate Change (IPCC), sets out how disaster risk is a function of not only the weather and climate event (the hazard), but the vulnerability and exposure of a given community.

Figure 3.1: Components of disaster risk

Actions to reduce hazards

Examples include:

- Ecosystem-based measures to reduce coastal flooding
- Mangroves to alleviate coastal storm energy
- Water reservoirs to buffer low flows and water scarcity



Actions to reduce vulnerability

Examples include:

- Social protection
- Livelihood diversification
- Insurance solutions
- Hazard-proof housing and infrastructure

Limits to adaptation

When risk becomes unmanageable, we hit limits to adaptation.

Actions to reduce exposure

Examples include:

- Coastal retreat and resettlement
- Risk-sensitive land use planning
- Early warning systems and evacuations

Source: Based on IPCC, 2012

Vulnerability is the "propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt" (IPCC, 2012). Vulnerability results from the whole range of economic, social, cultural, institutional and political factors that shape people's lives and create the environments where they live and work (Twigg, 2015). As recognized in the 2019 *Global Assessment Report on Disaster Risk Reduction*: "Location, age, gender, income group, disability, and access to social protection schemes and safety nets greatly affect the choices people have to anticipate, prevent and mitigate risks" (UNDRR, 2019).

However, no person, group, community or society is inherently vulnerable, and vulnerabilities experienced by people, communities and societies are not constant. They change over time depending on circumstances, interventions, access to social services and structures, compounding shocks – and most importantly factors around diversity and exclusion (IFRC, 2019).

Without analysing how or why some people at a given time in a given context have less capacity to cope with a hazard than others, humanitarian efforts will fail to reach these people with any relevant support.

The impacts of extreme weather events also depend on the **exposure** of communities and individuals. Exposure can be understood as the "presence of people; livelihoods; environmental services and resources; infrastructure; or economic, social, or cultural assets in places that could be adversely affected" (IPCC, 2012). Exposure differs from vulnerability because it has much to do with location: in the world, in a country and in a community. But location and vulnerability are also linked. Some people live in exposed locations because they belong to groups that are already at risk.

Lastly, the impacts of extreme weather events depend on the **capacities** of communities and individual people to manage the risks that come their way. Vulnerability and capacity are opposite sides of the same coin: one shows the weaknesses while the other shows the strengths. Unlike vulnerability, capacity both from within and outside the exposed locations can be mobilized, accessed and used by a community.

Coping capacity is "the ability of people, organizations and systems, using available skills and resources, to manage adverse conditions, risk or disasters" (UNDRR, 2017). However coping capacity is not enough, as coping with one crisis does not ensure resilience in the face of future crises. Instead the goal should be to enhance people's resilience in the long term, and this requires improving their capacities to absorb, adapt and transform in the face of shocks and stresses.

Supporting people's capacities to not only cope with crises, but to absorb, adapt and transform requires continuing awareness, resources and good management, in normal times as well as during disasters or adverse conditions. Understanding the capacities and resources of communities, people and systems – and working with them to build on and strengthen these capacities – are critical aspects of enhancing resilience and reducing disaster risks.

Hong Kong, 2018. According to studies conducted by the Hong Kong Observatory, urbanization contributes about 50% of the warming in cities like Hong Kong.Urban poor people face marginalization, insecure accommodation, limited access to life-sustaining services, higher proportionate costs of living, food insecurity and greater health risks.

3.1.1 Causes of vulnerability

At the same time as rising climate-related hazards, we are seeing concerning trends in vulnerability and exposure, that, when combined with an increase in climate-related hazards, are having devastating impacts – and will continue to do so.

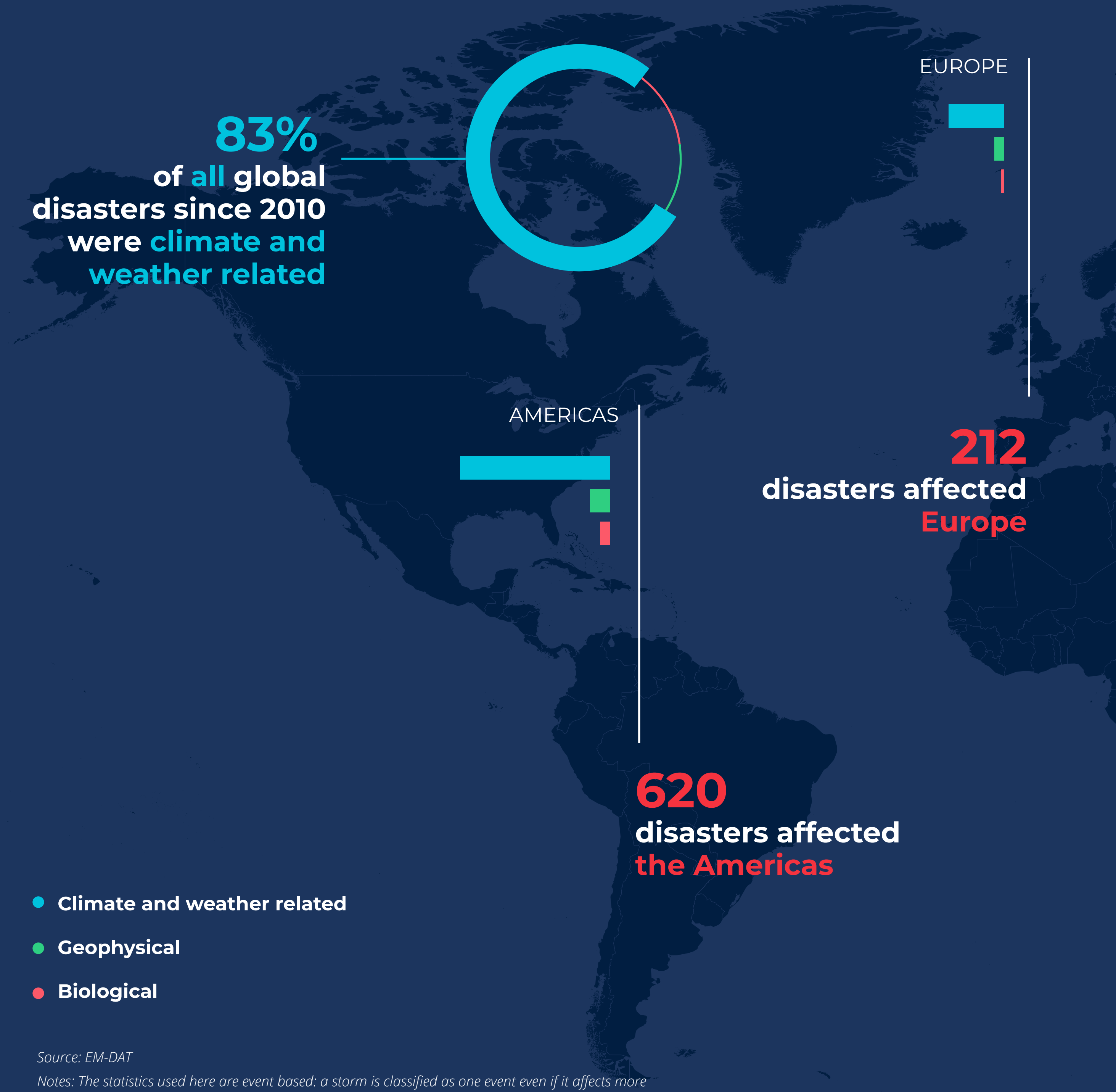
Trends which contribute to increases in vulnerability to climate and weather shocks include rapid, unplanned urban growth, a growing older population, increasing unemployment, discrimination, exploitation and violence – especially in the context of COVID-19 – and shifts and increases in migration and extreme poverty in places of high fragility. In many cases, we will see these trends overlap, leading to particularly vulnerable and exposed pockets of people. A lack of mobility is also a major factor in vulnerability, as trapped populations are disproportionately affected by natural hazards.

Urbanization, for instance, and the accompanying changes of livelihoods and lifestyles, contribute to climate change and create new vulnerabilities and risks to climate-related disasters. Already, more than 4 billion people live in urban areas, and this is projected to increase to more than 7 billion people by 2050. The impacts of climate change and other trends on specific groups of people such as urban poor people are explored further in section 3.3.

Disasters and conflicts themselves also play a major role in driving vulnerability and exposure to future hazards. Disasters can keep people in – or return people to – poverty and other situations of vulnerability. Estimates for 89 countries show that if we could prevent all natural hazards from becoming disasters over a year, we would reduce the number of people living in extreme poverty (on less than 1.90 PPP dollars a day)[1] by 26 million (Hallegate et al, 2016).

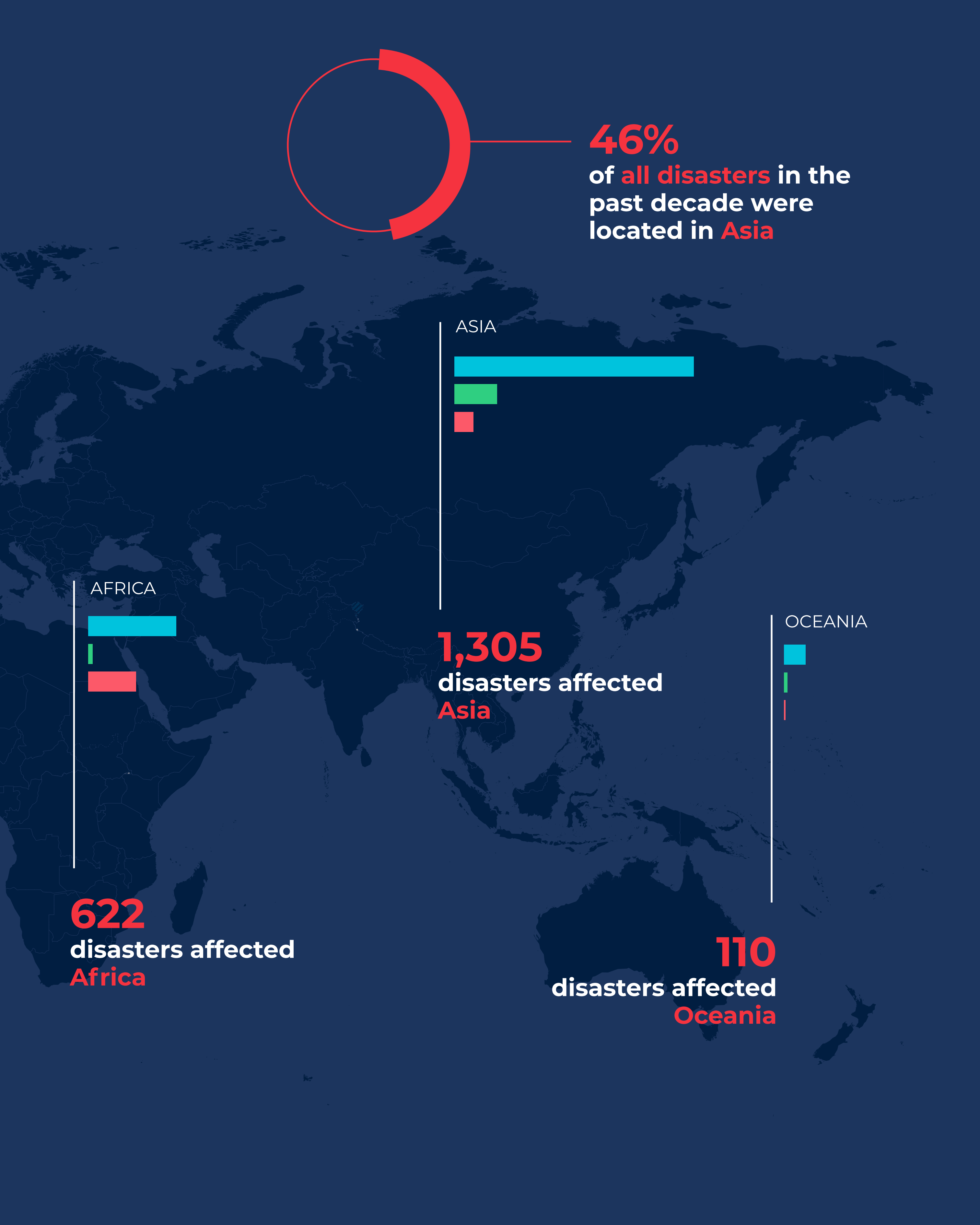
1 PPP (purchasing power parity) dollars are equivalent to the buying power of US dollars in the USA. This means the 1.90 PPP dollars can purchase the same basket of goods anywhere in the world as 1.90 US dollars can in the USA.

DISASTERS BY CONTINENT SINCE 2010



Source: EM-DAT

Notes: The statistics used here are event based: a storm is classified as one event even if it affects more than one country, but as more than one event if it impacts more than one continent. This map only covers disasters triggered by natural hazards.


46%
of all disasters in the past decade were located in Asia
ASIA
1,305
disasters affected
Asia
AFRICA
622
disasters affected
Africa
OCEANIA
110
disasters affected
Oceania

3.2 GEOGRAPHICAL INEQUITIES OF EXPOSURE

3.2.1 Regions hit by the most disasters

In 2019, Asia[2] and Africa were the most affected regions with 121 and 81 disasters respectively, followed by the Americas (63) and Europe (32), while Oceania was hit by 15 disasters. The vast majority of these were climate and weather related.

Looking at the **past decade**, Asia was by far the most-affected region with 1,305 disasters (46% of all disasters) followed by 622 in Africa, 620 in the Americas, 212 in Europe and 110 in Oceania.

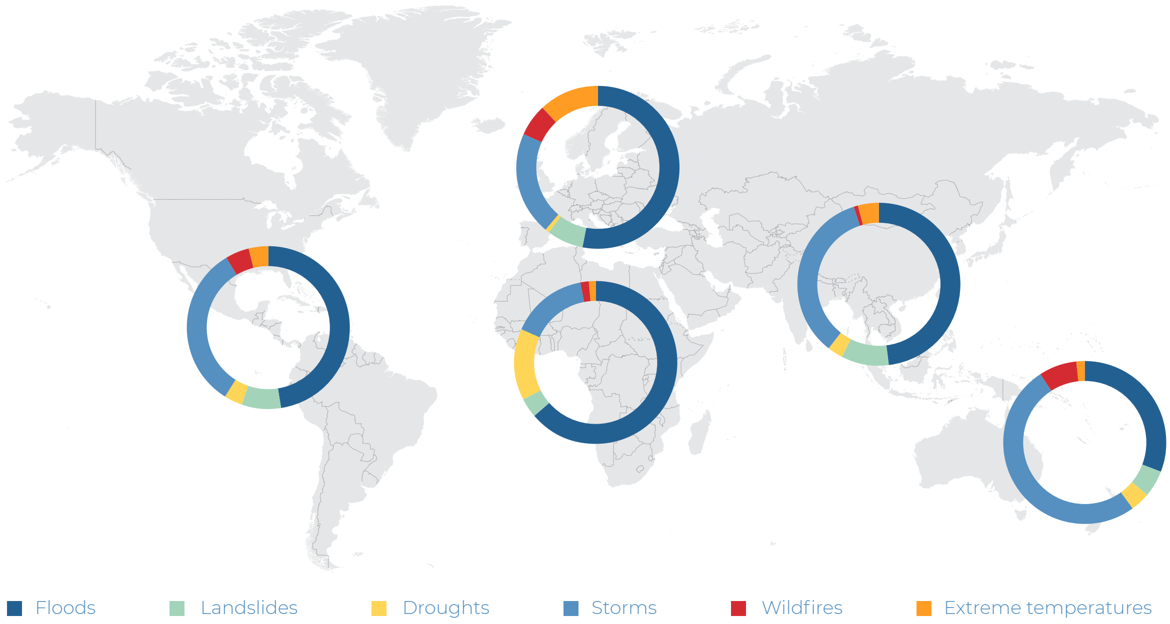
Taking a **longer-term** perspective, Asia has been the most-affected region since the 1960s with 44% of all disasters. The Americas follow with 23% of all disasters, then Africa with 21%, Europe with 8% and Oceania with 4%.

Viet Nam, 2020. A woman walks through floodwater in Quang Tri province. Floods in the Hai Lang district left residents in at least four communities isolated and without electricity and water for nearly 15 days.

© IFRC

2 Regional data in this report used a continental breakdown of Africa, Asia, Americas, Europe and Oceania, as this is the breakdown used in EM-DAT, although this differs slightly from the regions usually used by the IFRC.

Figure 3.2: Geographic distribution of climate- and weather-related disasters since 1960



Source: EM-DAT

Floods have affected all regions, with 44% of all floods occurring in Asia and 23% in the Americas. As a percentage of all climate- and weather-related disasters within a given region, floods represent over 64% of disasters in Africa, 53% in Europe, 48% in Asia, 48% in the Americas and 31% in Oceania.

More than half (52%) of all disasters triggered by **storms** occurred in Asia, followed by 26% in the Americas. In Oceania, 51% of disasters were triggered by tropical storms. In the Americas, 33% of disasters were storms (tropical storms, tornadoes and blizzards), affecting Central America and the Caribbean in particular.

Over 40% of **wildfires** occurred in the Americas. As a percentage of all climate- and weather-related disasters in a given region, wildfires were also relatively frequent in Europe (6.3%) and in Oceania (7.4% – mainly concentrated in Australia).

Almost half (49.5%) of all **droughts** took place in Africa, accounting for 14.2% of all disasters in Africa.

While 44% of disasters triggered by extreme temperature took place in Asia, these amounted to a very small percentage of all disasters in that region. In Europe, however, 12% of climatological disasters were triggered by extreme temperature events.

3.2.2 Affected countries

In 2019, 128 countries were affected by significant disasters. Of these, 91% (116) were affected by extreme weather events, in particular floods (69) and storms (53). The most-affected countries were the Philippines (with 23 disasters), India (18) and the USA (16). For climate- and weather-related hazards, India was the most- affected country with 16. Figure 3.3 shows how this disaster risk played out globally in 2019, focusing only on climate and extreme weather events.

In the past decade, an average of 115 countries were affected each year by disasters, with 93% of these affected by climate- and weather-related disasters (annual average of 107 disasters). The most disaster-affected countries globally over the decade were China (289 disasters), the Philippines (173) and India (166).

Figure 3.3: The 10 countries affected by the most disasters, 2000–2019

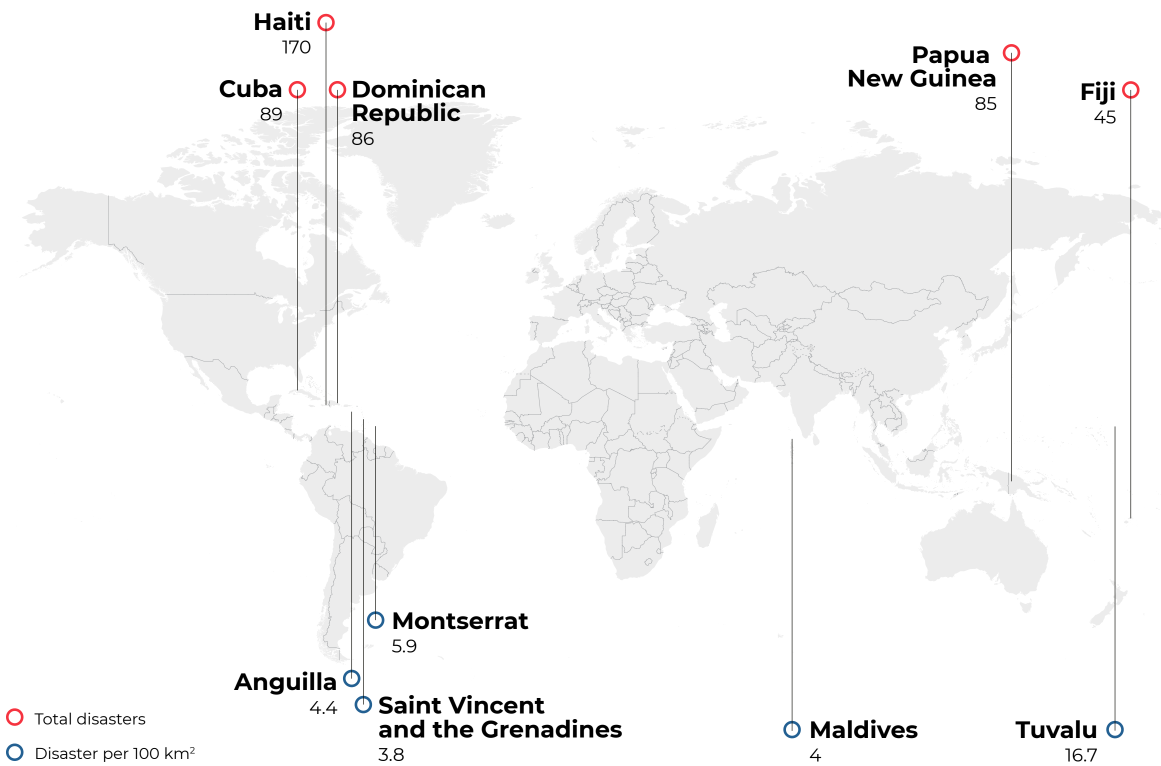
All disasters triggered by natural hazards			Climate- and weather-related disasters		
2000–2009	2010–2019	2019	2000–2009	2010–2019	2019
122 countries/ year	**115 countries/ year**	**128 countries**	**107 countries/ year**	**107 countries/ year**	**116 countries**
China **279**	China **289**	Philippines **23**	China **226**	China **238**	India **16**
USA **191**	Philippines **173**	India **18**	USA **183**	India **157**	USA **15**
India **182**	India **166**	USA **16**	India **154**	USA **150**	Philippines **12**
Indonesia **146**	USA **155**	Indonesia **13**	Philippines **130**	Philippines **142**	Japan **9**
Philippines **142**	Indonesia **129**	China **12**	Indonesia **90**	Indonesia **92**	China **9**
Bangladesh **82**	Japan **79**	Japan **10**	Viet Nam **76**	Japan **68**	Indonesia **8**
Viet Nam **81**	Viet Nam **65**	Viet Nam **7**	Bangladesh **71**	Viet Nam **64**	Viet Nam **7**
Afghanistan **81**	Mexico **62**	Uganda **7**	Mexico **57**	Mexico **57**	Uganda **7**
Pakistan **66**	Afghanistan **57**	Pakistan **7**	Afghanistan **55**	Afghanistan **52**	Bangladesh **6**
Japan **66**	Pakistan **56**	Nigeria **7**	Pakistan **51**	Bangladesh **48**	Afghanistan **6**

Source: EM-DAT

3.2.3 Comparison by country size

Larger countries are naturally more likely to experience a greater number of hazards, however if we control for surface area, we see a somewhat different picture of exposure. Over the past 20 years, a number of small island developing states have been disproportionately affected as well as small islands and countries in Central America, the Caribbean, the Pacific and Southeast Asia. For example, the ratio of hazards per 100km² in Comoros (1.93) is 100 times higher than in China (0.019).

Figure 3.4: The most disaster-affected small island developing states by number and area, 1960–2019



Sources: EM-DAT and World Bank, 2020

Tonga, 2020. Tropical Cyclone Harold affected the Solomon Islands, Vanuatu, Fiji and Tonga. Small island developing states face disproportionate climate risks.

© Tonga Red Cross

BOX 3.1: SMALL ISLAND DEVELOPING STATES' RESPONSE TO HAZARDS, VULNERABILITIES AND EMERGING THREATS

The small island developing states are home to 65 million people who are facing disproportional climate risks that combine water, food and economic insecurity, and growing relocation and migration challenges (Apgar et al., 2015; Haines, 2016; Haines and McGuire, 2014; Holland et al, 2020; Magnan et al, 2019; McNamara and Des Combes, 2015; Rivera-Collazo et al., 2015; UN-OHRLLS, 2015). More than 80% of people living in small island developing states live near the coast, where flooding, erosion and water scarcity already pose serious threats (IPCC, 2019, Nurse et al, 2014) . In the past decade, the islands have experienced stronger storms, heatwaves on land and sea, bushfires and other threats (Hernández-Delgado, 2015). They are especially vulnerable due to their insularity, climate-sensitive natural resource systems, high population densities and economic sensitivity to external shocks among other factors.

In the past five years, category 5 Tropical Cyclone Pam (2015) ravaged Vanuatu with losses close to 70% of GDP, also affecting Kiribati, Papua New Guinea, Solomon Islands and Tuvalu. Tropical Cyclone Winston (2016) left 43 people dead in Fiji with losses over a third of GDP (IPCC, 2019b). Category 5 Hurricanes Maria and Irma (2017) swept through 15 Caribbean countries, causing major damage and fatalities (Shultz et al, 2018). Rebuilding Dominica, Barbuda and the British Virgin Islands alone will cost around 5 billion US dollars (approximately 4.9 billion Swiss francs) (UNDP, 2017). Category 4 Tropical Cyclone Gita (2018) affected 80% of Tonga's population, destroying buildings, crops and infrastructure resulting in losses of 165 million US dollars (162 million Swiss francs) (36% of GDP) (Government of Tonga, 2018; Schimel, 2019). In 2019, record-breaking category 5 Hurricane Dorian stalled for more than a day over the Bahamas, sustaining 298 km/hour winds, a storm surge exceeding 6 metres above normal tide, and almost a metre (0.91m) of rainfall.

Tropical cyclones are projected to increase in average intensity, with more reaching Category 4 or 5. Accelerating sea level rise will combine with storm surges, tides and waves to affect flooding, shoreline changes and salinization of soils, groundwater and surface waters (IPCC, 2019b, Magnan et al, 2019). Researchers estimate some atoll islands will become uninhabitable before the 2050s, due to wave-driven flooding compromising freshwater lenses[3] and soil fertility, affecting drinking water supplies and livelihoods (see, for example, Cheriton et al, 2016; Storlazzi et al., 2018; Wilbers et al, 2014). Climate resilience needs to be built up where extreme droughts are projected, as evidenced by droughts in the Caribbean between 2009 and 2019, which brought bush fires, agricultural devastation, severe water shortages and social effects (Climate Studies Group, forthcoming 2020; Peters, 2015).

3 Atoll islands are those encircled by coral reefs. Some have fresh groundwater that floats above the denser saltwater known as a freshwater lens.

Figure 3.5: Number of disasters versus country size for small island developing states, 1960–2019

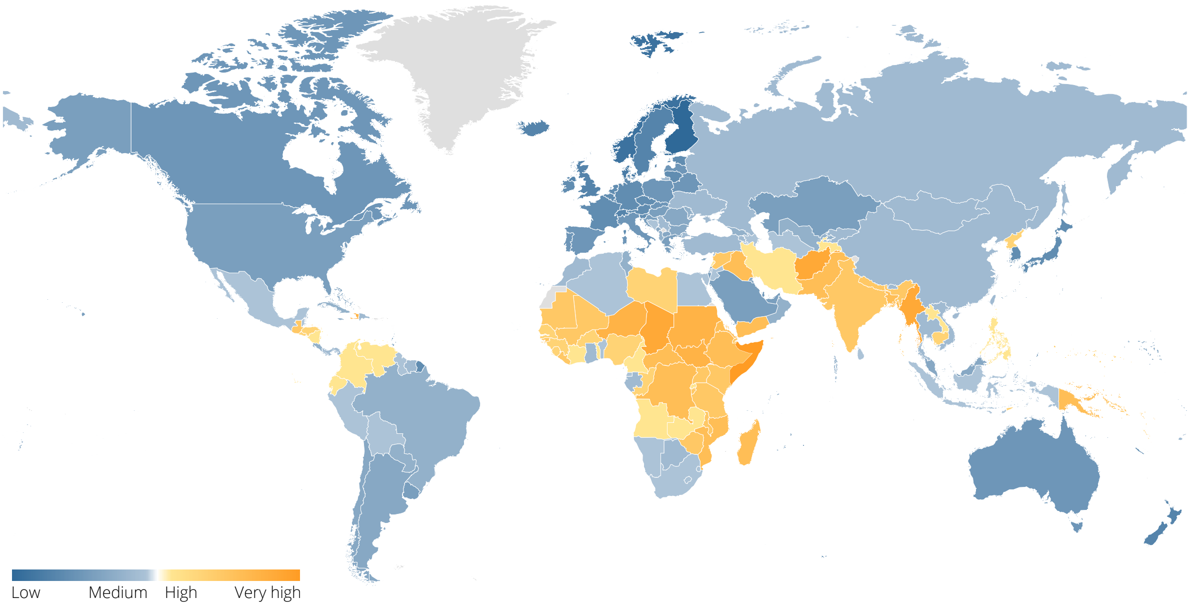
Sources: EM-DAT and World Bank, 2020

Notes: Surface area based on 2018 figures. Axes are log-scaled.

3.2.4 Differences within and between countries

Countries vary in the level in which they may be considered adapted, or ready, for climate- and weather-related threats, both slower-onset threats related to sea level rise and temperature change and extreme weather events. This depends on their risk and vulnerability as well as their ability to deal with these threats from an economic, governance and social components perspective. For example, 2012's Hurricane Sandy was one of the costliest storms in the history of the USA, with an estimated 74 billion US dollars (adjusted) worth of damage (NOAA, 2020b) but the impact was perhaps lower in terms of people in need after the disaster.

Figure 3.6: Map of climate vulnerability and readiness to adapt



Sources: Notre Dame Global Adaptation Initiative (ND-GAIN) Index, INFORM Index, OECD States of Fragility 2018

Notes: Overall climate vulnerability is calculated by combining measures of a country's disaster risk (INFORM) and its vulnerability to climate change (ND-GAIN). The INFORM index quantifies disaster risk based on historical exposure to hazards, vulnerability and coping capacity. The ND-GAIN index measures vulnerability to climate change based on exposure, readiness, governance and social factors. See Methodology for more details.

3.2.5 The impact of climate change on people living in countries affected by conflict

More than 1 billion people – 16% of the world's population – live in the 31 countries currently experiencing protracted humanitarian crises (Development Initiatives, 2020).

In recent years, concern has been growing about the consequences of climate change on global security, with warnings that a changing climate could provoke a succession of wars. Researchers generally agree that climate change does not directly cause armed conflict, but that it may indirectly increase the risk of conflict by exacerbating factors that can, in a complex interplay, ultimately lead to conflict (Peters et al, 2020). In situations of conflict, often characterized by the absence of strong governance and inclusive institutions, climate change may contribute to intensifying and prolonging instability by further weakening institutions, systems and people. It may also aggravate communal violence (De Juan, 2015).

While climate change may not directly cause conflicts, it creates serious challenges for people facing the hardship of conflict – threats to their security, homes and livelihoods. Access to food and water may be compromised, and essential services and systems, when they exist at all, may be dilapidated and overwhelmed.

The economy is depressed, social networks, protection and cohesion fray and parts of a country's territory or population may be neglected or inaccessible to the state. Disparities are aggravated and development is eroded. By harming the very assets that make people resilient, conflicts limit the capacity of people and communities to adapt and make them particularly vulnerable to shocks (Adger et al, 2014).

The convergence of climate risk and fragility is shown in Figure 3.6. Many of the most climate-vulnerable countries, and those with the highest rates of disaster risk, also face challenges of conflict and fragility. These include Afghanistan, Haiti, Myanmar and Somalia. Indeed eight of the ten most climate-vulnerable countries are extremely fragile. Similarly, five of the top ten countries most vulnerable to disaster risk (connected to climate- and weather-related events) are considered extremely fragile.

As conflict and climate risks converge, this can further worsen food and economic insecurity (ICRC, 2020) and health disparities and limit access to services. Meanwhile the capacity of institutions and governments to provide emergency or longer-term support, manage resources and mediate tensions is diminished. Conflicts can also cause long-term damage to the environment, harming people's livelihoods and resilience for decades (ICRC, 2020).

In southern Iraq, for instance, people attribute their water and farming problems to the cutting of emblematic date palms for military purposes during the Iran–Iraq war. Impacts are even more acute when conflict-induced insecurity limits the capacity of humanitarian and development organizations to respond to emergencies and support climate adaptation.

Adapting to a changing climate can require major social, cultural and economic transformation. Yet long-term concerted efforts tend to be limited in times of conflict, partly because authorities are weakened, but also because they concentrate on restoring national security and eventually on revitalizing the economy. Without adequate institutional support, people and communities try to cope by changing or diversifying their livelihoods, adapting their ways of life or moving away from their homes. Farmers may change the type of seeds they use or their irrigation methods. Herders may start farming a small plot of land or fishing. Some family members may move seasonally to find work – even to neighbouring countries.

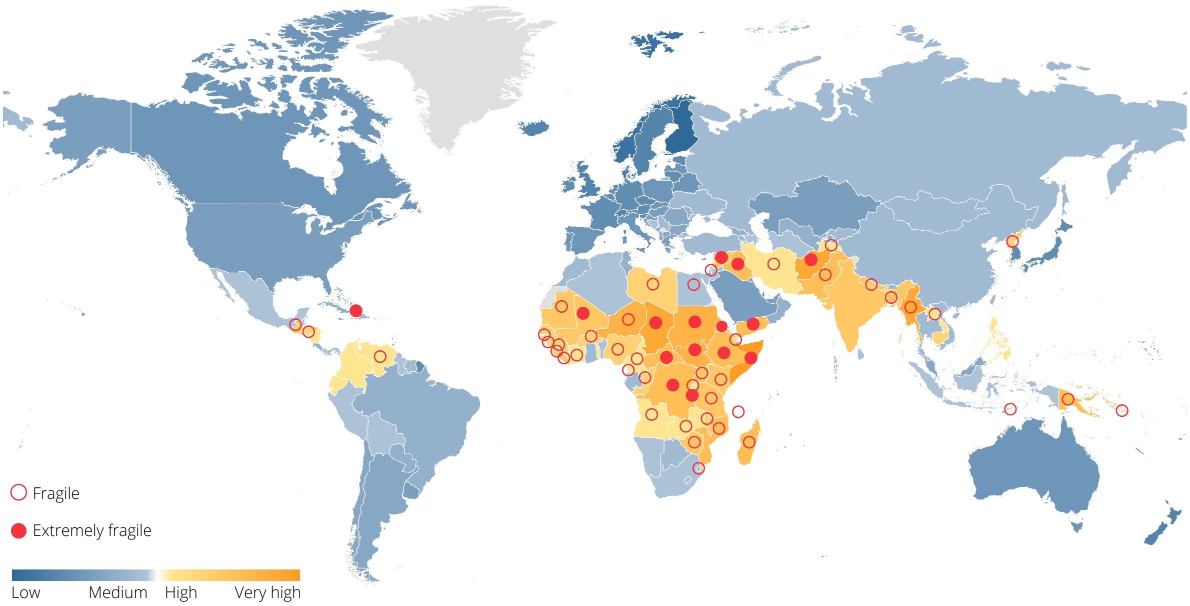
Many people are forced to take bigger risks in search of basic livelihoods and thus engage in unsafe and dangerous work or find themselves exposed to high risks of exploitation or abuse such as trafficking in persons or child marriage. National Red Cross and Red Crescent Societies work to support displaced women who are at risk – particularly women-headed households – and face challenges in restarting their livelihoods in a new country or region. For example, the Jordan National Red Crescent Society offers Syrian and Jordanian women training in hair and beauty services, sewing, crafts and pastry making, with support from the British Red Cross and the IFRC. After the training, participants are given a starter kit, which helps them to expand their business and start making a living in Jordan (IFRC, 2017).

Although moving may not be people's primary method of adaptation, in the absence of viable options many people end up doing so, usually within their own country. Some move in a preventive manner. In southern Iraq, for instance, large numbers of farmers of a lower socioeconomic status decided to relocate because their livelihoods were increasingly unreliable. Others react to a direct threat to their safety triggered by conflict, extreme weather or a combination of both. People often end up in precarious urban situations where they continue to be exposed to hazards (Cardona, 2012). In the Central African Republic, for example, people who fled the violence and settled in temporary settlements on the outskirts of urban areas endured intense rains that, in some cases, destroyed their shelters.

The impacts of conflicts and climate change are uneven and especially dire for people who are already at risk. For example people of a lower economic status, and notably women, are often less able to withstand the socioeconomic impacts of shocks as they tend to lack the financial resources, social capital and assets needed to cope, recover and adapt (Buvinic, 2013).

Figure 3.7: Map of climate vulnerability and fragility

46 out of 60 high-vulnerability countries are fragile or extremely fragile.



Sources: ND-GAIN 2017, INFORM Index 2017, OECD 2018

Notes: The INFORM data is screened to only look at disaster risk (connected to climate- and weather-related hazards), so does not also include conflict-related risk. The OECD classifies contexts as 'fragile' or 'extremely fragile' using fragility score thresholds of -1.2 and -2.5, respectively.

BOX 3.2: THE LAKE CHAD BASIN: THE INTERSECTION BETWEEN CLIMATE, CONFLICT AND DISASTERS

The Lake Chad Basin is a vast area of land that covers around 8% of the African continent and spreads across Algeria, Cameroon, the Central African Republic, Chad, Libya, Niger and Nigeria. The area is affected by conflict between herders and farmers, trafficking in persons, abductions and other challenges. There are almost 11 million people in the area whose survival depends on humanitarian assistance; 5 million people are targeted for emergency food assistance; and just over 1 million people are displaced and mostly living in host communities.

The lake is a key resource that underpins the livelihoods of people in the area, and is at the heart of the area's humanitarian, security and development challenges. Lake Chad has contracted in size by 90% since 1972 while its population has expanded from around 7 million people to 30 million today. This population does not all live alongside the lake but relies on it for drinking water, irrigation and livelihood opportunities.

Climate change is a major contributor to the diminished water resources triggering conflict between pastoralists and farmers in the area and creating tension between farmers and fishermen.

The impact of climate change on the lake, combined with the population growth, has exacerbated community conflict and led to humanitarian and development challenges. Some of the pressure points of the crisis could have been reduced if more attention and resources were provided to protecting vital natural resources that are being diminished by climate change.

Chad, 2020. Like many herders in the region, Ali's way of life is under threat due to the combined impacts of armed violence and climate change.

© ICRC

3.2.6 What climate change has in store for each region

In Africa, the IPCC has indicated that flood hazards are likely to rise, particularly in tropical parts of Africa, while Southern Africa is expected to be increasingly affected by wildfires and droughts (medium confidence) (IPCC, 2014). These hazards are likely to lead to increased exposure for vulnerable communities and the IPCC has predicted large rises in the number of people at risk from floods, due in part to population increases (from 850,000 people in 1970 to 3.6 million people in 2030) (Handmer et al, 2012). African populations will also be increasingly affected by extreme high temperatures, in some cases above physiological limits for thermal comfort (high confidence). At the same time populations are predicted to rise in highly exposed urban centres which have not undertaken adaptation measures for extreme heat (IPCC, 2019a).

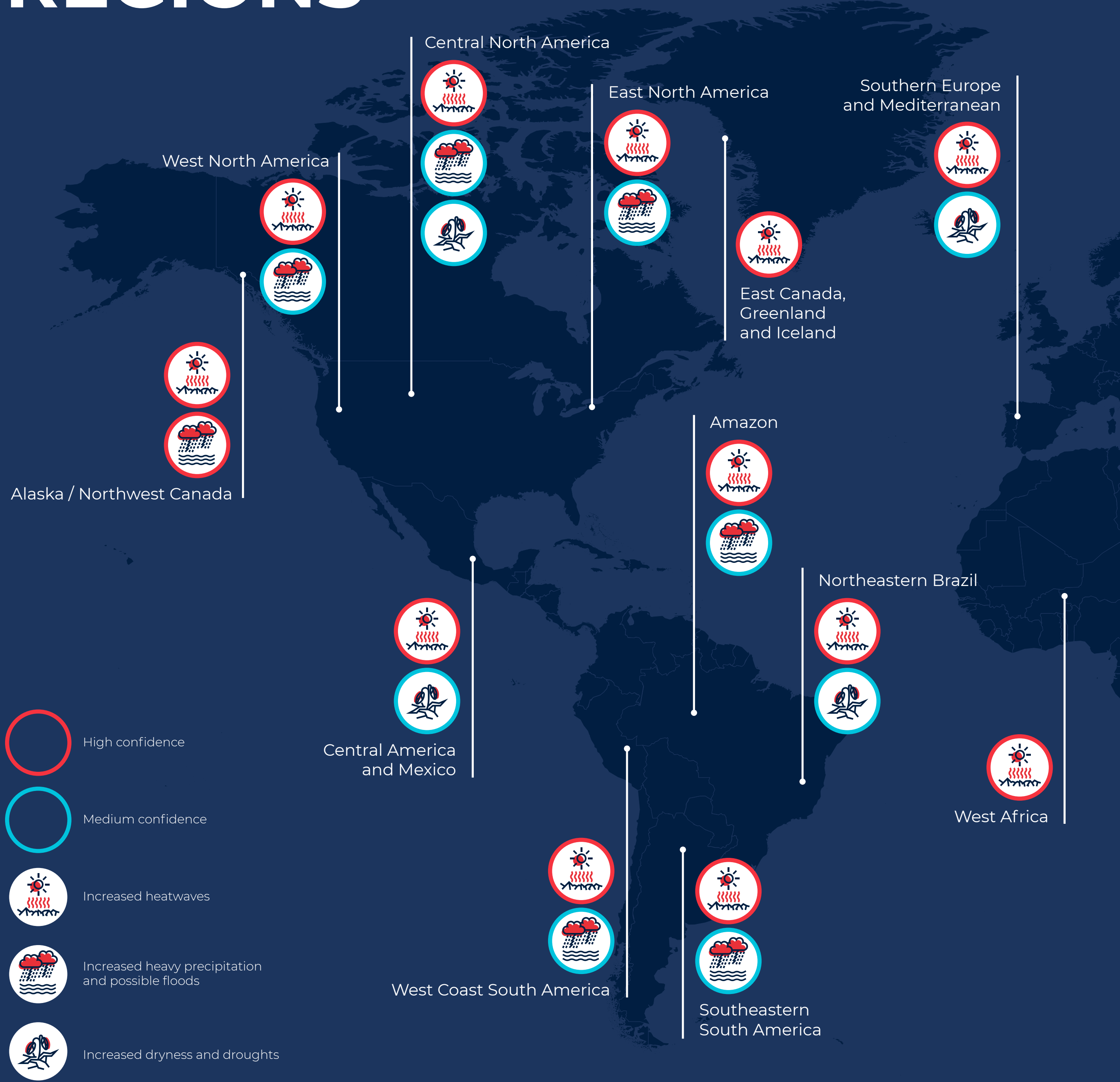
In Asia, flood hazards are likely to increase in parts of South and Southeast Asia (medium confidence), and the population across Asia vulnerable to flooding could rise from 29.7 million people in 1970 to 77.6 million in 2030 (Handmer et al, 2012). A number of regions are expected to be increasingly vulnerable to, and affected by, wildfires, including North and Central Asia; while grassland fires are in particular expected in China. Increased risk of peatland fires is predicted in tropical parts of Asia (IPCC, 2014). Advances in development, growth of mega and secondary cities in Asia, and changes in poverty (which vary between subregions) will all affect how climate change impacts people across Asia.

In the Americas, flood hazards are likely to increase in South America (medium confidence), while the population at risk of flooding is predicted to rise significantly in North and South America (from 640,000 people in 1970 to 1.19 million in 2030 in North America and from 550,000 people in 1970 to 1.3 million in 2030 in South America) (Handmer et al, 2012). Risks associated with glacial melt will also increase, including flooding and glacial lake flood outburst events (IPCC, 2019a). Extreme waves and storm surges are projected to increase due to the heightened sea level across the Southern Ocean (high confidence). The population at risk of flooding in the Caribbean is predicted to rise, with annual coastal flood damage expected to increase, affecting island communities (IPCC, 2019a). The Americas are also expected to be increasingly vulnerable to, and affected by, wildfires (low to medium confidence).

In Oceania, extreme waves and storm surges are projected to increase due to the heightened sea level across the tropical eastern Pacific (high confidence). Annual coastal flood damage is also expected to increase, and communities in island atolls will be particularly affected (IPCC, 2019a).

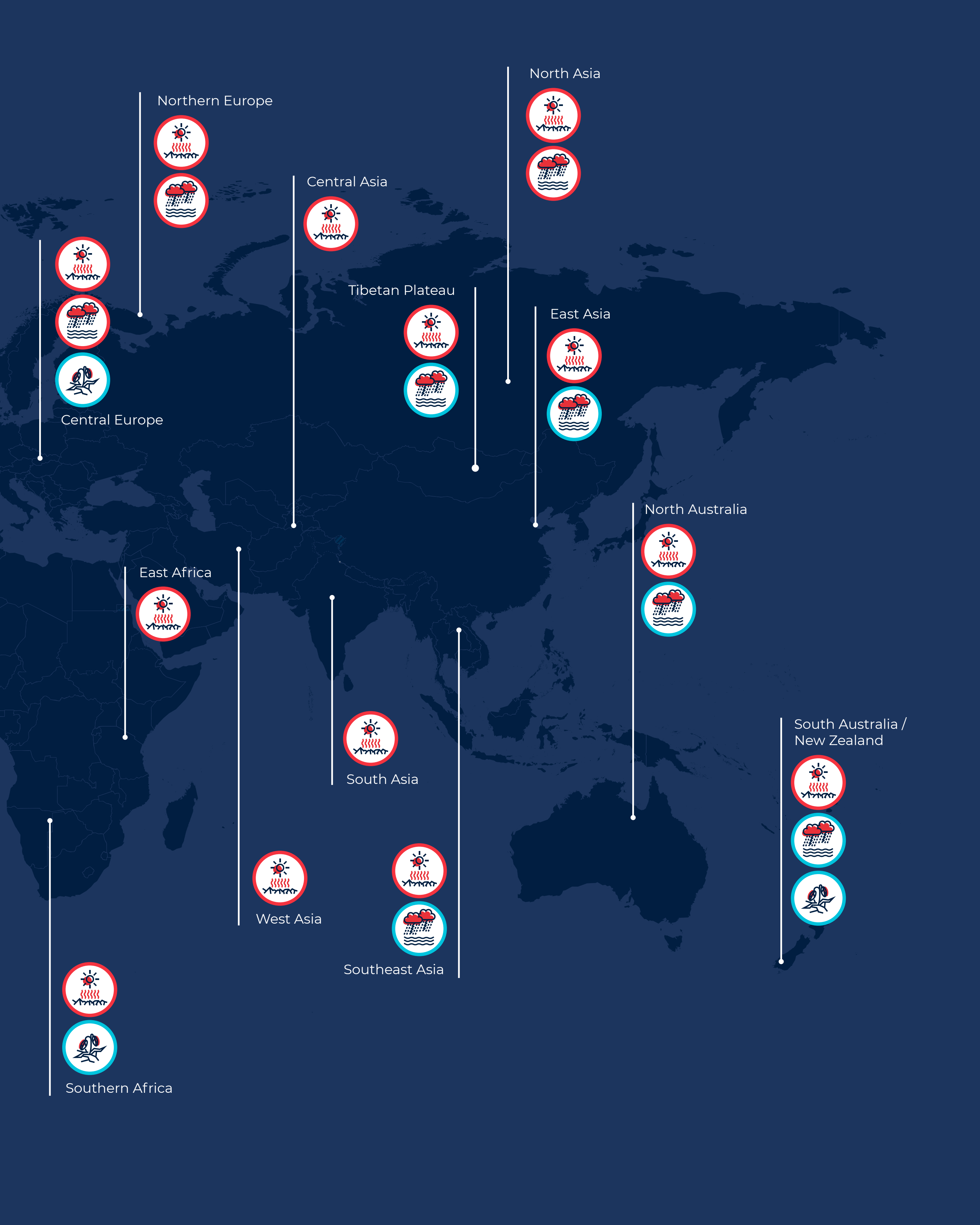
In Europe, flood hazards are likely to increase in northeast Eurasia (high confidence). Extreme waves and storm surges are projected to increase due to the heightened sea level Baltic Sea (medium confidence) (IPCC, 2014; IPCC, 2019a). Arctic locations can expect increased annual coastal flood damage (IPCC, 2019a). The IPCC projects that the frequency and intensity of droughts will continue to increase, particularly across the Mediterranean region, which is also expected to be increasingly vulnerable to, and affected by, wildfires (medium confidence). Heatwaves have already increased in frequency and intensity and will continue to in the future (high confidence) (IPCC 2014).

CLIMATE-VULNERABLE REGIONS



Source: IPCC, 2014

Notes: Increased precipitation refers to either increased heavy precipitation, increased intensity and frequency of heavy precipitation or increased 20-year return value of annual maximum daily precipitation (or a combination). Updated projections are expected in the IPCC's Sixth Assessment Report, due to be published in 2021. Wildfires are often associated with increased heat and dryness, and increased wildfires are predicted in some regions. However this was not systematically recorded in the Fifth Assessment Report so have not been included in this map.
Regions are defined for the purpose of this map only according to the 26 sub-continental regions used by the IPCC (IPCC, 2012).


North Asia
Northern Europe
Central Asia
Tibetan Plateau
East Asia
Central Europe
North Australia
East Africa
South Asia
South Australia /
New Zealand
West Asia
Southeast Asia
Southern Africa

3.3 IMPACTS OF DISASTERS AND CLIMATE CHANGE ON DIFFERENT GROUPS

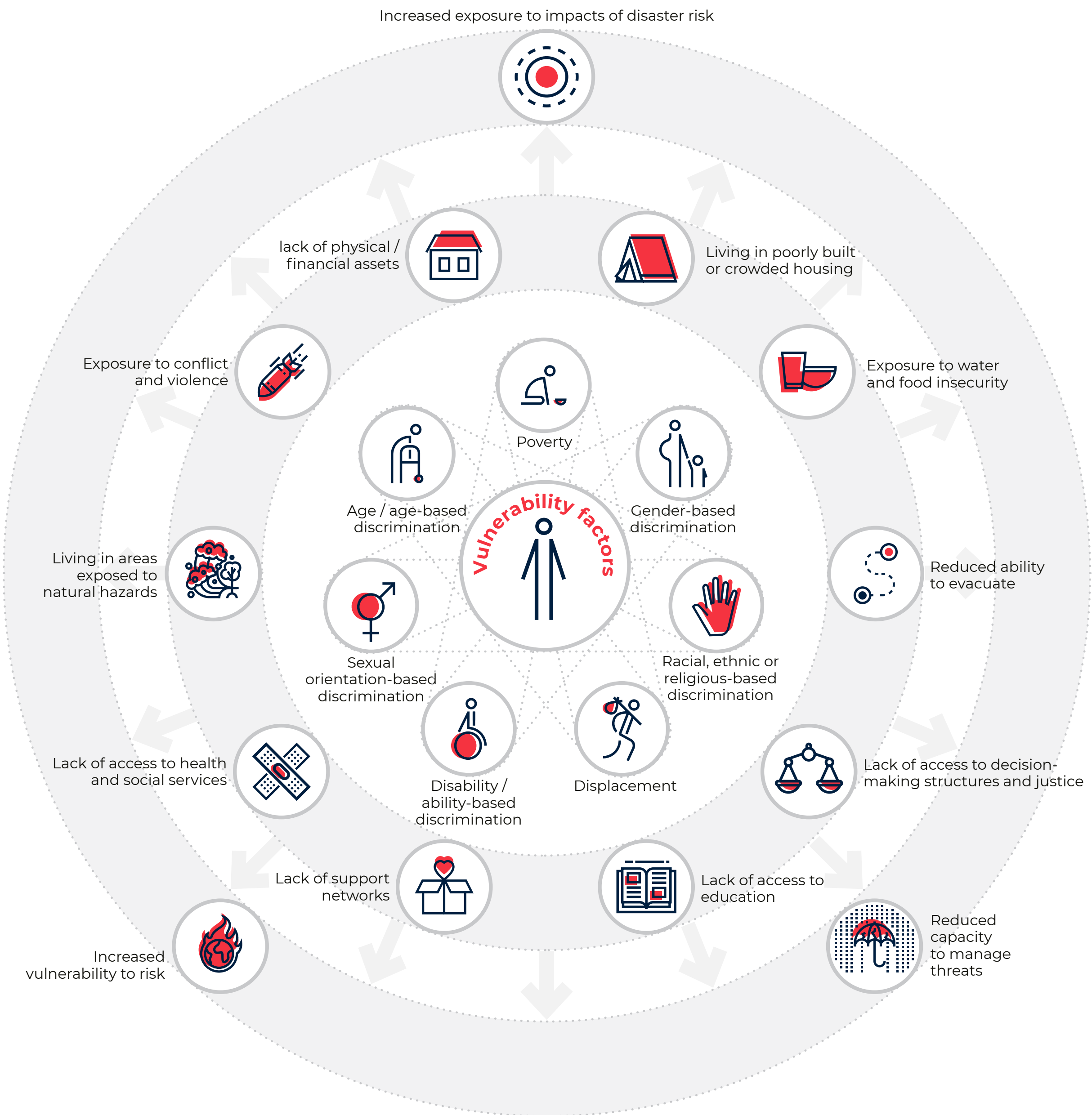
All communities are different and people within communities have diverse capacities, experiences and barriers. Yet certain factors make certain groups structurally and systematically more vulnerable or exposed to disasters, putting them at a higher risk.

3.3.1 Children and young people

In 2013, the UN High Commissioner for Refugees (UNHCR) found that children are the group most affected by disasters each year. This has not changed since and IFRC research shows that "children are at higher risk than other age groups of encountering violence, abuse, neglect and exploitation in disaster settings, including those disasters driven by climate change" (IFRC, 2020). More than half a billion children worldwide live in areas with extremely high flood occurrence and 160 million children live in high or extremely high drought severity zones. Around 1.6 million children across Malawi, Mozambique and Zimbabwe were in need of assistance after Cyclone Idai swept away their schools and homes, and separated them from their families (UNICEF, 2019).

Besides the direct risk, children also tend to be affected by some of the more long-term, indirect consequences of disasters. Extreme weather events disrupt education, directly and indirectly. They often destroy or damage infrastructures such as bridges, roads, schools and classrooms, thereby rendering facilities unusable or preventing (safe) access to them. Disasters affect livelihoods, result in food scarcity and malnutrition, reduce the availability of safe drinking water and compromise sanitation (with subsequent consequences on girls' school attendance during menstruation). They can also increase the incidence of diseases such as malaria and cholera, and disrupt the treatment of chronic diseases, which in turn leads to absenteeism and impairs learning performance. COVID-19 is having – and will have – clear effects on children's education, social life and physical and mental health (Ramchandani, 2020).

Figure 3.8: Impacts of disasters and climate change on different groups




01

Rosa Nunez and her family survived Hurricane Maria but she is scared that where they live is too dangerous for her children. More than half a billion children worldwide live in areas with extremely high flood occurrence and 160 million children live in high or extremely high drought severity zones.

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BOX 3.3: ENGAGING YOUTH TO BRING CLIMATE ACTION TO SCALE

Today's children and youth will be disproportionately affected by the impacts of the changing climate. At the same time, youth are actively promoting action on climate change. In 2019 millions of young people in over 150 countries took to the streets to demand climate action. Protests were organized at an unprecedented scale and youth activism pushed climate change to the top of global agendas. As Sir David Attenborough highlighted, "young people have achieved things that many of us who have been working on the issue for 20 years have failed to do." (Bradley, 2019)

The humanitarian, development and climate sectors can and should help make sure that the perspectives of children and youth are heard at local, national and global levels.

Coalitions such as the newly reinvigorated Children in a Changing Climate are striving to advance this agenda through innovative approaches – including supporting the ongoing development of global 'Children's Climate Cards' to promote collective children's voices. Creating enabling environments, alongside education and empowerment, are also central to the Red Cross and Red Crescent Climate Centre's youth engagement strategy on climate change.

The Red Cross and Red Crescent Climate Centre's flagship curriculum, Y-Adapt, has been used to inspire youth-led action and advocacy on adaptation in communities around the world. Examples of youth-led action include clearing drains to reduce flood risk in Haiti and promoting dengue awareness campaigns in Guatemala. Y-Adapt also demonstrates how empowering youth at the local level can open national and global advocacy opportunities. Shadwig Edward, a 19-year-old volunteer with the Micronesia Red Cross Society, shared his Y-Adapt experiences at a UN Global Climate Summit in New York and called for the international community to "imagine themselves facing what the people of small islands are facing".

3.3.2 Urban poor people

Climate change and urbanization are two of the most transformative trends of the 20th and 21st centuries. More than half of the world's population lives in cities and two-thirds are projected to do so by 2050 (UN, 2018a).

Poverty is a key cause of vulnerability. The World Bank's report *Unbreakable* found that "When poor people are affected, the share of their wealth lost is two to three times that of the nonpoor, largely because of the nature and vulnerability of their assets and livelihoods" (Hallegate et al, 2016).

Urban poor people, especially people living in slums and informal settlements, face marginalization, insecure accommodation, limited access to life-sustaining services, higher proportionate costs of living, food insecurity, and greater health risks. Without concerted effort to mitigate or eliminate its impacts, climate change will exacerbate all of these challenges.

Communities at risk are often living in the most exposed places within countries. In Medellin, Colombia, people living in informal settlements, many of them displaced by conflict (Albuja and Adarve, 2011; Wisner et al, 2004), are perched on steep slopes and near water bodies at the periphery of the city (Cadavid, 2011). These informal settlements are more exposed to either floods or landslides because of their location. The often-weak structure of the housing, lack of sufficient drainage in the communities, and challenges in accessing basic services among other socioeconomic conditions place these communities at greater risk of natural hazards.

In the future cities will be at increased risk of severe water shortages due to climate change and population pressure. We are already witnessing the first glimpses of this in recent instances in Cape Town – where the 2018–2019 water shortage brought the city dangerously close to 'Day Zero', where it would run out of water – and in Chennai and Karachi. Globally, urban poor people already face limited access to safe, reliable and affordable water, with many facing exorbitant costs when purchasing water from vendors (Mitlin et al, 2019). Urban poor people will also be the first and most acutely affected by municipal water shortages.

As the world continues to warm, the risk of extreme heat is also on the rise. Heatwaves are most acutely felt in cities, where construction materials retain heat causing ambient temperatures to be significantly higher than surrounding rural areas. Extreme heat is even more acutely felt in slums and informal settlements where micro-heat islands often exist and indoor air temperatures have been documented higher still. Older residents and people with pre-existing medical conditions will be more vulnerable to the threat the rise in temperature poses to their health. They may also face barriers to emergency healthcare due to cost, proximity or stigma.

Although many of these risks are already experienced today, climate change coupled with rapid unplanned urbanization will exacerbate the scale and scope of their impacts. Equitable, forward-looking actions to reduce risk must be invested in *today*.

3.3.3 Indigenous communities

Indigenous communities around the world are feeling the effects of climate change.

For example, around 10% of the four million people living permanently in the Arctic region are indigenous people who are already experiencing the impacts of climate change and will face a growing threat not only to their health and livelihoods, but to their traditional ways of life and culture (UN-DESA, 2008). The IPCC reports that changes in Arctic sea, lake and river ice, and to permafrost, are disrupting traditional hunting, herding and fishing practices, and leading to heightened risk of diseases, malnutrition, injury and mental health challenges among indigenous peoples. Marine ecosystems are also increasingly affected, with negative consequences for the communities who depend on fisheries for their livelihoods (high confidence). These changes risk not only economic losses, but also "potentially rapid and irreversible loss of culture and local knowledge and indigenous knowledge", as communities adapt to shifts in distribution of harvested species, or reduced access to fishing or hunting grounds (IPCC, 2019a).

In Colombia, the Waayu indigenous people who live in the Guajira desert region in the far north near the Venezuelan border were seriously affected by the El Niño phenomenon between 2010 and 2016. This led to difficulties in accessing safe water, due to the loss of surface water sources (ponds and streams) during the drought; increased incidence of acute diarrhoeal and respiratory diseases associated with malnutrition and limited access to water; and losses of subsistence agriculture and death of animals (goats and sheep). It also exposed a lack of emergency or response strategies by communities during times of drought.

In Australia, indigenous communities are facing increased hardship in the Top End, a geographical region that encompasses the northernmost part of the country's Northern Territory and is said to be on the front line of the continent's most severe climate change. Indigenous people in remote areas are projected to be disproportionately affected by the impacts of climate change, particularly communities who rely on natural environment for hunting and fishing (Australian Broadcasting Corporation, 2019; Green et al, 2009; Salleh, 2007).

In the Tiwi Islands, for example, indigenous artists from the Daly River (Nauiyu) noted that traditional warning signs for flooding were changing in recent times. Artist Kieren Karritpul said: "Now the older people in Nauiyu say they are confused. The climate and the cycle is changing. This year we have had no 'knock 'em down rains'. The wind is coming from all directions. There was no juice in the stems of the spear grass." (TRPPF, 2018).

3.3.4 Older people

Older people (people aged over 70) represented 8.26% of disaster-related deaths from 2000 to 2017 (about 4,700 per year) (UN, 2019). Older people tend to be disproportionately affected by disasters, in particular by extreme temperatures. As a percentage of the total population, they have the highest death rate of any age group (IMHEI, 2020).

Older people's vulnerability to disasters can come from age or age-related disabilities combined with other factors such as gender, ethnicity and social exclusion. Reduced mobility is likely one of the major factors rendering older people disproportionately impacted by disasters, as is the breakdown of family and other support structures. In Japan, the country with the highest proportion of older people worldwide, torrential rains in the beginning of July 2020 flooded more than 50 nursing homes on the island of Kyushu, leading to several deaths. Although a warning was issued for the region, it can be difficult to evacuate older people during a disaster. Evacuation centres often do not provide the care needed and particularly in light of the COVID-19 pandemic, fears of the virus might discourage residents from leaving their nursing homes (New York Times, 2020). Similarly, the vast majority of people who died in Australian bushfires (apart from those involved in the fire-fighting effort) were over 60 (Coates, 2020; Wahlquist et al, 2020).

3.3.5 Persons with disabilities

By 2018, there were an estimated one billion people in the world with some form of disability – around 15% of the global population (OHCHR, 2020). The share of people with a disability is higher in environmentally vulnerable countries, adding up to 177 million people, and is considerably higher for the poorest 20% of a given country's population (IFRC, 2018b). People with intellectual and psychosocial disabilities often face multiple levels of discrimination and barriers to healthcare, support, education and inclusion (UN, 2018b).

According to OHCHR: "Persons with disabilities are disproportionately affected by the adverse impacts of disasters and are at greater risk of death, injury and additional impairments owing to their general exclusion from disaster risk reduction policies, plans and programmes. Emergency-related information and warnings are often not accessible to persons with disabilities" (OHCHR, 2020).

Persons with disabilities may be excluded from processes to design disaster management plans. If left out of decision-making, persons with disabilities are left unable to contribute by identifying risk reduction and adaptation measures they might otherwise carry out (Turnbull et al, 2013). Engaging disabled persons' organizations in the design of relevant strategies and programmes and to share important information widely is essential to reduce the impact of disasters on persons with disabilities.

3.3.6 Women and girls

The effects of disasters are not gender neutral. Women and girls are often severely limited by gendered systems, laws, structures and social expectations. This means they are underrepresented in decision-making processes, and marginalized and excluded in their efforts to ensure they and their families can live with dignity, development, safety and overall preparedness and capacity to manage shocks and stresses.

Challenges for women and girls include lack of access to nutrition, clean water, menstrual hygiene management, sexual and reproductive health services and education. The socioeconomic and food security-related impacts of disasters can be particularly problematic for women and girls. They are overrepresented in low-paid or unpaid work and more exposed to protection risks such as sexual and gender-based violence including abuse and child marriage, and to exploitation and trafficking in persons (Plan International, 2019).

Women and girls are at higher risk of the direct health impacts of epidemics, as they are more likely than men to be first response care providers – both at home and professionally – and may face increased exposure to infectious diseases.

BOX 3.4: FOSTERING WOMEN'S ENGAGEMENT TO ADDRESS CLIMATE IMPACTS IN MYANMAR

Climate change impacts in Myanmar are being experienced through intensified rains and storms that affect local communities, further aggravating the divide between ethnicities and between rich and poor people, and increasing existing gender inequalities and vulnerabilities. In the urban areas of Hinthada, a 4.5-year programme of the Myanmar Red Cross Society called Urban Risk Resilience focuses on changing attitudes, behaviours and gender norms to enhance an inclusive community-based disaster risk management (DRM) system.

The practical work focused on training women as fire-fighters, while promoting their inclusion in community-based disaster management led to transformative changes in how women are seen in the community, thus promoting women's leadership in disaster management. Women have reported that they are now seen as part of the DRM team and acknowledged as active members of their community. This not only contributes to enhanced preparedness and resilience for the community to shocks and hazards, but also to addressing more structural gender inequalities (Myanmar Red Cross Society, 2020).

Myanmar, 2020. Myanmar Red Cross Society volunteers spread flood warning messages in Manpin and Kone Khar villages.

© Myanmar Red Cross Society

3.3.7 People with diverse sexual orientation, gender identity and expression, and sex characteristics

Disasters and climate change disproportionately affect people who are already marginalized across the world, including people of diverse sexual orientation, gender identity and expression, and sex characteristics.

During and after disasters, people of diverse sexual orientation or gender identity are often affected by heightened social discrimination and may be excluded from accessing aid due to proscriptive laws and structures surrounding sexual orientation and gender identity and expression.

Systemic institutional and societal discrimination in accessing justice, health, education, employment, housing and other services does not go away after a disaster, neither does marginalization due to exclusion from families, communities and religious and other organizations. This can undermine attempts to build secure livelihoods and to access health, water and sanitation services, increasing vulnerability to shocks and stresses and reducing capacity for recovery.

Disasters which destroy homes and community structures can force people with diverse sexual orientation or gender identity into high-tension public spaces where pre-existing stigma is often exacerbated, producing overt harassment and violence. This intolerance frequently results in increased violence towards known diverse sexual orientation or gender identity communities.

People of diverse sexual orientation or gender identity may avoid seeking help from government centres after disasters. Thus, they are unable to access formal aid, and are more vulnerable to violence from others affected by the disaster.

3.3.8 Migrants and people who are already displaced

Displaced people may be particularly vulnerable to disasters, due to poor standards of housing, location of camps and limited access to assistance. Although not in the direct path of Cyclone Amphan which hit parts of coastal India and Bangladesh in May 2020, displaced persons living in camps in Bangladesh endured heavy rain and winds that flooded parts of the displaced settlements and caused further displacement. At least 60 shelters were destroyed. Relocations from high-risk areas were delayed, and site development work, like clearing drainage and emergency shelter repairs, was suspended or reduced due to COVID-19 lockdowns. UNHCR has warned of life-threatening consequences if annual monsoon preparations cannot be completed on time.

Migrants are regularly left out of disaster response plans and the actual response. Migrants, in particular irregular migrants, face multiple barriers to services, from fear of arrest to lack of information to not having the right identity document to access services. These restrictions apply consistently in the context of disaster response – from the USA to Belize to Thailand. Sometimes migrants may be excluded, and sometimes they are structurally excluded in ways that authorities and service providers may be unaware of. For example, the

Maldives experienced a water crisis when the desalination plant – the only source of potable water for the capital Malé – broke down. The Maldivian Red Crescent was asked to distribute water, however the initial process followed by the government was to provide water when people showed their national identification card. When Red Crescent staff explained that this would deny access to water to many migrant workers, a policy decision was taken not to check for identification at the distribution points to ensure access to water for all.

Migration and human mobility can also influence the ability of communities in areas of destination to cope and adapt to a changing climate. While migrants can make a very positive contribution to receiving societies, mobile populations may not be aware of local environmental conditions, or may contribute to environmental degradation through increased use of land and natural resources. For example, deforestation can be a consequence of establishing displacement sites. At the same time, when land is abandoned, ecosystems may degrade.

Bangladesh, 2019. Since August 2017, more than 700,000 people have fled Rakhine State, Myanmar, to seek safety in Cox's Bazar. Displaced persons living in camps may be particularly vulnerable to disasters. In 2020 some settlements for displaced persons in Bangladesh were flooded, causing further displacement.

© American Red Cross

Displaced people may be particularly vulnerable to disasters, due to poor standards of housing, location of camps and limited access to assistance. Migrants are regularly left out of disaster response plans and the actual response.

3.4 HUMANITARIAN RESPONSE NEEDS AND COSTS

Some people affected by disasters will have access to savings or social protection schemes to enable them to cope and recover. But many people cannot rely on support from others. Families, neighbours and communities are always the first responders, and the vast majority of disaster response is local – local organizations with their own capacities and funding.

Tracking what is spent on domestic humanitarian assistance in response to disasters, including climate- and weather-related disasters, is extremely challenging. However, the data for international humanitarian assistance is a little easier to track or estimate.

In 2019, UN and partner response (based on humanitarian response plans) to disasters totalled almost 707 million US dollars (approximately 693 million Swiss francs), not including response to conflicts, nor situations of mass displacement where reasons may have been mixed – see Figure 3.9. The IFRC and National Red Cross and Red Crescent Societies were involved in 109 internationally supported disaster response operations during 2019 (based on appeals for international assistance), spending over 153 million Swiss francs and targeting around 15 million people in need. The top ten are shown in Figure 3.9. Note these numbers are based on actual assistance provided, not on aiding all who needed it, which would have cost substantially more.

Figure 3.9: Global humanitarian response to disasters in 2019

UN and partner humanitarian response to disasters in 2019

Country – crisis	Expenditure (Swiss francs, millions)
DRC – Ebola virus disease outbreak, 2018–2019	342.2
Mozambique – Cyclones Idai and Kenneth, April 2019	295.5
Bahamas – Hurricane Dorian, September 2019	28.5
Iran – Floods, March 2019	13.9
Bangladesh – Floods and landslides, June 2019	6.2
Indonesia – Tsunami, December 2018	5.4
Indonesia – Tsunami/earthquake, September 2018	1.0
Djibouti – Floods, November 2019	0.2
Total	**692.8**

IFRC-supported response to disasters in 2019 – largest 10 (based on international appeals)

Country – crisis	Expenditure (Swiss francs, millions)
DRC – Ebola virus disease outbreak	16.8
Indonesia – Earthquakes and tsunamis	11.5
Mozambique – Tropical Cyclone Idai	8.3
Bahamas – Hurricane Dorian	7.9
Afghanistan – Drought and flash floods	3.3
Syria – Floods	1.2
Laos – Flash floods	1.0
Bangladesh – Monsoon floods	0.9
Malawi – Floods	0.6
Cuba – Hurricane Irma	0.5
Total	**52.0**

Sources: OCHA FTS and IFRC GO

Taking the average number of people affected over the past decade to get a slightly more accurate estimate of costs of international humanitarian response, around 130 million people each year have needed international humanitarian assistance due to the impacts of disasters triggered by natural hazards, and some 108 million people have been affected by climatological disasters. This can be estimated to cost between 6 and 19.3 billion Swiss francs per year in humanitarian response for all disasters triggered by natural hazards, or between 5 and 16 billion Swiss francs per year for climatological disasters.

BOX 3.5: IFRC RESPONSE TO DISASTERS (2019)

While only the major disasters make the headlines and trigger a substantial international humanitarian response, National Red Cross and Red Crescent Societies respond to a range of disasters in their own countries. These range from severe disasters affecting many hundreds of thousands of people, to smaller disasters that are not recorded on EM-DAT as fewer than 10 people are killed or less than 100 affected.

In 2019, the IFRC and National Red Cross and Red Crescent Societies were involved in 109 internationally supported disaster response operations (based on appeals for international assistance), of which 70 were connected to climatological events, and many more were supported using in-country resources. If we consider the more minor disasters, some National Societies are responding all the time, with more than one disaster a day recorded in some countries.

In 2018, the IFRC and National Red Cross and Red Crescent Societies invested significantly not only in responding to disasters, but also in disaster risk reduction (DRR), spending 207 million Swiss francs on DRR projects across 160 countries and reaching 52 million people (IFRC, 2018a; note 2019 DRR mapping results are not yet available) (see Chapter 7 for more on global DRR and climate change adaptation spending). Also, in 2019, the IFRC and National Red Cross and Red Crescent Societies invested over 5.18 million Swiss francs in epidemic and pandemic preparedness, integrating a multi-hazard approach to disaster preparedness and preparedness for infectious disease outbreaks and response.

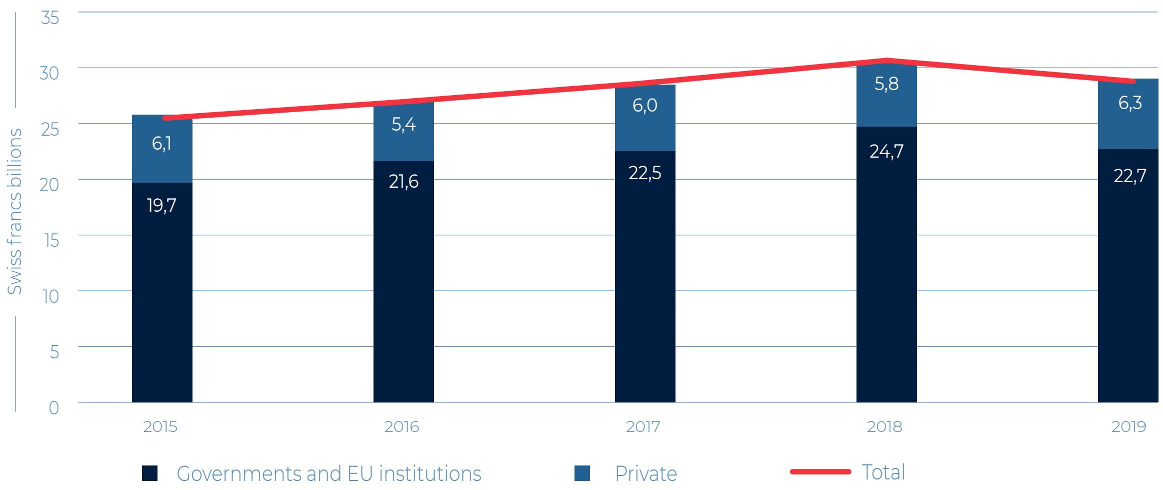
3.5 CAN THE SYSTEMS COPE – NOW AND IN THE FUTURE?

3.5.1 Falling funds

The humanitarian system is already facing challenges in raising enough resources to help the most vulnerable people to anticipate, absorb and adapt to shocks and crises, and in ensuring that nobody is left behind (IFRC, 2018b). Even before the extra stresses of the COVID-19 pandemic, national and international humanitarian organizations and systems were struggling to do more with less as a result of an increase in the number and intensity of climate-related disasters and no corresponding rise in the resources available to prevent, respond and support recovery (International Red Cross and Red Crescent Movement, 2020).

In 2019, the total amount of international humanitarian assistance dropped for the first time since 2012, with Development Initiatives noting that the COVID-19 pandemic "places additional demands on a strained humanitarian system, it is also eroding the capacity of governments and institutions to respond, with the risk that already limited sources of humanitarian and development finance could decline further and faster. The combination of these factors presents a perfect storm for a humanitarian system that is already under immense stress" (Development Initiatives, 2020).

Figure 3.10: Volume of international humanitarian assistance, 2015-2019



Source: Development Initiatives (2020) based on OECD Development Assistance Committee, UN Office for the Coordination of Humanitarian Affairs (OCHA) Financial Tracking Service (FTS), UN Central Emergency Response Fund (CERF) and Development Initiatives' unique dataset for private contributions.

Notes: Figures for 2019 are preliminary estimates. Data is in constant 2018 prices.

This is not projected to improve in 2020, indeed, according to Development Initiatives, all resources are set to fall, including official development assistance (ODA). Its analysis suggests revenues of some countries could fall 7%, while worst-case scenarios indicate a 19 billion US dollar (18.5 billion Swiss franc) drop in ODA by 2021.

And as funds are going down, needs are going up, and these gaps will be worsened by the impact of the COVID-19 crisis. A changing climate will put even greater strain on systems and donors alike, and – as with COVID-19 – the world is not prepared. As IPCC notes: "At 2°C of global warming it will become even harder to effectively help people in need, with implications in terms of both human and financial costs. Already today, humanitarian needs far outpace available funding, even as the latter has increased" (IPCC, 2018).

3.5.2 Costs are going up

In 2019, climate and disaster experts from the IFRC and the Red Cross and Red Crescent Climate Centre worked with leading climate economists to highlight the human and financial cost of continued poor investment in adaptation.

The IFRC's report *The Cost of Doing Nothing* (IFRC, 2019) put forward optimistic and pessimistic scenarios for what the international humanitarian response to climate-related disasters and crises could be in 2030 and 2050.

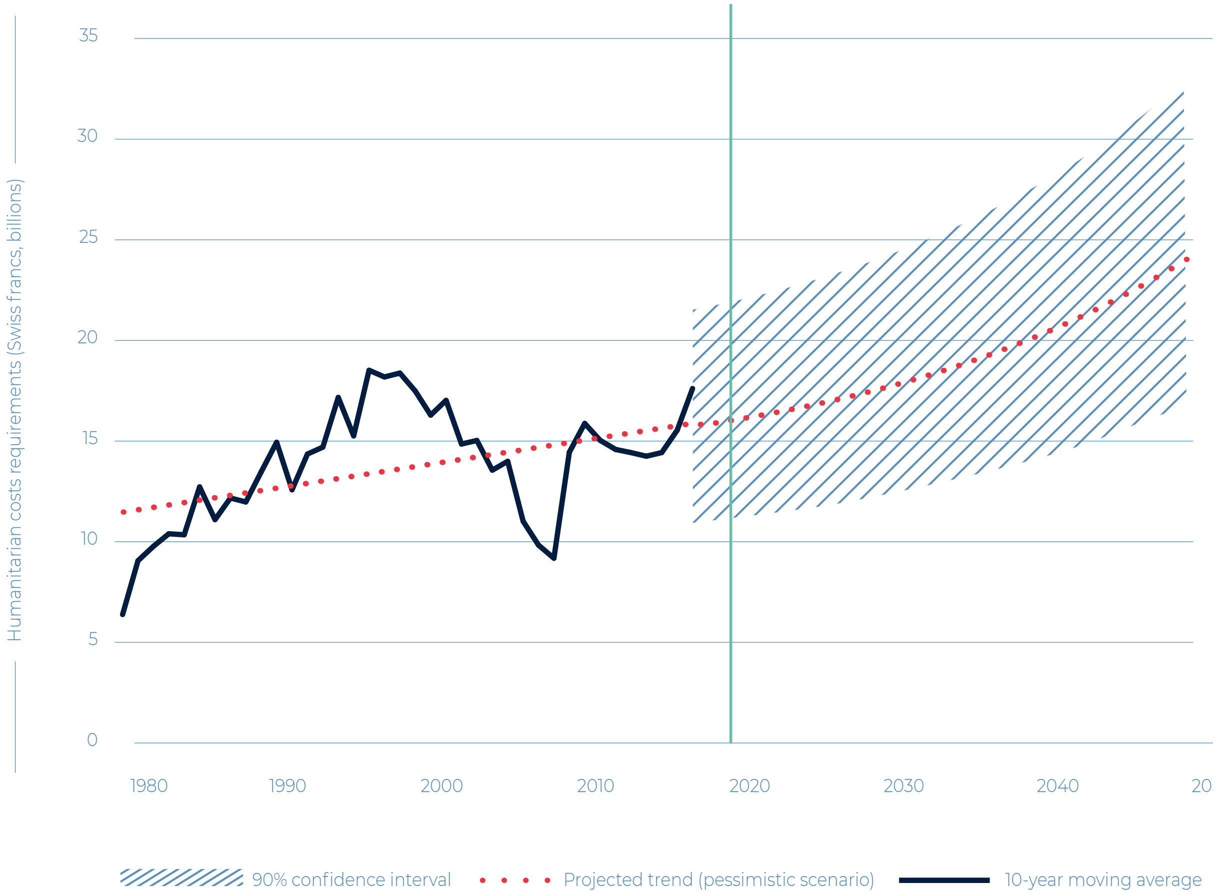
In the pessimistic scenario, it suggested that by 2050, 200 million people every year could need international humanitarian aid as a result of climate-related disasters and the socioeconomic impact of climate change. This is nearly twice the estimated 108 million people who need help today from the international humanitarian system because of floods, storms, droughts and wildfires. Even by 2030, which is only a decade away, this number could increase almost 50%.

Depending on the amount of support provided and the source of cost estimates, meeting current needs would cost international funders 5 to 16 billion Swiss francs per year (based on a ten-year average, and noting that all needs are not generally met by international funders, or indeed at all). By 2050, this funding need could rise to over 24 billion Swiss francs per year.

The Cost of Doing Nothing indicates that the pessimistic outcomes can still be avoided if there is immediate and substantial investment in climate adaptation measures for the poorest and most at-risk populations. The number of people in need of international humanitarian assistance as a result of climate-related disasters annually could also be as low as 68 million by 2030, and even drop to 10 million by 2050 – a decrease of 90% from today.

The scope of the study was limited to immediate life-saving aid and support provided by the international humanitarian system, and did not take into account the costs of long-term recovery or the multiplier effects of conflict. As a result the true cost of doing nothing is likely to be considerably higher than the figures presented in the report (IFRC, 2019).

Figure 3.11 Humanitarian costs of climate disasters – past and future



Sources: EM-DAT, OCHA FTS, World Bank and IFRC (2019)

Notes: Projection shown for 2019–2050 is the pessimistic scenario from the IFRC's Cost of Doing Nothing report (2019). The pessimistic scenario is based on SSP4 with unbalanced growth and an increase in the share of global population affected by disasters. For more information, see IFRC, 2019. Values are in 2018 prices. Chart shows 10-year moving average of the estimated annual humanitarian cost requirement associated with climate-related disasters. Shaded area denotes 90% confidence interval of the pessimistic scenario projection.

3.6 CONCLUSIONS AND RECOMMENDATIONS

Climate change is a major threat, but it is how it interacts with vulnerability and exposure that produces disasters. Therefore, a critical part of our adaptation to climate-related disasters is not about the climate itself, but about the causes and circumstances that place people in harm's way.

This chapter has explored the causes of vulnerability and how climate change is affecting people in different geographical regions, and looked in depth at the numbers and types of disasters that have affected people in recent years. It has also described how different hazards can have a disproportionate effect on children, older people, urban poor people, women and girls, indigenous communities, migrants and displaced people, persons with disabilities, and people of diverse sexual orientation, gender identity and expression, and sex characteristics.

What we need to do now

Tailor support to at-risk groups

- No person, group, community or society is inherently vulnerable, and the risks they face change over time depending on circumstances, interventions, access to social services and structures, and compounding shocks. Concerted efforts must be made to tailor support to at-risk groups while dismantling the systemic and cultural barriers that place them at higher risk.
- There are many steps that countries and communities can take in light of the knowledge we have about current and future exposure, and to address the particular needs of the people and groups most at risk of climate-related hazards now and in the future.
- But these steps must be based on an understanding of why some communities and some people have less capacity to cope with a hazard than others, and careful analysis of the differing experiences of risk. Without this, humanitarian work to reduce risks will fail to reach the people who need it most.

Reduce emissions and invest in climate adaptation measures

- In 2019, the Global Commission on Adaptation asked a stark question: "Will we delay and pay more or plan ahead and prosper?" The challenges are immense and, if the worst impacts are to be avoided, concerted efforts must be made to reduce emissions and invest in climate adaptation measures. This is not only for the most poor and marginalized people in the world, but for everyone, and for the ecosystems, goods and services that life on Earth depends on.

Design a new approach to prepare for rising risk

- As we have seen, humanitarian needs will continue to rise. The resources available to meet those needs were falling even before the global shock of the novel coronavirus. There is a risk that these gaps will be worsened by the COVID-19 crisis, putting even greater strain on systems and donors alike, and leaving the world unprepared for the rising risks of climate change.
- A new approach is needed to help humanity prepare for the next global shock – climate change – while it is managing the COVID-19 pandemic. Chapter 4 outlines some of the practical measures that humanitarian, development and climate actors can take to reduce the impact of disasters, through acting to reduce exposure and vulnerability, anticipate hazards and act faster, and ensure the response is sustainable and really does build back better.

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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.

4

REDUCING RISKS AND BUILDING RESILIENCE

Minimizing the impacts of potential and predicted extreme events

Contents

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, 2020).

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.

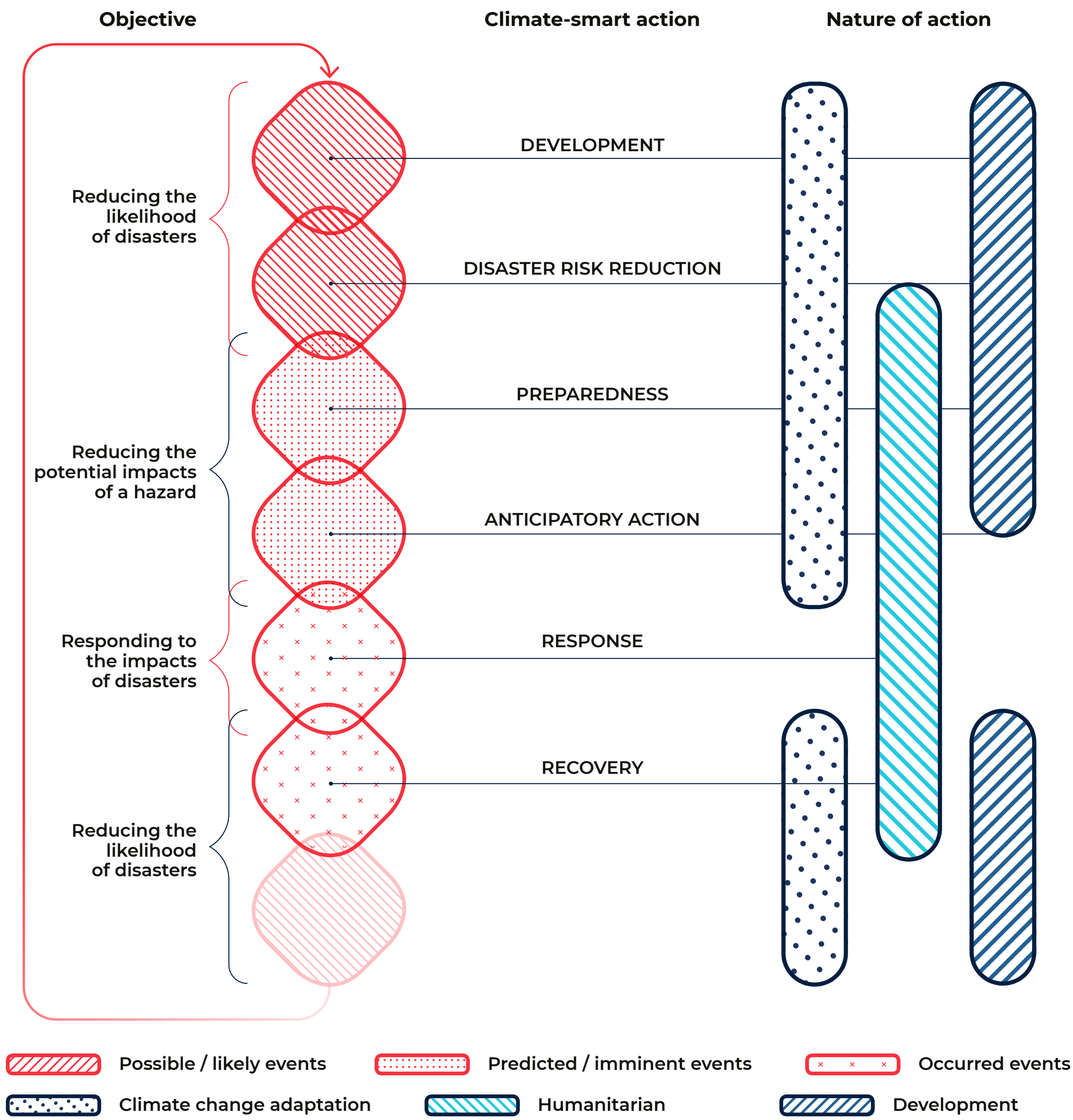
Having a sound understanding of why people are more likely to be impacted by hazards in a changing climate is essential. By understanding what makes people more vulnerable to shocks and stresses and why, it is possible to address the root causes of these vulnerabilities and strengthen people's adaptive 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.

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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

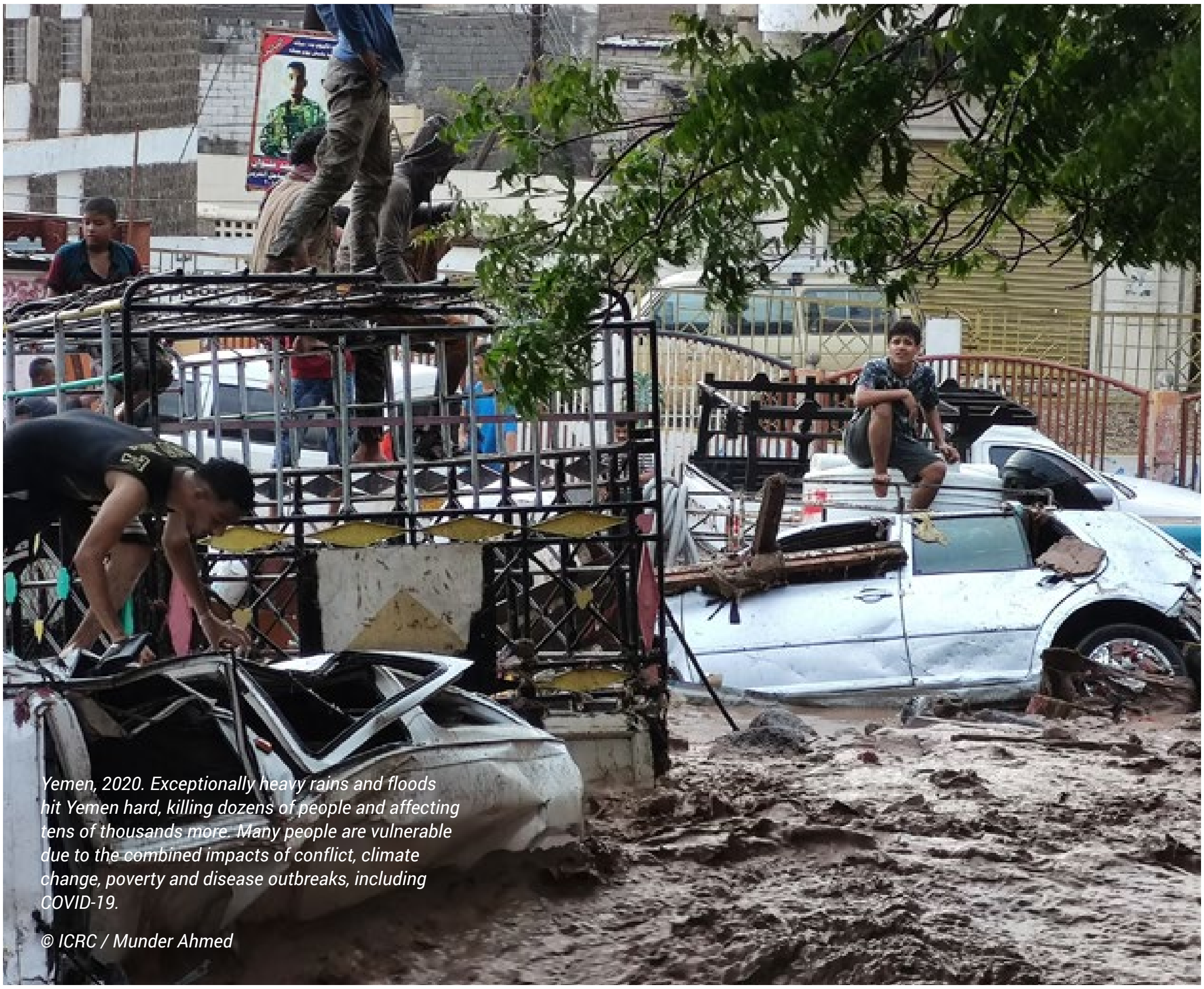
A few key challenges stand in the way of effectively addressing exposure and vulnerability to future risks. One is **being able to properly identify and understand these risks in the first place – particularly changing risks in light of climate change**. The availability, quality and accessibility of 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.

Afghanistan, 2018. A camp for people displaced due to drought. Some camps were not suitable for winter conditions.

© Afghan Red Crescent Society

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.

Mongolia, 2017. Many animals die due to starvation and cold caused by the Mongolian extreme winter dzud. Community assessments are used to analyze the risks of displacement of nomadic herders due to the dzud in support of risk reduction activities.

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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.

Philippines, 2018. PfR has worked with coastal communities in Tacloban to support them in rebuilding their lives after Typhoon Haiyan in 2013, including supporting mangrove replanting to reduce the impact of storm surges and flooding in typhoons.

© Climate Centre / Nicola Ward

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 (Hallegate 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. 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.

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, 40, is a Maasai in Nkoilale village, Kenya. Cows are an intrinsic part of the culture and daily life of the Maasai people: cattle are not simply an income source, but a way of life.

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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 2ºC 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.

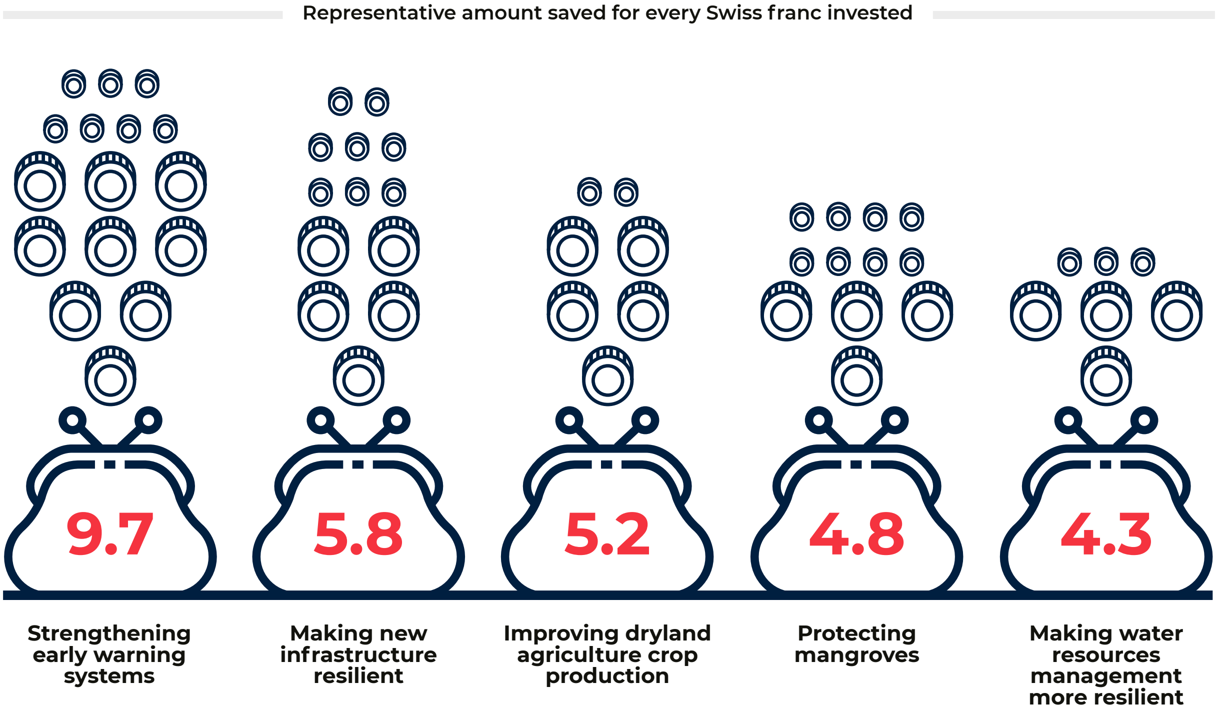
Norway, 2018. In the 2010s, 46% of disasters triggered by natural hazards were floods, affecting more than 673 million people worldwide. The economic toll of floods is high: in the first half of 2019, losses were estimated at 33.7 billion US dollars.

© 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. 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.

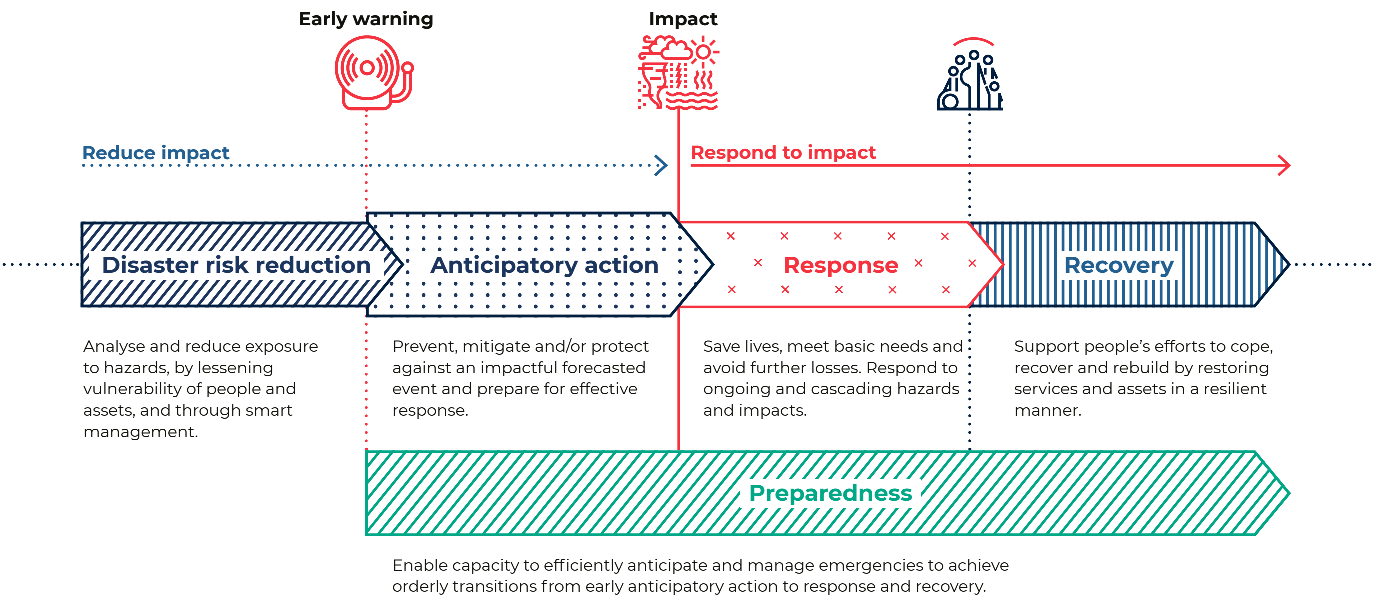
© American Red Cross / Brad Zerivitz

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 cycle



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

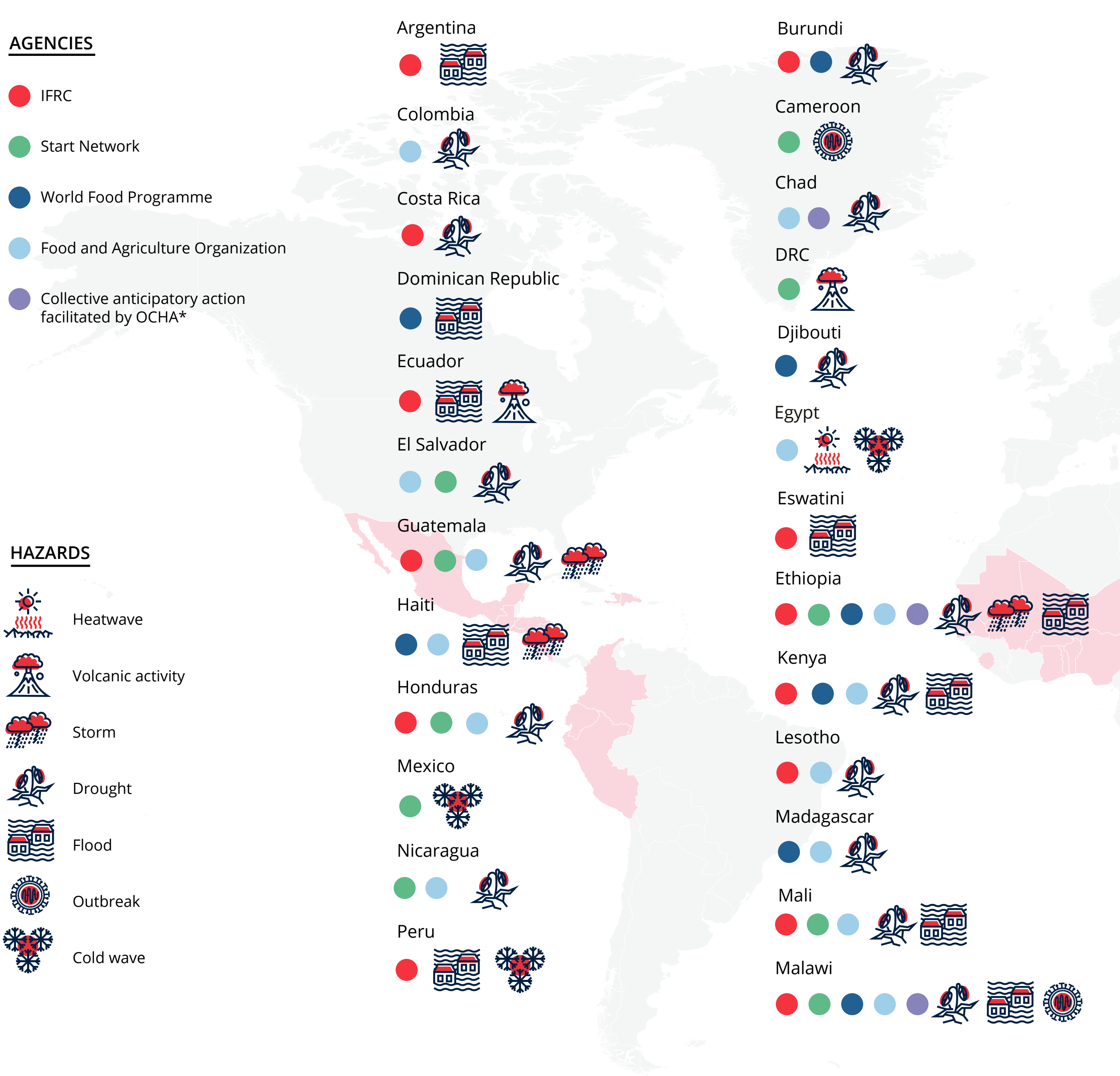
Anticipatory approaches have gained significant momentum in recent years. Alongside the Red Cross and Red Crescent Network and the World Food Programme (WFP)'s pioneering work in the form of FbF, other humanitarian agencies such as the Start Network, the Food and Agriculture Organization (FAO) and, more 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.

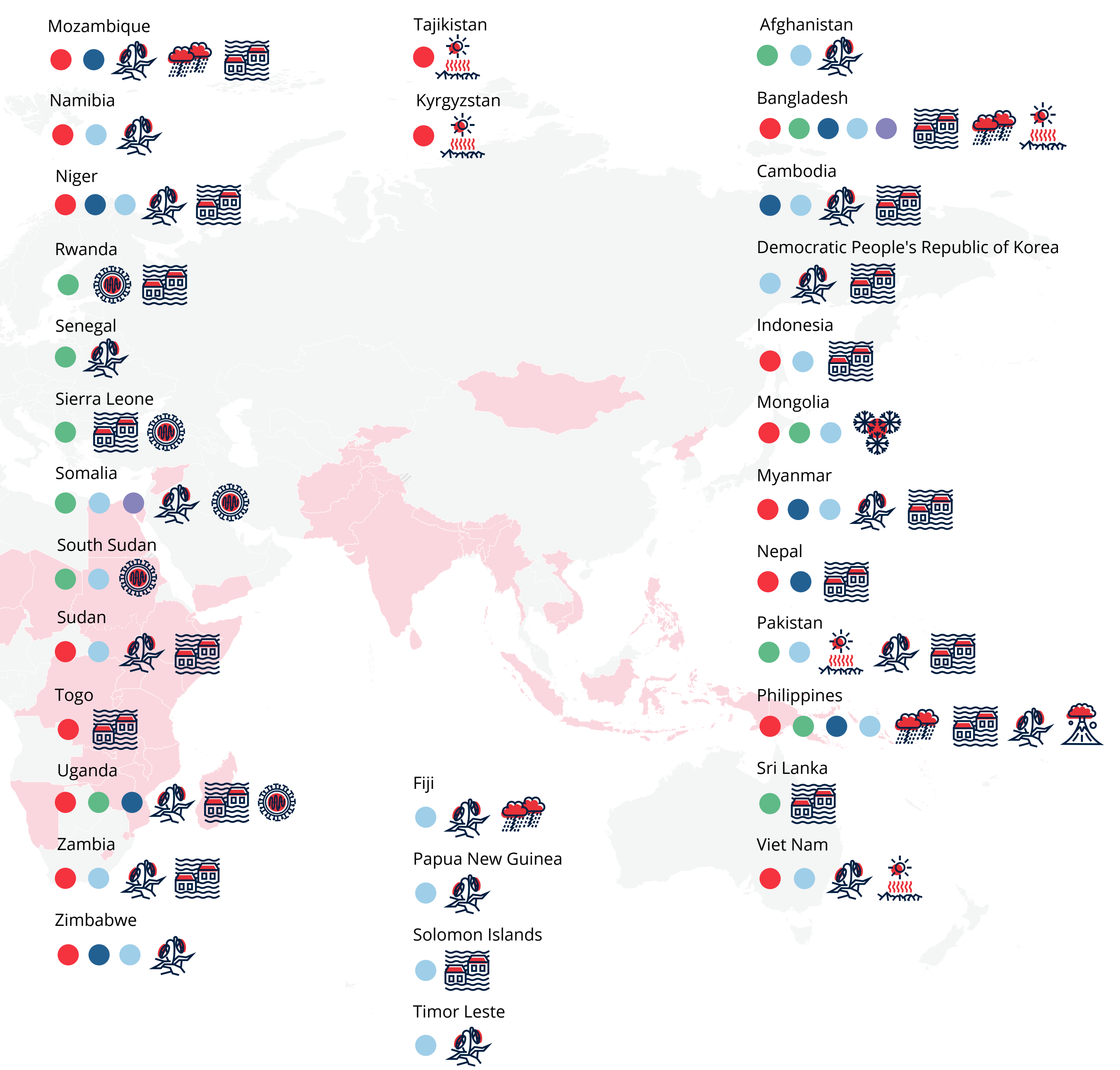
Figure 4.4: Geographic distribution of internationally supported anticipatory action initiatives in advance of natural hazards



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
Fiji
Papua New Guinea
Solomon Islands
Timor Leste
Afghanistan
Bangladesh
Cambodia
Democratic People's Republic of Korea
Indonesia
Mongolia
Myanmar
Nepal
Pakistan
Philippines
Sri Lanka
Viet Nam

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. The World Bank also provides a set of pre-arranged financing instruments, such as the Catastrophe Deferred Drawdown option, which have delivered significant early finance to governments during the COVID crisis. To date, most of them fall under response. 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 supports anticipatory action for pandemics and food insecurity crises. See Chapter 7 for more information on different disaster risk financing instruments.

All 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.

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DPRK, 2019. Red Cross volunteer Kang Song Ok in a greenhouse in South Hamgyong province. Greenhouse systems can improve growth conditions, which can reduce the need for pesticides and increase yield. However, it is important to ensure they are sustainable, as many greenhouse systems use significant amounts of fossil energy and water. (Marcelis and Heuvelink, 2019).

5 GOING GREEN

Strengthening the climate and environmental sustainability of response and recovery operations

Contents

Definitions

Sustainability: Achieving a balance between environmental, social and economic demands. Sustainable development refers to development that meets the needs of the present without compromising the ability of future generations to meet their own needs (World Commission on Environment and Development, 1987).

Environmental sustainability: A state in which the demands placed on the environment can be met without reducing its capacity to allow all people to live well, now and in the future (GEMET, 2020b). While environmental sustainability is broader than climate action, limiting climate and environmental impacts can both contribute to mitigating climate change, for instance by reducing emissions and greening practices, and to strengthening people's resilience to climate change (GEMET, 2020b; IUCN, no date; IUCN 2015).

Environmental degradation: A process through which the natural environment is compromised in some way, reducing biological diversity and the general health of the environment. It can be entirely natural in origin, or accelerated or caused by human activities (GEMET, 2020a). Environmental degradation is both an impact of climate change, and a compounding risk to communities affected by climate change.

Environmental footprint or impact: The impacts which activities can have on the environment, including through greenhouse gas emissions (the latter also known as 'carbon footprint').

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.

INTRODUCTION

Until recently, the humanitarian sector and other disaster responders have largely perceived their role in relation to climate change as being at the receiving end: at the frontlines of the climate crisis, addressing the disasters that are already exacerbated by climate change. There had been much less attention to our own climate and environmental footprint. After all, there is an incredible urgency to save lives with always-insufficient resources.

In recent years, however, there has been a shift.

First of all, humanitarians have realized that we can make a contribution to greenhouse gas mitigation, albeit a modest one. Certainly, the emissions from humanitarian response activities are hardly as polluting as some sectors of industry. Precise numbers are lacking, but very crudely, using the cost of international humanitarian assistance as a proxy,[1] the humanitarian sector could be responsible for up to 0.03% of global emissions. Modest, but not negligible.

The humanitarian sector has a responsibility to be part of the solution – otherwise we are part of the problem. This also means raising our voice – based on the humanitarian impacts of the rising risks we observe every day – as a means of contributing to a wider cultural shift to a more sustainable world. A world where our humanitarian voice can hopefully have a much wider impact than just our own footprint.

Perhaps even more importantly, our footprint also extends beyond just greenhouse gas emissions and their long-term impact on the global climate. Our response and recovery activities also affect other, much more local aspects of the natural environment, often with direct impacts on the future well-being of the very communities we serve. By neglecting these aspects, we may well be breaking the fundamental promise to do no harm, putting communities at further risk and undermining longer-term resilience and development objectives.

There is an increasing understanding in the sector of the climate impacts and environmental costs of response and recovery operations themselves, often borne by the communities who are meant to be assisted and the most vulnerable groups (Brangeon and Crowley, 2020; JEU, 2014; Johnson et al, 2020).

Moreover, reducing our own environmental footprint does not just come at a cost to effective response and recovery. There are many cases where we can be both more environmentally sustainable and more cost effective. Furthermore, response and recovery operations that effectively integrate climate and environmental risks and prioritize sustainable approaches can not only address the immediate life-saving needs of communities, but also reduce exposure and vulnerability in the longer term.

1 The global cost of international humanitarian assistance was estimated at 28.9 billion US dollars (approximately 28.3 billion Swiss francs) in 2019 (OCHA, 2020). The global economy was estimated at 87.7 trillion US dollars (86 trillion Swiss francs) in 2019 (World Bank, 2019).

There may be trade-offs to be dealt with. While in some cases, the more environmentally friendly solution can be cheaper and more efficient than our current practices, this is not always the case. We need to understand these trade-offs and navigate them consciously, reducing the negative impact of our activities where we can.

This chapter seeks to draw attention to the global and local environmental impacts of our response and recovery operations and possible solutions to strengthen environmental sustainability. Although the recommendations are targeted towards humanitarians, long-term recovery and climate-smart development should happen concurrently and recommendations are equally relevant for the development and climate sectors.

Cambodia, 2020. The local red cross branch in Svay Rieng province, Cambodia uses solar energy to operate the pumps for two water schemes. By providing more sustainable energy solutions, climate and environmental risks and impacts can be mitigated.

© Cambodian Red Cross

Mozambique, 2020. In many urban communities in Mozambique, waste management is a serious issue, raising the risk of disease. The Mozambique Red Cross is delivering community clean-up campaigns in collaboration with the authorities.

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5.1 STATE OF PLAY – UNDERSTANDING CLIMATE AND ENVIRONMENTAL IMPACTS AND RISKS IN HUMANITARIAN ACTION

There is a growing momentum in the humanitarian sector to better identify, report and improve on organizational climate and environmental impacts and risks.[2] This includes an increasing prioritization of climate and the environment in longer-term humanitarian strategies.[3] While recognizing significant progress over the last 10 years, the next decade will require even stronger commitment and a better understanding of the different aspects of the humanitarian sector's global and local climate and environmental footprint.

5.1.1 Global climate and environmental footprint: how humanitarian action risks contributing to climate change

While the countries and industries with the greatest emissions must do more to reduce their climate and environmental footprint, the humanitarian sector is recognizing the need to take responsibility for its own climate and environmental impacts. Commonly, this is focused on overall greenhouse gas emissions. How organizations choose to report on these emissions varies, as does how they define their boundaries – the scope of activities that are included in what an organization counts as 'their emissions' and over which they have a level of control and influence (Greenhouse Gas Protocol see World Business Council for Sustainable Development and World Resources Institute, no date.)

The lack of consistent boundaries and reporting metrics, as well as different capacities and priorities across different humanitarian organizations, make comparisons difficult. It also makes it very difficult to provide an accurate estimate of the overall emissions of the humanitarian sector. But very crudely if we use the cost of international humanitarian assistance globally as a proxy – estimated at 28.9 billion US dollars (28.3 billion

2 Several processes, collaborations and platforms are seeking to improve environmental sustainability policy and practice in the humanitarian sector (see for instance, the Red Cross and Red Crescent Movement Green Response Working Group, the Environment and Humanitarian Action (EHA) Network, the Environmental Emergencies Centre and the Global Shelter Cluster Environment Community of Practice). There is also the UN Greening the Blue campaign and a multitude of humanitarian organizations driving their own processes to limit and improve on their climate and environmental footprint.

3 For instance, the IFRC Strategy 2030 identifies climate and environmental crises as the top challenge for the next decade and makes strong commitments to strengthening environmental sustainability in how it delivers its services (IFRC, 2018a). The ICRC Strategy 2019–2022 includes a strategic orientation toward building sustainable humanitarian impact (ICRC, 2020a). The International Red Cross and Red Crescent Movement has also formulated its ambitions to reduce the current and future humanitarian impacts of climate change and support people to adapt to it (IFRC, 2020a). The International Council of Voluntary Agencies (ICVA) is developing its Strategy 2030. In a recent survey, 84% of participants stated that environmental change and its impact on creating and alleviating humanitarian needs must be a core focus area for ICVA; nearly 70% of participants stated that their organization already had a dedicated strategy or approach for integrating environmental change issues into their humanitarian action (IFRC and Swedish Red Cross, 2020a). These figures can be compared with the 2017 survey informing the ICVA's strategy 2019–2021, where mentions of environmental sustainability of humanitarian action and related issues were almost absent.

Swiss francs)in 2019 (OCHA, 2020) as a proportion of global GDP at 87.7 trillion US dollars (86 trillion Swiss francs) (World Bank, 2019), then the humanitarian sector could be responsible for up to 0.03% of emissions.

One recent example showing emissions from humanitarian programmes is from the water, sanitation and hygiene (WASH) sector. A life-cycle assessment of the standardized IFRC Water, Sanitation and Hygiene Emergency Response Unit, which can provide water treatment and distribution for 40,000 people for a maximum of 4 months, estimates that each deployment has the equivalent of 1.3 million kg CO^2 emissions (Berggren, 2020). Problem areas include transporting water from site for water treatment to the distribution point, producing the M40 (the nuts and bolts of the unit) and flying it around the world.

5.1.2 Local environmental footprint: actions that exacerbate short- and long-term vulnerabilities

The local environmental impact of humanitarian action, while not always having direct implications for climate change, can have a direct and long-term impact on people's health, livelihoods and ability to recover from disasters and rising climate shocks and stresses, and therefore has a compounding effect on vulnerability. The potential impact depends on the types of intervention undertaken, the approaches used (such as the type of waste management practices, how the shelter materials are sourced), and the scale and broader context of the response, including the fragility/strength of the environment and ecosystems. For example, a large WASH or shelter infrastructure project will generally have a more significant impact than a community-based public health messaging project.

There are many examples of adverse environmental impacts resulting from humanitarian response and recovery operations, including the over-extraction of natural resources such as water from aquifers and firewood and building materials from forests. For instance, the building of 20,000 houses as part of a post-conflict housing programme in Sri Lanka required an excess of 60,000 fully grown trees in the construction process. To reduce the costs of building, families were allowed to use suitable trees from their own land. Without significant mitigation measures, it is clear that this type of practice will result in unsustainable management of natural resources and have an adverse environmental impact, where a long-lasting conflict already had taken its toll on the environment and natural resources (bombs had destroyed many trees). The mid-project review identified this challenge, among others, and recommended a modified house design that used less timber as well as setting up a tree planting project to replace the trees being cut down (IFRC, 2020b, interview with humanitarian shelter expert). In eastern Chad, the additional needs for water, firewood, pasture and land for cropping around the 12 camps housing 360,000 Sudanese refugees since 2004 resulted in a deforestation radius of up to 20 km from the camps (EHAN, 2020; see also WeADAPT and SEI, 2020).

Adverse environmental impact caused by humanitarian action also includes the improper management of waste, including hazardous waste, which particularly affects developing countries without sufficient infrastructure or waste management systems (see for example, Zhang et al, 2019; IFRC and Swedish Red Cross, 2020b; OCHA et al, 2013; USAID, 2020). Waste, in particular use of plastic, can be significant. For example, the Shelter Cluster reported that more than 12 million pieces of tarpaulin were distributed in humanitarian shelter operations during 2018 (IFRC, 2020b, interview with humanitarian shelter expert).[4] The recent reduction of plastic sub-packaging in IFRC kitchen sets has resulted in an estimated 250,000 to 300,000 fewer pieces of plastic annually. While this is a positive change, picture the environmental impact such a large number of plastic bags would have on communities, and the impact the packaging of other relief items still has (GRWG, 2019). Solid wastes, such as plastics, can clog waterways, increasing risks of flooding and waterborne diseases.

An inappropriate selection of a water distribution site during a 2011 flood response put communities at risk – it was in the middle of the local rubbish dumping ground and adequate drainage was not put in place – increasing risk of contamination of the water (such as jerry cans becoming contaminated) and health issues arising from stagnant water (such as mosquitoes carrying diseases) (Swedish Red Cross, 2020a, interview with humanitarian WASH expert). Poor waste management practices following the 2010 Haiti earthquake led to the largest cholera outbreak in recent history (Cravioto et al, 2011). Each of these situations has implications for the short- and long-term vulnerability of communities. Several of these situations could have been avoided had international humanitarian agencies better consulted communities, local environmental and ecosystem services experts and authorities and used environmental data to inform programming (Crowley, 2019; JEU, no date; JEU, 2014; Kelly, 2013; Tull, 2019).

Humanitarians are bound by a fundamental promise to seek to alleviate human suffering **wherever** it is found. Sometimes this means providing immediate humanitarian assistance to displaced communities living in areas of high environmental and climate risks. Sometimes it is just where people turned up; sometimes displaced people, asylum seekers or refugees are allocated to, or allowed to reside in, areas of already fragile or degraded land because these are uninhabited or less commercially attractive. In Cox's Bazar, Bangladesh, near the border with Myanmar, around 900,000 people displaced from Rakhine State, Myanmar, are living in congested camp settlements in areas highly exposed to flooding and landslides. Environmental impact assessments from Cox's Bazar highlight a number of common environmental issues caused by both the humanitarian crisis and the response. These include: rapid deforestation, including of protected areas (primarily due to firewood collection), alarming groundwater depletion and contamination, rapid biodiversity reduction and poor management of sewer sludge. There is also a gendered aspect to these environmental impacts, where women and girls are required to walk further to collect firewood, increasing protection needs (IFRC and Green Response Working Group, 2017; UNDP Bangladesh and UN Women, 2018).

Climate and environmental risks and variations can significantly impact humanitarian response operations and put already vulnerable communities in harm's way. Often, we do not know the full impact of our actions on the environment or on the long-term vulnerabilities of communities. It can take several years or even decades to see the full environmental impact of response and recovery operations, in which time international humanitarian agencies will most likely have left and funding ceased, leaving the responsibility of environmental recovery to local authorities, civil society and communities.

The humanitarian project cycle is designed to be temporary and short term. However, with the average humanitarian crisis now lasting more than nine years (and some operations in protracted crises lasting over 36 years (ICRC, 2016)), and an increasing number of people being displaced for longer periods of time (OCHA, 2019, 2020), short-term thinking is no longer an option.

4 Note this includes only what is coordinated through the Shelter Cluster and not locally bought tarpaulins or tarpaulins used for other sectors such as WASH and health.

Bangladesh, 2020. A mother and daughter search for debris from their electronics shop following Cyclone Bulbul. Electronic waste contains harmful substances which can pose significant risks to water, air, soil and human health if not properly managed.

5.2 GETTING TO WHERE WE NEED TO GO – HUMANITARIAN ACTIONS THAT SUPPORT CLIMATE AND ENVIRONMENTAL SUSTAINABILITY

Taking a strong sustainability approach means focusing on strengthening climate and environmental sustainability as it encompasses and establishes the necessary conditions for economic and social sustainability and development (Barua and Khataniar, 2016; Pelenc et al, 2015). Environmental sustainability is intrinsically linked to social and economic sustainability and any action to further one dimension should always include the others. To provide sustainable response and recovery efforts, it is vital to embed social sustainability principles and normative and regulatory frameworks, including those around protection, gender and inclusion, community engagement and accountability, and supporting and enabling local action.

Two main aspects of environmental sustainability should be considered in the humanitarian sector. First (as already discussed), a stronger emphasis on identifying and addressing communities' underlying social, economic and environmental vulnerabilities and exposure to past and future risks.

Second, addressing immediate humanitarian needs in a way that does not break the fundamental promise to 'do no harm' by putting communities at further risk, but rather reduces their vulnerability and exposure, so they are more resilient to the next hazard. This means identifying, reporting and improving on global and local climate and environmental impacts (GRI, 2016b). This aspect encompasses both internal practices and the entire humanitarian project cycle. Without it, the humanitarian sector cannot be a credible voice in the global climate action and resilience debate, nor a good partner to the communities it works with.

At global level, this means assessing and limiting the most significant climate and environmental impacts, calculating, reporting on and reducing emissions, and demanding higher quality and sounder practices along the supply chain. This also means considering accountability measures to reduce the transfer of risks – from present to future generations and from the people at the start of the humanitarian supply chain to the people at the end.

At local level, this means incorporating climate and environmental data and considerations in each step of the project cycle – including in programme design – across the disaster risk management (DRM) continuum and ensuring sustainable approaches to addressing humanitarian needs, for example water and sanitation, shelter, health and social protection. This should include training and awareness for communities on environmentally friendly practices, so that, for example, communities that receive plastic sheeting know how to reuse or properly dispose of materials to avoid creating more waste. It also means designing and implementing multi-sectoral recovery operations that encompass the principles of build back better and integrate risk reduction, climate action and environmental protection – in close collaboration with international, national and local development and climate and environment agencies (IFRC, 2020c).

Across these two aspects also lies a responsibility to enable local voices and the voices of the most vulnerable groups and those most impacted by climate change and environmental degradation to be heard at all levels of the climate and environment debate, and advocate for more effective action and investment. It includes calling on all states and actors to take urgent and large-scale action, not only to reduce emissions but also to strengthen investment in nature-based solutions and climate-smart development and programming, and to better integrate environmental and ecological dimensions in national adaptation planning processes (GCA, 2019; Griscom et al, 2017; Morgan et al, 2019; UN Environment, 2019).

1. Establish a common approach across all organizations

Without a common understanding and approach, it is difficult to establish concrete actions, indicators and standards. Interviews with humanitarians from the UN, World Wildlife Fund and across the International Red Cross and Red Crescent Movement, as well as recent reports, highlight that the concept of environmental sustainability is still poorly understood and environment and climate change are conflated, both within and across humanitarian organizations (Hartelius, forthcoming 2020; see also EHAN, 2020; Johnson et al, 2020).

A common approach enables definitions, standards, safeguards and reporting mechanisms to be established which in turn allows tools, guidance and resources to be shared across the humanitarian sector. A common approach must align to international sustainability industry standards and normative and regulatory humanitarian frameworks, standards and safeguards. This development will also enable donors to apply consistent standards and reporting requirements, which will support simplified and harmonized reporting for implementing partners. A common approach must also be flexible enough to allow for contextualization, including taking into account local and indigenous knowledge and practices.

There are several ongoing cross-organizational initiatives that will assist in establishing a common approach to environmental sustainability. Collaboration across these different initiatives is crucial to avoid duplication or different standards that complicate compliance. Sphere has published a factsheet on reducing environmental impact in humanitarian response (Sphere, 2018). The UN Environment Programme (UNEP)/ UN Office for the Coordination of Humanitarian Affairs (OCHA) Joint Environment Unit is supporting the integration of environmental considerations and indicators for the development of the Joint Intersectoral Analysis Framework, led by OCHA and the Global Cluster Coordinators Group. The Joint Environment Unit also convenes a remote environmental analysis cell that is activated immediately following a crisis to ensure that environmental risk and considerations are factored into the sector-wide remote analysis work coordinated by OCHA. The ICRC and IFRC are leading a consultative process to develop a Climate and Environment Charter for humanitarian organizations. UNEP is also developing sector-wide guidance to address the relationship between environment and humanitarian needs in humanitarian response planning.

2. Reduce our carbon footprint

As part of a common approach, the humanitarian sector has the opportunity to align its processes with industry standards to assess, report on and reduce its carbon footprint (see for instance, GRI, 2016a; Greenhouse Gas Protocol (World Business Council for Sustainable Development), no date; ISO, 2018). As already noted, the estimated contribution by the humanitarian sector to global emissions may not be significant. However, we all have a role to play, and we must show that we can move from words to actions.

When assessing their global environmental impact, humanitarian organizations commonly apply the established standards and parameters of energy, water and paper used in offices, waste management practices, procurement and transport and travel behaviours (see for example, UN, 2019). While such reporting is important, including emissions from the humanitarian supply chain (such as producing and transporting relief items such as tarpaulins, kitchen sets, hygiene kits, food and seeds) more accurately reflects the true global impact of a humanitarian organization (ICRC, 2018; IFRC, no date b; IFRC, 2018b). This is especially true as the humanitarian supply chain represents a material proportion of the overall climate and environmental footprint of the humanitarian sector (see for example, Hasselbalch et al, 2014; Salvadó et al, 2017; Sarkis et al, 2013; Van Wassenhove, 2006). In 2018, ICRC mapped the environmental impact of its activities worldwide, including greenhouse gas emissions, from its activities and humanitarian supply chain. The assessment showed that acquiring and distributing relief items – primarily rice, vegetable oil and hygiene parcels containing cotton-based products – made the biggest contribution to the organization's footprint, accounting for nearly 30% of the total (ICRC, 2018).

There is growing interest among National Red Cross and Red Crescent Societies, supported by ICRC and IFRC, to learn from each other, share resources and align processes and procedures to reduce our collective carbon footprint within the Movement. Since 2017, the Costa Rican Red Cross has been working as part of the Blue Flag Initiative, a programme that awards eco labels to organizations that meet a range of criteria that reduce climate change effects. Among other activities, it has cut down its use of water, electricity and fuel, saving more than 81,000 Swiss francs. The next goal is to make the National Society carbon neutral by 2022. The British Red Cross has also made significant efforts to assess, report and significantly cut its carbon footprint, and aims to become carbon neutral by 2030 (British Red Cross, no date a and b). In 2019, the Swedish Red Cross exceeded its target of lowering its carbon emissions by 10% annually, reporting a 28% reduction in metric tons of carbon dioxide per employee (Swedish Red Cross, 2019). It is also working closely with the Lebanese Red Cross to share resources and knowledge on how to improve environmental sustainability across its internal practices and programme delivery, including improving office practices and piloting environmental assessments and green techniques for WASH programmes.

3. Design climate-smart and sustainable response and recovery operations

a. Use environmental risk data to inform programming

As already mentioned, all development, disaster risk reduction (DRR) and humanitarian efforts must be based on a sound risk analysis informed by present and future risks in a changing climate. This includes evolving risks and vulnerabilities of the surrounding environment and ecosystems, and the impacts of different response and recovery efforts. Certain aspects of environmental impacts are more due to the nature of a humanitarian crisis and the fragility of the ecosystem than the response. As outlined earlier, in an emergency phase, there may not be a choice of sensible location. However, humanitarians always have a responsibility to design interventions based on community needs and priorities, in a way that does not cause further harm or put communities at risk. Drawing on international, national and local environmental expertise, lived experience and local knowledge to identify and mitigate risk in programme design is crucial.

With limited time and resources, assessing and integrating environmental risks must be made simple for practitioners in the field. The Nexus Environmental Assessment Tool (NEAT+) was developed by the Coordination of Assessments for Environment in Humanitarian Action Joint Initiative to provide a practical and rapid project-level environmental screening for humanitarians to quickly identify issues of environmental concern (EEC, no date). The NEAT+ has been piloted by over ten humanitarian organizations in operations worldwide. This has included and emphasized the added value of community consultations in collecting more detailed contextual information, validating results and engaging community members in the planning and implementation process. The NEAT+ is a first step for humanitarian practitioners to flag climate and environmental risks, and highlights the need for further in-depth assessments that consider scientifically based current and future climate risks.

There are significant climate and environmental risks and impacts that can be mitigated by changing how we respond to humanitarian needs. This includes providing more sustainable energy solutions such as fuel-efficient stoves and solar lighting (reducing the need for firewood as well as emissions) and more sustainable WASH solutions including rainwater catchments (reducing over-extraction of aquifers), improved waste management practices and reducing the use of single-use plastics (reducing health risks).

There is an element of raising concerns with relevant authorities about longer-term needs and how to transition from immediate response to longer-term recovery that can incorporate principles of build back better and reduce exposure and vulnerability of communities. In contexts with expected longer-term camp settlements, this can include land-use negotiations.

As outlined in Chapter 4, it is vital to seek advice from specialists on the regional climate trends and projections and flood/drought modelling, as well as from sector agencies exploring adaptation options applicable to the area in question. While site-specific climate projections will not be available to the level of detail planners might want, general projections for the region or country on likely new extremes (in temperature, heatwave risks, rainfall extremes, possible new flood levels and so on) can at least be considered in the disaster preparedness planning. The alternative – just expecting and planning based on current risk levels – would, of course, be an unforgivable omission.

BOX 5.1: CHECKLIST FOR CLIMATE-SMART DESIGN OF RESPONSE AND RECOVERY OPERATIONS

1. Are camps and reconstruction sites positioned and planned with the changing local risks in mind – for example, in potential flood risk zones (new flood risk levels with climate change-induced extreme events)?

2. Are they set up to handle ever-increasing heatwave risks? For example, in the various camps managed by several agencies in the Middle East, how do they cater for vulnerable inhabitants' needs to stay cool and hydrated?

3. Are camps/refugee settlements established in wooded localities sensitive to local energy demand (wood fuel) that could lead to speedy depletion of forest cover (for example, the case of the Mantapala Refugee Settlement hosting thousands of Congolese refugees in Northern Zambia)? Is there a risk of inducing long-term variability of rainfall patterns?

4. Are camp management systems heeding early warnings to take early action in case of disaster, such as floods or heatwaves?

5. Are WASH facilities and water provisions able to handle water shortages in 'new extreme' drought scenarios?

b. Mainstream climate and environmental considerations into existing processes and tools

For climate-smart programming and environmentally sustainable practices to become part of the humanitarian sector's ways of working, the identification of climate and environmental risks and mitigating measures as well as other environmental considerations must be effectively integrated across existing processes and tools. This must be done in preparedness so that it can be effectively and efficiently rolled out during response and recovery operations. A wide range of useful tools, resources and guidance already exists (eg ehaconnect.org) but without effective mainstreaming, prioritization will almost inevitably become an issue, especially in a humanitarian context.

Learnings from deploying an environmental field advisor to support the Mozambique Tropical Cyclones Idai and Kenneth operation highlight the importance of timing milestones in the programmatic cycle. It is not enough to identify environmental risks and propose mitigating measures if the assessment does not align with the timing of the Emergency Plan of Action revision, or if longer-term local staff are not sufficiently trained and aware of how to drive the issues once the deployment has finished.

The IFRC global response to the COVID-19 pandemic highlights similar issues, including the importance of updating planning and reporting templates and allocating responsibilities. While recognizing the need for integrating environmental considerations into response and especially recovery planning, the lack of dedicated space, prompts and assigned responsibilities across technical areas in the Emergency Plan of Action template poses a challenge, further highlighting the continuing issue of thematic silos for cross-cutting issues (Swedish Red Cross, 2020b, interview with IFRC Disaster and Crisis Preparedness, Response and Recovery team staff members). A small adjustment is crucial – prompting the identification of environmental risks and opportunities into assessment, planning, budgetary and evaluation tools and templates, such as the Global Humanitarian Response Plan and the Emergency Plan of Action process.

Australia, 2020. Aboriginal Elder Keith Nye worked tirelessly to help his community after the bushfires destroyed his town and helped set up a recovery centre supported by the Red Cross. Indigenous communities play a vital role in environmental management and sustainable development.

© Australian Red Cross / Dilini Perera

Bangladesh, 2019. A drying bed being prepared at the British Red Cross faecal sludge management site in Cox's Bazar. Sewage collected from the latrines is treated with lime and dried out over a series of days. It can then be used to make ash fertilizer, or as rubble to help support walls and river banks.

BOX 5.2: RED CROSS AND RED CRESCENT WORKING TOWARDS A GREEN RESPONSE

The Red Cross and Red Crescent Movement Green Response Working Group, chaired by the Swedish Red Cross, works with partners in and outside the Movement to progress initiatives seeking to improve the environmental sustainability of humanitarian action. Activities sit across the DRM spectrum, from more sustainable climate-smart DRR programming and resilience building, through to effective preparedness, response and recovery efforts.

The group collaborates with specialists from each thematic area of intervention (such as shelter, WASH, procurement and logistics, health) and with National Societies to assess, develop and action recommendations for improving practices in preparedness, building capacities and improving standards. It also seeks to support and promote more sustainable solutions during response and recovery operations, through deploying environmental specialists and developing and piloting new techniques in the field. For example, in recent responses, environmental specialists have been deployed to support the Mozambique Tropical Cyclones Idai and Kenneth operation and the Bangladesh Population Movement operation in Cox's Bazar. Over two years, the group has also been involved in refining the Aerobic Faecal Sludge Treatment Unit in Cox's Bazar, seeking to reduce risks to human health and the environment by improving excreta management in emergencies.

The group is part of the ICRC-IFRC Sustainable Humanitarian Response project which focuses on strengthening sustainability in humanitarian supply chain management and integrating environmental risk assessments into needs assessment, planning and evaluation tools. This includes taking learnings from the Red Cross and Red Crescent Movement's piloting of the Nexus Environmental Assessment Tool (NEAT+) in the Democratic Republic of the Congo and Lebanon in 2019 and 2020.

For more information on Green Response, see IFRC's website (IFRC, no date a). See also the publication on COVID-19 and Green Response (Swedish Red Cross, 2020c).

c. Build capacity within the humanitarian sector

The need to invest in dedicated staff and staff time at every level, from the headquarters to the field, has been highlighted in recent research reports on this topic (Brangeon and Crowley, 2020; Hartelius, forthcoming 2020; Johnson et al, 2020). This requires investment in time, people, systems and technologies, which in turn requires clear commitment from our leaders.

There are two parallel approaches to the build capacity of humanitarian personnel for more climate-smart and sustainable response and recovery operations. One is environmental experts deployed to support response and recovery operations, such as those deployed to support IFRC operations in Mozambique and Bangladesh, or as part of the UN Disaster Assessment and Coordination team to support the Hurricane Dorian operation in the Bahamas (GRWG, 2019; JEU, 2019).

The other approach is to require and build environmental competencies as part of core competencies for national and international emergency response and recovery staff. For instance, the IFRC tiered Core Competency Framework for Rapid Response Personnel includes environmental competencies (IFRC, 2019) and the National Society Preparedness for Effective Response approach includes environmental considerations to support the strengthening of local capacities.

Interviews with humanitarians have highlighted that field personnel who understand the added value of increasing climate and environmental sustainability across operations and have the relevant competencies, not only promote more sustainable approaches to addressing needs, but build the capacity of their colleagues, a process which is then replicated across subsequent operations (Hartelius, forthcoming 2020). The ICRC and IFRC have developed an open access four-week course on Sustainable Development in Humanitarian Action (ICRC and IFRC, no date). UNEP, with support from partner agencies and organizations, is developing e-learning on the environmental dimensions of human mobility.

4. Invest in local environmental capacities

Local voices have not been adequately included in discussions on strengthening environmental sustainability of humanitarian action, missing the wealth of expertise across traditional knowledge systems and national scientific institutions. Indigenous and other local communities have a recognized vital role in environmental management and sustainable development.[5] Women's leadership in addressing the climate crisis more generally has also been recognized (Figueres and Rivett-Carnac, 2020). However, too often these stakeholders are excluded from planning- and decision-making processes.

Aboriginal people were among those most affected by the 2019–2020 bushfires in south-eastern Australia. Following the bushfires, traditional Aboriginal burning practices as part of DRR measures for Australia were prominent in the public discourse, however the role of Aboriginal people in disaster recovery and planning more generally was largely absent (Williamson et al, 2020). Australian Red Cross made significant efforts to ensure that recovery efforts build on respectful partnerships with First Nations organizations and communities, leveraging their deep and long-standing knowledge of caring for the country and coping with disasters. This includes recruiting Aboriginal and Torres Strait Islander recovery officers in each affected state (Australian Red Cross, 2020).

5 See for example, the Brundtland Report (World Commission on Environment and Development, 1987); the UN Rio Declaration on Environment and Development and the Convention on Biological Diversity (UN, 1992b); and the UNDRR Sendai Framework for Disaster Risk Reduction 2015–2030 (UNDRR, no date).

BOX 5.3: SPANISH RED CROSS: STRENGTHENING ENVIRONMENTAL PRACTICES DURING COVID-19

Spain reported its first case of COVID-19 on 2 February 2020. The spread of the virus quickly escalated, reaching over 9,000 cases daily by 26 March (Spanish National Centre for Epidemiology, 2020; WHO, 2020). The medical system was pushed to its limits and movement restrictions were imposed to slow down the spread of the virus. Since the crisis began, nearly 213,000 Spanish Red Cross staff and volunteers have worked tirelessly to help contain COVID-19 and care for the most vulnerable people.

For over 15 years, Spanish Red Cross has also actively focused on strengthening environmental sustainability of its programmes and practices. This includes integrating environmental aims and objectives in project planning templates and emergency plans of action. The COVID-19 response has been no different, including specific objectives to raise awareness of the environmental aspects of the pandemic and providing guidance and training on how to improve environmental practices at home. See environment and COVID-19 training module (in Spanish) (Spanish Red Cross, no date a).

COVID-19 has also had a compounding effect on people living in energy poverty. In Spain, around 4.5 million people could be at risk of this. In 2018, Spanish Red Cross launched a three-year programme targeting 40,000 families to assist them in improving the energy efficiency of their homes (Spanish Red Cross, no date a). This has become even more important as people are staying at home – and may need to do so during heatwaves or extreme cold events – and has been integrated into the COVID-19 response.

Spanish Red Cross is working closely with its public authorities and the private sector to ensure families do not have to choose between buying groceries and keeping the lights or heating on. "Our assistance is incomplete if we don't attend to the environmental aspect of a person's vulnerability" says Sara Casas Osorio, Spanish Red Cross Environmental Sustainability Advisor, emphasizing that effectively integrating environmental sustainability across the whole organization has been a long process, significantly enabled by senior leadership support, annual budget allocation and the establishment of an environmental department.

Local humanitarian and civil society actors have the relationships, knowledge and longer-term capacities to work with national and international partners to ensure that the impact of humanitarian action is sustainable.

Contextualized analysis for understanding existing and future climate and environmental vulnerabilities requires longer-term meteorological and environmental data. In contexts where such data and knowledge are available, local environmental agencies and authorities can provide the necessary longer-term perspective for environmental sustainability across the humanitarian–development nexus. In contexts with limited data and knowledge, the humanitarian, climate and development sectors should prioritize building up local data and capacities by establishing partnerships with local communities and relevant experts. Building this capacity, structures and systems longer term will allow international, national and local actors across the different sectors to access crucial information for reducing exposure and vulnerability. It will also assist humanitarian agencies in delivering emergency and recovery assistance that is informed by climate and environmental risks (ICRC, 2020b).

Local humanitarian and civil society actors have the relationships, knowledge and longer-term capacities to work with national and international partners to ensure that the impact of humanitarian action is sustainable. Crucial to this is the role of law and policy to create governance structures for increased coordination, empower local actors and hydrometeorological and scientific institutions, and enable community-driven solutions that promote indigenous knowledge and women's leadership.

Strengthening environmental sustainability should not become the privilege of well-funded, international humanitarian agencies. Donors have an important role in driving quality improvement through stronger environmental compliance and accountability requirements (Brangeon and Crowley, 2020; JEU, no date). Yet there is a risk that instead of driving improved conduct by key responders, these approaches exclude local responders from funding due to challenging compliance requirements (Swedish Red Cross, 2020d, interview with the Alliance for Empowering Partnerships). Recent research by the Red Cross and Red Crescent Movement Green Response Working Group on barriers and enablers for effectively greening practices and strengthening environmental sustainability across the International Red Cross and Red Crescent Movement highlights similar issues. Implementing and less financially sustainable National Societies often have to prioritize limited organizational development funding on facilities, equipment and staff costs, rather than improving their environmental footprint. Similarly, projects – even climate smart and environmentally sustainable ones – are often limited by funding cycles, geographical locations and timeframes, with limited ability to scale up (Hartelius, forthcoming 2020). Donors must therefore allow for adequate budgeting to account for the true costs of different actions. It is important to invest in long-term support and predictable funding alongside compliance requirements, to strengthen policies and procedures for climate and environmental sustainability, and to build and especially retain local capacities and create genuine partnerships with local responders in the driver's seat.

5.3 CONCLUSION AND RECOMMENDATIONS – MAKING IT BETTER, NOT WORSE

A climate-smart approach for the humanitarian sector (and others involved in DRM) requires us to take on our measure of responsibility for mitigating climate change as well as adapting to it. As a sector, we accompany communities struggling to avoid or withstand disasters and we have a particularly stark view of some of the worst consequences of climate change. This can inspire our efforts to be part of the solution.

Both the everyday activities of our organizations and our disaster response and recovery operations have impacts on the climate, and also on the local environment – some similar to other sectors and some particular to our context. Operations can be designed and implemented to support resilient community recovery, address underlying risks and vulnerabilities and support longer-term climate smart development objectives (IFRC, 2020c).

Also, as pointed out in Chapter 4, an environmentally informed approach is not only useful for reducing our negative impacts. Nature-based solutions to addressing climate-driven disaster risks are among the most efficient and effective (GCA, 2019; Griscom et al, 2017; UN Environment, 2019). By strengthening the environmental sustainability of response and recovery operations, we can meet immediate humanitarian needs and reduce vulnerability and exposure in the long term. Environmental considerations need to permeate the entire DRM cycle.

This includes establishing partnerships with local, national and international development, climate and environmental agencies and developing joint proposals with expanded time frames to allow for concurrent short-, medium- and long-term interventions. Such partnerships can enable a multi-sectoral programmatic approach that is data driven and risk informed, directed by communities' expressed needs and priorities, that meaningfully works towards achieving collective outcomes in line with the New Way of Working (Joint Steering Committee to Advance Humanitarian and Development Collaboration, 2020).

How we need to do things differently

Get serious, and professional, about the climate and environmental footprint of the humanitarian sector

- The humanitarian sector needs to scale up its ambitions to transparently report and improve on its global and local climate and environmental footprint and to invest in, and effectively mainstream, more environmentally sustainable approaches.
- There is a need for many in the sector to become more educated about the environmental impacts of their own activities, and about key tools (such as environmental assessment tools) and good practices that various organizations have successfully piloted.

- Establishing common approaches, indicators and standards across the sector will help to build an overall cultural shift and achieve a reasonable balance with other priorities.

- Donors can play a critical role in the success of these efforts, by encouraging and funding humanitarian organizations to put in place the necessary systems and tools (which can have significant up-front costs) and coordinating among themselves to avoid contradictions in their demands on funding recipients. This also means recognizing that greener products might be more costly, and that additional investment will be needed to support a more environmentally friendly response.

Support, and don't undermine, localization through environmental initiatives

- Working with local actors and communities must be recognized as central to a sustainable response. This includes incorporating local, traditional or indigenous knowledge into the design of the activities and actively investing in inclusive processes.

- International investment in 'greening' humanitarian action must reinforce our commitments to increase our investment in the leadership, delivery and capacity of local actors. Investments in analysis, monitoring and system improvement should take into account the quality, costs and environmental impacts of longer and shorter supply chains as well as the deployment of goods and foreign personnel across the world. Investments should also support local actors to be leaders in greening efforts.

- At the same time, it is important to ensure that local partners of international humanitarian organizations are not impossibly burdened by pass-through environmental requirements that are inadequately resourced and unrealistic in their contexts.

Invest in more environmentally sustainable approaches across the DRM cycle, including nature-based solutions and climate-smart programming

- Environmental sustainability cannot be an add-on to the humanitarian sector but must be the fundamental way in which we approach our work. We have an opportunity to advance our ways of working through more climate-smart, risk-informed programming, and through developing new technologies, combined with local and traditional knowledge and approaches, to more efficiently and sustainably address needs.

- In response and recovery efforts, we must identify and take into account evolving risks and vulnerabilities of the surrounding environment and ecosystems, as well as the impacts of different interventions. We must integrate the principles of build back better from the start.

- We need to work collectively – across communities, international, national and local development and climate and environment agencies – with resilience as a common goal, to support communities' own adaptation and mitigation efforts, including through promoting and investing in nature-based solutions.

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Indonesia, 2019. The Indonesian Red Cross Society provides critical information, community-based surveillance and referrals in coordination with Government Ministries to help stop diseases from spreading. Local risk governance requires effective engagement with – and support to – local partners and communities.

6

CLIMATE-SMART DISASTER RISK GOVERNANCE

Ensuring inclusive and coherent regulatory frameworks

Contents

INTRODUCTION

Previous chapters have made clear that the new reality of climate-related disasters is a classic 'wicked problem': it is complex, multi-layered (for example, unplanned urbanization in flood-prone areas) and has no single or final solution. We need a holistic, anticipatory and forward-looking approach that engages people and institutions from every walk of life. Solving a puzzle this big requires governance tools – laws, policies and institutions – that are climate smart and ready for the new era.

In 2015, three main global instruments were adopted that set out roadmaps for climate-smart governance: the Sustainable Development Goals (SDGs) as the heart of UN 2030 Agenda for Sustainable Development, the UN Framework Convention on Climate Change (UNFCCC) Paris Agreement and the Sendai Framework for Disaster Risk Reduction 2015–2030. But five years on, many countries have yet to implement these commitments in a coherent way, or get better at integrating their national and subnational laws, policies and systems.[1] This is partly because the global frameworks were set up in parallel and with different structures – prompting a corresponding fragmentation at national level.

Disasters do not fit neatly in a single sector (whether agriculture, urban planning or anything in between). Recent events have shown that while governments and communities are responding to one disaster event, another may be just around the corner. A good example is the desert locust invasion, flooding and COVID-19 pandemic that simultaneously struck Eastern Africa in 2020. As Chapter 3 shows, disasters also spring from the factors that make communities vulnerable to extreme climate- and weather-related events, including the socioeconomic, cultural and ecological context. An effective response – addressing both risks and vulnerabilities – will break long-standing institutional silos and reduce duplication of efforts to allow for the connected and collective action called for in the climate crisis action plan (Chapter 4).

This chapter explores how existing risk governance structures are standing up to these challenges. It first identifies the main issues to address, and explores how the international community set the scene for necessary improvements. It then provides findings on regulatory and planning practice, showing how some countries are finding a path to coherence. Special focus is given on how to engage local actors and communities through integrated regulatory approaches. Finally, the conclusion discusses how these good practices are paving the way to further strengthen resilience of communities and systems through risk-informed and more integrated laws, policies and plans.

1 In this chapter, the concepts of cross-sectoral 'coherence' and 'integration' are meant as distinct but interconnected. The first is based on identifying and comparatively assessing the multifaceted regulatory purposes exerted by different instruments, which – when logical and consistent – allow for their effective coexistence. The second builds on the assessment of how different laws and policy are drafted and implemented to exert combined and synergical effects, as part of the same 'whole' (the same regulatory and institutional system).

6.1 CLIMATE AND DISASTER RISK GOVERNANCE IN 2020 – A REALITY CHECK

6.1.1 Establishing more integrated regulatory systems and planning processes

Many governments have taken positive steps in recent years, shown for instance by increasing references to disaster risk reduction (DRR), disaster risk management (DRM) and adaptation in climate change laws and policies (see Box 6.2). Yet decades-old institutional fragmentation and siloed implementation planning are still present in many national systems (Amaratunga et al, 2017; Leitner et al, 2020). This has been brought about by parallel or disconnected laws and policies and competition among government agencies, especially around access to external funding streams and technical support. Many systems still focus on the vicious cycle of disaster-respond-rebuild-repeat, while risks generated by the interaction of complex human and natural systems, amplified by the changing climate, are reversing efforts to achieve the goals of the 2030 Agenda (UNDRR, 2019a).

The IFRC – particularly through its Disaster Law Programme – has compiled some of the best examples and supported National Societies to advocate for coherent law and policy reforms, mainly by developing supporting tools for decision-makers and giving recommendations (IFRC, 2018a).[2] Good practice on DRM laws has been identified, including mechanisms for better coordination and integration with climate change institutions and policies, and vice versa, such as in Algeria, the Dominican Republic, Mexico, Uruguay and the Federated States of Micronesia (IFRC and UNDP, 2015a). Despite such positive developments (see also section 6.3), many national systems still lack viable models and standards for integrating law, policy and planning across climate, development and DRM sectors.

Some countries, as seen for instance by recent research in the Pacific region (IFRC and UCC, 2020), have made substantial legal improvements but have not yet conquered silos in governance and institutional arrangements. Others, such as the Philippines, have made connections between climate change and disaster-related laws and institutions, but more work towards integrated targets, tools and priorities is needed (OECD, 2020).[3] Sometimes, weak synergies and integration can be traced to the absence of finance and economic ministries and development planning agencies in climate and DRM processes and plans. Also, ensuring that climate science feeds into all relevant assessment tools is pivotal (IFRC, 2019c), as parallel risk assessment

2 See IFRC, no date for all the main disaster law-related tools and research. Preliminary recommendations on the topic are also given in the recent IFRC literature review on aligning climate adaptation and DRR (2019), see IFRC and UCC, 2019.

3 See also the work undertaken in several countries by the Global Initiative on Disaster Risk Management, founded by the German Federal Ministry for Economic Cooperation and Development (BMZ) and implemented by the German Gesellschaft für Internationale Zusammenarbeit (GIZ) (GIZ, no date). The second phase of the Global Initiative runs from February 2018 to January 2021, focusing on Mexico and the Philippines.

information, strategies and actions can duplicate efforts and not make best use of resources (EEA, 2017). These aspects are often compounded by capacity gaps at local level.

In many cases, national and subnational plans do not reinforce one another in expected ways. National plans are often unclear as to how they will serve the most vulnerable people at community level, while subnational plans do not always add up to the resilience goals set at national level. This disconnect can create an additional burden on subnational/local governments, which spend time and resources engaging in multiple planning processes, instead of focusing on scaling up action.

6.1.2 Listening and planning with people at risk

Disasters and climate change affect people differently. This is unlikely to be understood if groups who are most exposed and most vulnerable to climate- and weather-related events are not heard. To help governments identify, plan, resource and meet their different and specific needs, at-risk groups (and civil society organizations (CSOs) representing their needs) should be engaged in decision-making at different levels. Used effectively, laws and policies can play an important role in both mandating at-risk groups' effective and systematic participation in law and policy-making, and in including provisions addressing their particular needs (IFRC, 2019b; IFRC, 2019c; IFRC and UNDP, 2015a; IFRC and UNDP, 2015b).

However, getting to this kind of meaningful engagement is still a challenge (UNDRR, 2019d; UNDRR, 2019b). Many countries lack legal mandates for the participation of community members and especially marginalized community members in decision-making processes (IFRC and Pietropaolo, 2015). Some countries, such as Indonesia, have made considerable efforts to strengthen the inclusiveness of their DRM legal frameworks and policies. For example, some villages have developed their own local-level regulations on the participation of women and disadvantaged groups in local disaster management. Nevertheless, more needs to be done – in Indonesia as in many other countries – to ensure the active participation of women, children and marginalized groups in all relevant decision-making processes (IFRC and Palang Merah Indonesia, 2016). Legal frameworks in countries such as the Dominican Republic, New Zealand and the Philippines mandate community participation in DRM decision-making, for example through membership of local committees. However, there can be challenges in implementing these enabling policy provisions at local level and pre-existing social barriers may prevent meaningful engagement by marginalized groups (IFRC and UNDP, 2014).

Unfortunately, many climate and disaster laws and policies only make broad and aspirational statements about community engagement and do not include the necessary detail required to ensure active community participation and inclusion. The lack of a definition of community, and clarity on how to engage this broad range of people, is another part of the problem. In an urban context this only becomes more complex, with more diversity in the population, less social cohesion, the sometimes-arbitrary nature of geographical boundaries, and consequent difficulties in engaging with community members (IFRC, 2020a). To overcome this, further support is needed, particularly at local level to ensure that meaningful and inclusive consultative and advocacy processes are invested in and readily practised, linking decision-makers with community representatives empowered to actively exercise their rights, roles and responsibilities (IFRC, 2019b; IFRC and UNDP, 2015a; IFRC and UNDP, 2015b).

Good practice in DRM laws include mechanisms for better coordination and integration with climate change institutions and policies, and vice versa. Despite such positive developments, many national systems still lack viable models and standards for integrating law, policy and planning across climate, development and DRM sectors.

6.2 A CALL FOR INTEGRATED AND INCLUSIVE GOVERNANCE

The Sendai Framework acknowledges that the "intergovernmental negotiations on the post-2015 development agenda, financing for development, climate change and DRR provide the international community with a unique opportunity to enhance coherence across policies, institutions, goals, indicators and measurement systems for implementation, while respecting the respective mandates" (para. 11). This would have been much more convincing if these main frameworks had not been negotiated separately. Still, international messaging on coherence and integration in adaptation, DRR and development planning is stronger in these instruments than their predecessors, and has grown since 2015 (see for example, ECOSOC, 2019; GCA, 2019; IFRC, 2018b; 2019a; IFRC, 2019d; International Red Cross and Red Crescent Movement, 2019; UNDRR, 2019c).

What might be called the 'Post-2015 Global Agenda on Climate and Disaster Risk Governance' (Natoli, 2020) is made up of three main instruments adopted that year, all of which underline the need to favour greater cross-sectoral integration at national level. These are the SDGs as the centrepiece of the UN's 2030 Agenda for Sustainable Development,[4] the UNFCCC Paris Agreement[5] and the Sendai Framework for Disaster Risk Reduction 2015–2030.[6] This setup requires countries to undertake different data gathering and model parallel plans and reporting activities (see Figure 6.1). Despite some attempts to join efforts (such as the SDGs and Sendai indicators) many countries state that they lack the capacity and technical means to fully engage in all of these reporting activities. But keeping track of progress in a consistent way is critical to understanding if and how national governments are meeting the combined aims of the three global instruments.

4 Goals 1 (target 1.5), 11 and 13, see the SDGs.
5 In particular article 7, see the Paris Agreement.
6 Especially paragraphs 11, 13, 19, 25, 28, 31 and 47, see the Sendai Framework for Disaster Risk Reduction 2015–2030.

Figure 6.1: Coherence and reporting activities in 2015 global instruments

	UN Agenda 2030 – SDGs	Paris Agreement on climate change	Sendai Framework for Disaster Risk Reduction
Main aim	Global agenda for action towards sustainable development	Agreement on the global response to climate change (adaptation, mitigation and finance)	Global framework to guide multi-hazard management of disaster risk
Climate change adaptation–DRR intersection and coherence	Climate action and DRR are cross-cutting issues, but explicitly mentioned in: · Goal 13 to combat climate change and its impacts · Goal 11 to make cities inclusive, safe, resilient and sustainable Climate action also contributes to the achievement of many other goals	Explicit focus on climate change adaptation and DRR: · Article 7.1 on enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change, with a view to contributing to sustainable development · Article 8.1, on averting, minimizing and addressing loss and damage associated with the adverse effects of climate change, including extreme weather events and slow-onset disasters	Reference to climate change: · Disasters are exacerbated by climate change and are increasing in frequency and intensity, significantly impeding progress towards sustainable development. (paragraph 4) · Addressing climate change as a cause of disaster risk (while respecting the UNFCCC mandate) creates a chance to reduce it in a joined-up way. (paragraph. 13)
Reporting activities	Governments have the primary responsibility for follow-up and review, at the national, regional and global levels, in relation to the progress made in implementing the goals and targets. Indicators based on quality, accessible, timely and reliable disaggregated data have been developed to assist this work. (paragraphs 47–48) Member states are encouraged to conduct regular and inclusive reviews of progress at national and subnational levels, which are country led and country driven, drawing on contributions from indigenous peoples, civil society, the private sector and other stakeholders. National parliaments as well as other institutions can also support these processes. (paragraph 79)	Article 3 establishes the so-called nationally determined contributions – the core commitments countries make to implement the Paris Agreement – which need to go up in ambition over time. Initially these were intended just for greenhouse gas mitigation, but in the Paris Agreement they also include adaptation, with an explicit reference to article 7 on the adaptation goal. The reporting on these commitments is arranged in the transparency framework established by article 13. In addition, Article 7.10 calls each party to, as appropriate, submit and update periodically an adaptation communication, which may include its priorities, implementation and support needs, plans and actions, without creating any additional burden for developing country parties. According to Article 7.11 such adaptation communications shall be, as appropriate, submitted and updated periodically, as a component of or in conjunction with other communications or documents, including a national adaptation plan, a nationally determined contribution as referred to in Article 4, paragraph 2, and/ or a national communication.	The Sendai Conference recommended to the UN General Assembly that an open-ended intergovernmental working group is set up. This would comprise experts nominated by member states, and be supported by the UN Office for Disaster Risk Reduction, with involvement of relevant stakeholders. It would develop a set of indicators to measure global progress in the implementation of the framework in conjunction with the work of the Inter-Agency and Expert Group on Sustainable Development Goal Indicators. See UN, 2016.

Source: Adapted from: OECD (2020). Texts are summarized from the original documents

There are common elements across these three frameworks that guide how good governance can reduce human vulnerability to disasters and climate change. These include:

- Working together at different levels (global, regional, national/subnational) and across different sectors of society and government to become more effective.
- Enhancing communities' own adaptive capacities and promoting the use of both local and scientific knowledge for risk management.
- Adopting a non-discriminatory and gender-responsive approach to assessing risks, planning and decision-making, ensuring community engagement and focusing on the people most vulnerable to disasters.

These frameworks also collectively stress the importance of national laws, policies, strategies and plans in providing guidance on how to effectively scale-up and integrate national efforts. The 2030 Agenda points to "the essential role of national parliaments" in ensuring the effective implementation of commitments.[7] The Sendai Framework promotes "the coherence and further development, as appropriate, of national and local frameworks of laws, regulations and public policies" and calls for "clear roles and tasks to community representatives within disaster risk management institutions and processes and decision-making through relevant legal frameworks" to be assigned.[8] Likewise, the Paris Agreement states that its parties "shall, as appropriate, engage in adaptation planning processes and the implementation of actions, including the development or enhancement of relevant plans, policies and/or contributions".[9] In addition, the national adaptation plans (NAPs) under the UNFCCC aim for the integration of adaptation "within all relevant sectors and at different levels"[10] and the Warsaw International Mechanism for Loss and Damage promotes implementing comprehensive risk management approaches, including considering regulatory environments.[11]

These global commitments were further reinforced in 2019 by the resolution on 'Disaster laws and policies that leave no one behind' adopted by the state parties to the Geneva Conventions at the 33rd International Conference of the Red Cross and Red Crescent. The resolution encourages states to "assess whether their existing domestic disaster laws, policies, strategies and plans provide guidance to prepare for and address the evolving risks of weather-related disasters, ensure an integrated approach to DRM and adaptation to climate change and promote gender-responsive approaches and community engagement in risk analysis, planning and decision making".[12]

7 See UN, 2015, paragraph 45.
8 Sendai Framework, paragraph 27 (f).
9 Paris Agreement, article 7.9.
10 UNFCCC Conference of the Parties (COP) decision 5/CP.17, paragraph 1.
11 See UN Climate Change, 2017, strategic workstream (c).
12 See International Red Cross and Red Crescent Movement, 2019, paragraph 1.

Mexico, 2018. The town of Ocoxaltepec is located in an area that is prone to wildfires, landslides, and volcanic activities. In 2017, the region was further affected by an earthquake. Mexico's DRM laws have been identified as good practice, as they include mechanisms for better coordination and integration with climate change institutions and policies.

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6.3 TOWARDS COHERENT REGULATORY FRAMEWORKS THAT ADDRESS MULTIPLE CLIMATE AND DISASTER RISKS

The Paris Agreement and the Sendai Framework call on states to develop long-term, comprehensive plans on climate adaptation and DRR strategies for different sectors, respectively. These are both important ways for national authorities to improve resilience to climate-related disasters and there are encouraging areas where they come together. However, the different starting points and methodologies of these planning activities should not be underestimated.

6.3.1 National adaptation plans

The national adaptation planning process (NAP process), launched in 2010 at the 16th session of the Conference of the Parties (COP 16) to the UNFCCC under the Cancun Adaptation Framework,[13] calls on governments to adopt and mainstream adaptation plans with national strategies on development and risk management. The legal bases of this process were boosted with the adoption of the Paris Agreement in 2015, which binds each party to engage, as appropriate, in adaptation planning and implementing actions, including developing or enhancing NAPs.[14]

There is growing awareness of the benefits to taking an integrated approach to adaptation and DRR in NAPs. From planning and implementation to monitoring and evaluating progress, there are many entry points throughout the NAP process to address DRR priorities. In fact, most of the 20 NAPs so far submitted to the UNFCCC reference and integrate DRR, although how and how often they do so differs from country to country (UNFCCC, no date). Comparative review of NAP processes conducted for this report, supported by findings from the NAP Global Network, reveals that this integration takes several forms, including:

- Reference to a country's DRR strategy as a complementary policy to the NAP (such as Chile, Colombia and Paraguay)
- DRR and adaptation brought together in a single, integrated strategy – like Tonga's Joint NAP[15] and Kiribati's Joint Implementation Plan on Climate Change and Disaster Risk Management
- DRR presented as a discrete sector or priority in a NAP (such as Brazil, Ethiopia and Madagascar[16])

13 See UNFCCC, 2010, Decision 1/CP.16.

14 Between 2015 and 2018 there was a 45% increase in the number of countries reporting launching or initiating the process to formulate and implement NAPs (UNFCCC-LDC Expert Group, 2018, p. 12). NAPs contribute to other processes under the Paris Agreement, such as the nationally determined contributions (NDCs) and adaptation communications. NDCs and NAPs can be complementary and reinforcing, with NDCs enabling countries to share their adaptation goals, objectives, priorities and actions with the international community, and NAPs facilitating the achievement of these (NAP Global Network, 2017). About 75% of countries who submitted NDCs chose to include actions on adaptation (see UNFCCC-LDC Expert Group, 2018, p. 26; AdaptationCommunity.net).

15 At the time of writing, the Tongan Joint National Action Plan on Climate Change and Disaster Risk Management (JNAP2) 2018–2028 has not been formally submitted yet to the UNFCCC NAP Central.

16 Madagascar NAP has not been formally submitted to the UNFCCC NAP Central.

- DRR presented as a cross-cutting theme or integrated throughout priority sectors in a NAP, either implicitly or explicitly (such as Fiji, Grenada, Kenya and Peru,[17])
- DRR presented as both a stand-alone sector or priority and cross-cutting theme (such as Saint Lucia).

In some cases, explicit references are made to the role of law and policy in supporting climate change adaptation-DRR integration. The Brazilian NAP (Ministry of Environment, Brazil, 2016) urges the full implementation of the National Policy for Civil Protection and Defence as a measure to "directly promote reduction of disaster risks while, at the same time, fostering adaptation to climate change". Similarly, the Kiribati Joint Implementation Plan (Government of Kiribati, 2019), which prioritizes 104 climate adaptation and DRR actions, recommends to "enhance coordination between climate change adaptation and disaster risk management programmes and legislation".

6.3.2 National DRR strategies (Target E)

Target E of the Sendai Framework commits governments to "substantially increase the number of countries with national and local disaster risk reduction strategies by 2020". According to one of the two target indicators (E-1), DRR strategies should be "in line with the Sendai Framework".[18] It also includes as a criterion that DRR strategies should "promote policy coherence relevant to DRR such as sustainable development, poverty eradication, and climate change, notably with the SDGs and the Paris Agreement".[19]

While a good number of states have reported their progress towards Target E-1 via the Sendai monitoring platform (UNDRR, no date) with an increasing average score for the policy coherence criterion between 2015 and 2019, only 14 countries currently report its 'full implementation' (Chile, Costa Rica, Japan, Kyrgyzstan, India, Nepal, Malawi, Mexico, Peru, Qatar, Tajikistan, Thailand, UK and Uzbekistan).

In terms of good practice, the Chilean National Strategic Plan for DRR 2015–2018 (Ministry of the Interior and Public Security, 2016) calls for integrated DRR interventions which consider climate change adaptation perspectives, especially in terms of infrastructure and human settlements, and the development of a methodology to identify risks drivers which consider climate change patterns. And the Malawi National Resilience Strategy (2018–2030) (Government of Malawi, 2018) systematically addresses the combined risks of drought, flood and food insecurity, thereby planning integrated measures based on the concept of climate-resilient development (such as climate-smart agricultural practices).

6.3.3 Key findings on national planning and strategic processes

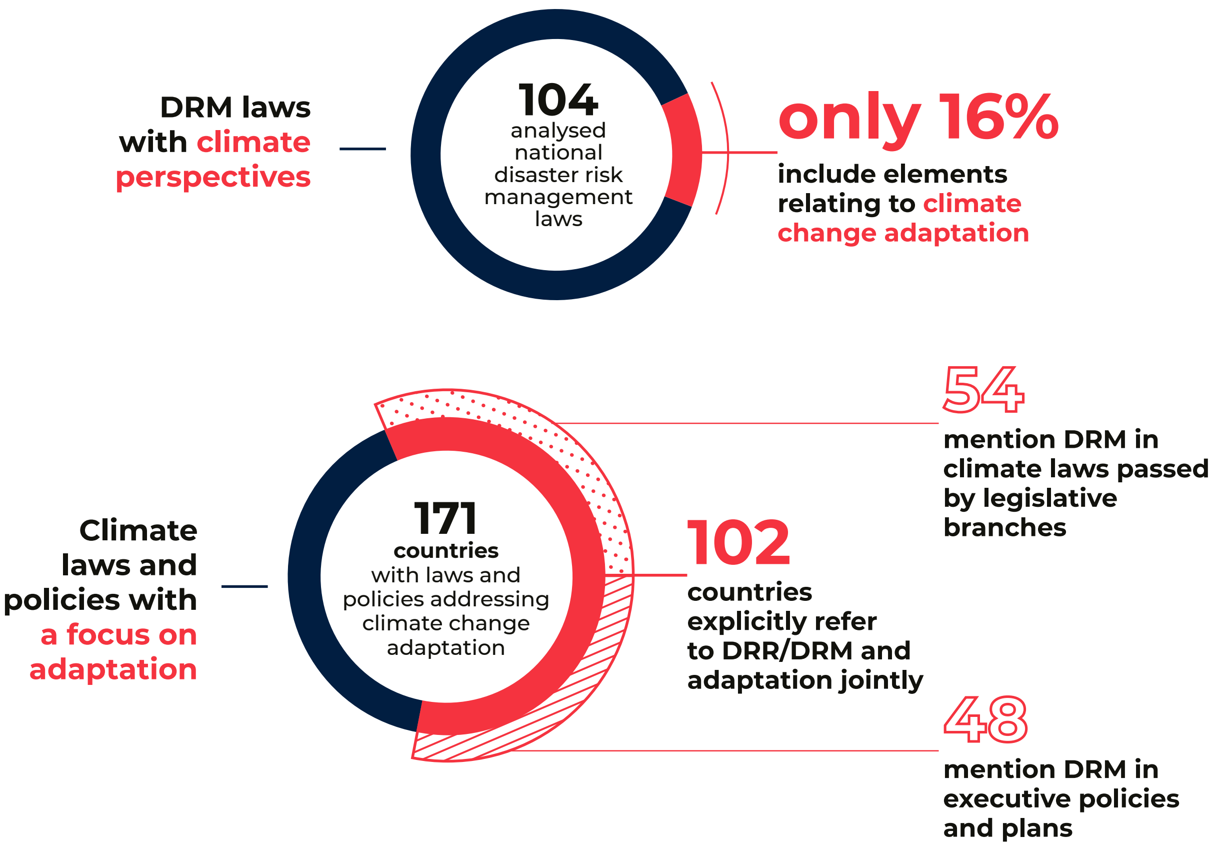
The experience with NAPs and national DRR strategies shows some undeniable progress towards an integrated approach between climate change adaptation and DRR. However, some concerns remain around both processes.

17 See NAP Global Network (2020). At the time of writing, Peru's NAP was about to be approved by government bodies and launched.
18 The same indicators are used in measuring disaster-related global targets of SDGs 1, 11 and 13 (UN Statistical Commission, 2017).
19 Key element for evaluation E-1 a #9, see UNISDR (UNDRR), 2017, p. 116.

First, just adopting a strategy does not necessarily lead to action, particularly at local level (UNISDR, 2017). In many African countries where national strategies have shifted from response focus to risk focus, the rate of implementation, due to factors such as institutional fragilities and politicization, remains very low (only 5% have been on track to implement their national strategies, see African Union, 2020). Significant discrepancies have also been reported between the objectives of NAPs and states' capacity to undertake – and report on – their implementation (UNFCCC, 2018).

This also highlights the importance of planning processes providing a clear understanding of the necessary technical and financial resources. The Burkina Faso NAP (Ministry of Environment and Fishery Resources, 2015) has been identified as good practice in this sense, including information on financial needs and the estimated budget for implementing any sectoral adaptation action (UNFCCC-LDC Expert Group, 2018). Finally, since the ultimate value of planning instruments lies in their capacity to prompt effective action, the need for clear legislative mandates, including identifying and allocating institutional roles and responsibilities, appears to be pivotal (see IFRC, 2019b; IFRC and UNDP, 2015b; UNDP, 2019). These aspects are explored in Boxes 6.1 and 6.2.

Figure 6.2 How integrated are legal and policy frameworks?



BOX 6.1: QUALITATIVE AND QUANTITATIVE OVERVIEW OF DRM LAWS WITH CLIMATE PERSPECTIVES

The IFRC Disaster Law Programme supports National Societies and states in the field of disaster law, including around the areas of concern addressed in this report. This happens mainly through technical assistance, capacity building, advocacy, development of tools, models and guidelines, as well as research and promotion of the sharing of experiences, techniques and best practices among countries.[20]

As part of these activities, an IFRC global survey conducted in 2019 on domestic laws addressing DRM shows that **only 16% of the 104 DRM national laws analysed include elements relating to climate change adaptation**.[21] Those pieces of legislation generally introduce a climate perspective in conjunction with a specific DRR component, and in most cases their provisions encompass detailed and comprehensive references to DRR definitions, specific measures and activities. All of this legislation was adopted from 2009 onwards and most – 69% of cases – by countries in Latin America or East Asia.

Many of the analysed DRM laws establish the first connection with climate change adaptation via an initial definitions section (Angola, Bolivia, Colombia, Mexico, the Philippines, Vanuatu). Then, the need to integrate national policies on civil defence and disaster management with other national priorities, including climate change, is often incorporated as a legal duty (Brazil, Madagascar, Mexico, Peru, the Philippines, Viet Nam). In other cases, specific regulations and measures for disaster management are formulated for strengthening cooperation with hazard risk prevention programmes, such as climate change adaptation, including at subnational level (Cambodia, Colombia, Myanmar).

In some instruments, high-level governmental authorities and/or territorial administrations are formally endowed with the duty to harmonize implementing activities and promote climate change adaptation-DRR coordination, policies and plans (Colombia, Honduras, the Philippines, Vanuatu, Viet Nam). Similarly, specific advisory bodies with climate change adaptation competence are created and/or tasked with supporting the work of DRR national committees or authorities (Bolivia, the Philippines). Other DRM laws consolidate cross-sectoral information and implement specific measures to cope with climate contingencies (Mexico, the Philippines, Seychelles, Vanuatu) or favour complementarity between financial instruments relating to any thematic issue with some relevance for DRM and climate adaptation (Bolivia). The Cambodian Law on Disaster Management (2015) provides for the enforcement of individual obligations to participate in climate change adaptation and DRR by abiding not only the law but also any "regulation and direction of the competent authorities" and "immediately reporting to the competent authorities of any risk situation that would cause a disaster".

20 See IFRC, no date.
21 IFRC (2019) DRM Law Index Database (developed in cooperation with White & Case LLP and other academic partners). Though in most countries laws and policies on DRM interplay as part of the same regulatory system, this box focuses on the content of binding legal instruments.

BOX 6.2: QUALITATIVE AND QUANTITATIVE OVERVIEW OF CLIMATE LAWS AND POLICIES WITH A FOCUS ON ADAPTATION

The Grantham Research Institute on Climate Change and the Environment at the London School of Economics compiles and analyses climate change laws and policies globally (GRI, no date). The dataset shows a close and growing link between climate change adaptation and DRM frameworks. Globally, of the 171 countries that have laws and policies to address climate change adaptation, 102 countries explicitly refer to DRR/DRM and adaptation jointly in their climate change laws and policies. These include 'framework' laws and policies (overarching, cross-sectoral laws or policies, such as Kenya's Climate Change Act (Republic of Kenya, 2016) or the Philippines Climate Change Act (Republic of the Philippines, 2008), and 'sectoral' ones. **Just over half (54) of the 102 countries mention DRM in climate laws passed by legislative branches, while the remaining 48 mention DRM in executive policies and plans**.

A global review of climate change adaptation laws and policies taken by the Grantham Research Institute (Nachmany and Byrnes, 2019) analysed framework laws in 100 countries. The analysis mapped physical hazards the laws and policies respond to, including extreme weather events such as floods and droughts (both mentioned by around 80% of the countries analysed), storms (61%), wildfires, heatwaves and landslides or mudslides (all mentioned by around half of the countries analysed). Acknowledging these risks can play a role in preventive planning as well as in planning and prioritizing response strategies. However, further analysis of flood risk management laws in 33 flood-prone countries (Mehryar and Surminski, 2020) shows a prevailing focus on the response and recovery strategies, and a lack of recognition of risk reduction strategies and proactive flood risk governance approaches.

As for the link to the global instruments, there appears to be an institutional disconnect between climate change adaptation and DRM approaches – while laws and policies in two-thirds of the 100 countries analysed in the Grantham Research Institute global review reference the UNFCCC and the Paris Agreement, only seven explicitly mention the Sendai Framework. While no one approach is 'right', synergies can be found in joining up the two agendas more closely.

Dominica, 2017. The village of Layou was destroyed when Hurricane Maria struck in 2017. In the aftermath of the hurricane, Dominica made significant choices designed to have a long-term impact on environmental recovery, disaster management and climate resilience.

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BOX 6.3 / CASE STUDY
CLIMATE-SMART POLICY-MAKING IN THE COMMONWEALTH OF DOMINICA

The link between climate change and disaster risk has become abundantly clear for the small island developing states of the Caribbean. The region's high-risk profile for disasters has been compounded by increasing ocean temperatures (leading to increased wind speeds in tropical storms) as well as increased frequency and intensity of the yearly hurricanes affecting the Atlantic and Caribbean Sea (see Chapter 2).

Among the most affected small island Caribbean states, the Commonwealth of Dominica is fast becoming a global standard in improving resilience through legislation and governance. In 2017, the island was devastated by Hurricane Maria (ACAPS, 2018), a category 5 storm and one of the most destructive of the 10 consecutive hurricanes to hit the Caribbean during the hyperactive 2017 Atlantic hurricane season. The disaster put every aspect of Dominica's government, economy and society under strain, wiping out entire communities and crippling businesses and social services for months. It also provided the country with a unique opportunity to reset its regulatory and infrastructure development systems with the integrated goal of advancing climate change adaptation and risk resilience.

In the aftermath of the hurricane, the country made significant choices designed to have a long-term impact on environmental recovery, disaster management and climate resilience. From including seeds and seedlings in relief packages – thus favouring environmental restoration and food security – to establishing a Climate Resilience Execution Agency[22] and a National Resilience Development Strategy (Commonwealth of Dominica, 2018). The strategy provided that, at the highest level, a Climate Resilience and Recovery Plan (Commonwealth of Dominica, 2020) – subsequently adopted in 2020 – should reflect the three pillars of resilience: 1) climate-resilient systems, 2) prudent DRM systems, and 3) effective disaster response and recovery. These initiatives are expanding possibilities for climate-smart DRM policy-making in the small island economy.

The Climate Resilience Execution Agency, whose mission is to "assist all public institutions, private sector and civil society in becoming better equipped to manage disasters and recovery from disasters in the future" was formed by the Climate Resilience Act of 2018 (Commonwealth of Dominica, 2018), a legal instrument aimed at promoting "the swift and cost-effective recovery of Dominica from climate-related disasters". The agency has a legislative mandate to integrate climate resilience in Dominica's infrastructure development, capital projects, reconstruction activities as well as in all government plans and policies. It is implementing extensive community activities designed to build knowledge, practices and attitudes that enhance the resilience to extreme weather events among families, businesses and civil society.

Dominica aims through these initiatives to become the world's first climate-resilient island and to "hurricane-proof" all aspects of public and private life. This aim is supported by the IFRC's disaster law research in the Caribbean, which is testing the integration of climate change adaptation metrics in how we assess and advocate for better national disaster laws so that islands like Dominica can build their resilience journey on the foundations of comprehensive laws and regulations.

22 See Climate Resilience Execution Agency

BOX 6.4 / CASE STUDY

DEVELOPING MORE HARMONIZED POLICIES AND INSTITUTIONS IN THE PHILIPPINES

The Philippines has consistently ranked in the top five countries most affected by natural hazards, and in 2019 was affected by more disasters than any other country. It was the fourth most-affected country in terms of climate- and weather-related disasters spanning from 2000 to 2019 (see Chapter 3). Many communities live near the sea and its tributaries, relying on them as the source of daily subsistence. The country is also experiencing a high level of urban migration mostly moving towards the National Capital Region, concentrated in Metro Manila, a densely populated network of cities with high flood risk and a huge number of informal settlements.

Due to the frequent, and often extreme, climate-related disasters the Philippines has previously experienced, it has developed a relatively advanced legal framework for climate change adaptation and DRR. The Climate Change Act (Republic of the Philippines, 2008) and the Disaster Risk Reduction and Management Act (Republic of the Philippines, 2010), respectively, are the core legal documents establishing resources and responsibilities for each policy area.[23] The latter codifies the policy on DRR-climate change adaptation integration, and both laws ensure that each area is budgeted for. There is a legally mandated 5% earmarking of local funds and a dedicated national fund for DRR (Sections 21 and 22 of the act), while the 2012 amendment of the Climate Change Act created the People's Survival Fund, (Republic of the Philippines, 2011) a pooled fund for eligible climate change adaptation projects, some of which also benefit DRR. The challenge, however, is in the integrated planning and monitoring of the vast array of activities that will implement these legal norms.

On the climate change side, the Philippines is updating its National Climate Change Adaptation Plan (Climate Change Commission, no date) (which will cover the NAP and the nationally determined contributions per the Paris Agreement) and also adopted a National Climate Risk Management Framework in 2019 (Climate Change Commission, 2019). The new framework is meant to harmonize various efforts on climate risk management, including a science-based measurement of climate risk that will guide anticipatory measures to avoid or lessen the impact of climate-related events. The framework uses a 'climate risk management action formulation' – a series of actions similar to DRM processes that address the underlying factors of risk.

A Presidential Executive Order No. 24 organized a Cabinet Cluster on Climate Change Adaptation, Mitigation and Disaster Risk Reduction in 2017 (Climate Change Service, 2018; President of the Philippines, 2017). This seeks to improve coordination among government agencies in integrating all DRR, climate change adaptation, environmental management and sustainable development efforts, with a roadmap that aims to see climate and disaster-resilient communities in select coastal and urban areas by 2022.

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23 In 2019, the Philippines disaster risk index score was lowered to ninth in the world: this would not have been possible without an enabling DRR-climate change adaptation legal framework.

6.4 ENGAGING LOCAL ACTORS AND COMMUNITIES THROUGH INTEGRATED REGULATORY APPROACHES

To effectively reduce disaster and climate risks, cooperation between communities and the different levels and sectors of government is needed. As stated in the Sendai Framework,[24] and already recommended by relevant IFRC tools supporting law and policy reform processes (IFRC and UNDP, 2015a; IFRC and UNDP, 2015b), 'local risk governance' requires effective engagement with – and support to – local partners and communities. A focus on creating an enabling environment for implementation of DRM and climate change laws "without needing to be underpinned by high per capita incomes" has been found to be critical (Satterthwaite, 2011).

This can also generate bottom-up demand for joint implementation of DRM, development and climate change laws and policies. An example of this can be found in the IFRC 'Know Your Rights, Roles and Responsibilities' Project, which supports greater awareness and understanding of local authorities and citizens corresponding entitlements and duties under the relevant climate/disaster-related legislation. This allows for a more informed exercise of their roles, a meaningful engagement in decision-making and more empowered implementation (see for example, IFRC, 2020b). Another good example is a set of training and awareness-raising activities addressing the effects of disasters caused by climate change for all segments of society (including local administrators) organized by the Turkish Ministry of Environment and Urban Planning as part of the EU co-funded project Enhancing Required Joint Efforts on Climate Action Project (iklimIN, no date).

Efforts toward coherent implementation of global agreements and their corresponding national frameworks are also evident in some subnational and community-level initiatives. With support from CSOs and global alliances, efforts have been made to help communities use climate and weather information to assess the risks they face now and in the future. CSOs can help unpack the science, connect policy-makers with scientists and practitioners, and find ways to break the silos on the ground.

Furthermore, law can play a key role in ensuring active and meaningful participation of at-risk communities in decision-making. One good example is Viet Nam's 2013 Law on Natural Disaster Prevention and Control, which recognizes the critical role that local organizations, households and individual people play in risk management. It establishes community-level 'People's Committees' and makes explicit provisions for communities to help develop local plans on disaster prevention and control, which are integrated into local socioeconomic development plans. Another good example is New Zealand's Resource Management Act, which requires local authorities to seek and consider comments from New Zealand's indigenous (Maori) community in any matters related to environmental policy. It also provides specific detail on how this consultation should be conducted.

24 Sendai Framework, paragraph 27 (f).

Meanwhile, in Samoa, the National Disaster Management Plan 2017–2020 (Government of Samoa, 2017), tasks the Law and Justice Sector to ensure clear roles for community representatives are assigned in the DRM institutions and processes. And comprehensive public and community consultations in the development of laws, policies and plans must meaningfully engage "women, children and youth, persons with disabilities, poor people, indigenous peoples, volunteers, the community of practitioners and older persons". The same instrument establishes 'Village Disaster and Climate Committees' responsible for coordinating disaster mitigation and preparedness programmes and activities at the community level, and for coordinating the various village response teams for different threats. It is the role of the Ministry of Women, Community and Social Development to support, monitor and liaise with village councils and organizations as they implement disaster management activities.

Nepal, 2017. Proud grandmother Hira Gurung lives in a remote hillside community. In Nepal, municipal leaders are encouraged to work together with their communities in assessing their risk governance frameworks and to main stream climate smart DRR at the local level.

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BOX 6.5 / CASE STUDY
STRENGTHENING LOCAL RISK GOVERNANCE IN NEPAL

Nepal's 2015 Constitution set the course for a major shift of power from central to local governance. The ensuing passage of national legislation (Local Government Act 2017 and Disaster Risk Reduction and Management Act 2017) further stipulated that the 753 newly formed municipalities would assume full responsibility for DRM, as well as taking on many new sectoral roles and functions such as education, health, transport, irrigation and agriculture. While communities and municipal authorities across the country welcomed the opportunity to have greater decision-making power in respect of these critical sectors, many felt overwhelmed by the growing and complex portfolios, including how to ensure a functioning governance system across them.

Grounded in its long experience of risk reduction and management at community level, Nepal Red Cross Society initiated a process to help local decision-makers and communities to take a more systematic and coordinated approach in the decentralization and mainstreaming of climate-smart DRR at local level. In close consultation with municipal and federal authorities, community leaders and development partners, the Municipal Risk Governance Assessment Tool was developed. This provides an easy-to-use checklist and self-assessment framework to support more risk-informed municipal regulations, policies and systems. It addresses six thematic areas which have to be considered: 1) legal and policy framework), 2) institutional and organizational structure, 3) planning, budgeting and monitoring, 4) coordination and partnership, 5) resources and capacities and 6) cross-cutting issues (focusing on inclusion). This tool is undergoing final endorsement by the Government of Nepal.

Municipal leaders are encouraged to work together with their communities in assessing their existing risk governance frameworks, identifying gaps and weaknesses, and pinpointing where further investment is needed including opportunities for mainstreaming DRR and DRM across different sectors, such as development and financial planning. The assessment tool is expected to be piloted in select municipalities in late 2020, before nationwide roll-out.

BOX 6.6 / CASE STUDY
ENSURING AN INCLUSIVE AND INTEGRATED RISK MANAGEMENT APPROACH IN UGANDA'S CLIMATE CHANGE BILL

"Enacting a climate change law in Uganda shall strengthen coordination, programming, resource allocation which are all essential for effective disaster risk management at all levels," Brian Kanaahe, Community Resilience Manager, Uganda Red Cross Society

Uganda continues to face climate change impacts including recurrent flooding, droughts and disease outbreaks. The 2013 National Climate Change Policy was developed to assist the country in dealing with climate change and building a green economy. But the government needed appropriate legal instruments to implement the policy and so the climate change bill was developed in 2016.

The Uganda Red Cross Society and the Red Cross Red Crescent Climate Centre, with the support of the Partners for Resilience consortium in Uganda (Partners for Resilience, no date), engaged in a series of activities to influence the draft bill, which would provide for effective institutional arrangements to accelerate climate action and reduce disaster risk. This included conducting a gap analysis to ascertain how the proposed bill would address the need for DRR and ecosystem management and restoration. The analysis revealed that 1) the bill had limited focus on addressing the needs of the most vulnerable people, 2) it would benefit from a diverse climate change advisory committee that included non-state actors (which was subsequently formed), 3) more funding was needed to implement climate action and 4) recognition for indigenous knowledge in adaptation and mitigation needed to be heightened.

A full 40% of the recommendations from civil society, informed in part by the gap analysis, were considered in the draft climate change bill. In May 2020, the bill was passed by the Cabinet and at the time of writing it was awaiting review by Uganda's parliament.

Uganda, 2020. Uganda continues to be affected by climate change impacts, including recurrent flooding, droughts and disease outbreaks. To implement the 2013 National Climate Change Policy, Uganda developed a climate change bill that was passed by the Cabinet in early 2020.

© Uganda Red Cross Society

6.5 CONCLUSIONS AND RECOMMENDATIONS

Law, policy and strategic planning are vital for reducing human vulnerability and increasing the resilience of communities against weather- and climate-related hazards. Climate-smart law and policies will be key for achieving successful and inclusive implementation of the climate crisis action plan discussed in previous chapters. Harmonized regulatory approaches can reduce the impact of climate risk by integrating analysis and knowledge of the expected changes to the frequency and severity of extreme weather events into national and local DRM plans. This approach is increasingly embraced by decision-makers, experts and practitioners as enabling more consistent and sustainable domestic action (GPDRR, 2019; UN, 2019).

The 2015 global frameworks are helping many states to accelerate progress on climate change adaptation, DRR and sustainable development. However, this is only the starting point.

What needs to happen next

Turn international commitments into national laws and policies

- Commitments must be translated into national laws and policies in a coherent way to enable concrete impacts on the ground. More efforts are needed to promote this approach. For example, the UNFCCC COP could recommend financial mechanisms to prioritize funding for more integrated and specific measures, thus prompting cross-sectoral policy planning. New action plans at regional and global levels could help states identify steps to follow to operationalize the Sendai Framework through regulatory instruments.

Ensure laws and policies are climate smart, understood and implemented

- Greater efforts and political leadership are needed at national and subnational levels. Law and policy frameworks should press for more institutional and cross-sectoral coordination and be climate-smart, that is, build on available science and practice on present and future risk trends and patterns. There needs to be constant investment and action to ensure that these laws and policies are understood, well-resourced and fully implemented, particularly at subnational level. Finance ministries and institutions responsible for budget allocation must be an active part of decision-making.

Consider decentralizing to subnational level to connect from the bottom-up

- More decentralization to subnational authorities (regions, provinces, municipalities) should be considered, with the aim of empowering local decision-makers and connecting citizens and marginalized groups to local authorities in an inclusive and transparent way.[25]

Such law and policy-making approaches would enable a more multifaceted response to the multi-pronged challenge of climate change. There are many promising examples and ways that states can learn better from each other's experiences. Identifying and further disseminating these regulatory models and translating these into effective action on the ground are key for a climate-resilient future.

25 This could be done, for instance, along the lines of Talanoa Dialogue Approach, see UNFCCC, 2017.

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Iraq, 2016. Iraqi Red crescent provides assistance to displaced people at Dibagah camp. In Iraq, climate change threatens access to food and water of people already affected by conflict. Despite this, Iraq and other countries with high and very high climate vulnerability receive limited climate adaptation funding.

7

SMART FINANCING

Getting the money where it's needed most

Contents

Definitions

Climate change adaptation financing: funding and financing to reduce vulnerability and exposure and boost resilience to the actual or expected impacts of climate change (UN, 1992). Instruments include bilateral and multilateral grants and loans, such as those channelled through multilateral climate funds, the largest of which are the Green Climate Fund, the Adaptation Fund and the Least Developed Countries Fund.

DRR financing: funding directed to activities which promote "the goal and global targets of the Sendai Framework to achieve substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries" (OECD, 2017).

Disaster risk financing: financing arranged before a potential shock, which pays out in certain pre-agreed circumstances to fund a pre-agreed plan (adapted from World Bank, 2018). Instruments include those to retain risks (such as contingency funds), share risks (such as regional pools) or transfer risks (such as insurance), ideally in a 'layered' strategy.

Humanitarian financing: funding and financing intended to save lives, alleviate suffering and maintain dignity in the event of a crisis – including disasters and conflicts (adapted from GHD, 2003). Focused on emergency response but can also include funding to act early to get resources in place and prepare for humanitarian responses. Instruments include bilateral, multilateral and pooled funds (including the UN Central Emergency Response Fund and the IFRC's Disasters Emergency Relief Fund).

Other development assistance: in this context meaning other ODA which has a primary function of supporting recovery from and/or resilience to the disaster impacts of climate change. Instruments include bilateral, multilateral and pooled funds to provide grants, concessional loans or technical/in-kind support.

Haiti, 2016. An emergency response unit team assesses damage, water and food sources and water access points for future interventions after Hurricane Matthew. Haiti has the 5th highest climate-vulnerability score globally, yet receives just over 2 Swiss francs per person in climate change adaptation funding.

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INTRODUCTION

Investing upfront in climate change adaptation and disaster risk reduction (DRR) clearly makes moral sense because it saves lives and suffering, but it also makes financial sense because it saves money. The Global Commission on Adaptation suggests benefit–cost ratios of adaptation investments ranging from 2:1 to 10:1 depending on the context (GCA, 2019), yielding a 'triple dividend' of avoided losses, increased innovation and societal and environmental benefits (Tanner et al, 2018).

These upfront investments are first and foremost made in-country, where the costs of disasters are primarily borne – by the domestic authorities, communities, households and enterprises facing the risks and impacts of climate change. Putting a single figure on this web of formal and informal contributions – including ministry spending, private sector investments, individual remittances and much more – is not yet possible.[1] However, analysis of climate change spending in the official national budgets of four of the world's poorest countries[2] alone identified an annual total of 1.1 billion US dollars (1 billion Swiss francs) (Bird et al, 2016), illustrating the scale of domestic expenditure.

In many countries where disaster risks associated with climate change are highest, the financial capacity to address them is insufficient. International support is clearly needed. And this international climate financing is not just a matter of discretionary support: there are collective commitments agreed by all countries in the UN Framework Convention on Climate Change (UNFCCC) based on "common but differentiated responsibility and respective capabilities". In other words, money should be transferred from countries who have the most wealth and most responsibility for climate change to those who have least of both (Pauw and Klein, 2015; Resch et al, 2017; UN, 1992). This chapter examines these global public contributions – those counted as official development assistance (ODA) – with a focus on climate change adaptation and DRR.

Climate finance has tended to prioritize global measures to mitigate greenhouse gases – which are essential – but has also often overlooked more localized measures to adapt to the impacts of climate change. It is well known that there are serious shortfalls in net global financing for climate adaptation and DRR. Estimates of annual international public funding directed to climate change adaptation suggest an upper figure of 28 billion US dollars (27 billion Swiss francs)[3] (Buchner et al, 2019), though annual requirements of just 50 developing countries (based on the adaptation needs outlined in nationally determined contributions) total at least 50 billion US dollars (approximately 50 billion Swiss francs).[4] The economic fallout of the COVID-19

1 The need for tracking and analysis of national expenditure on climate adaptation is widely recognized as a prerequisite to improving accountability – addressing and promoting this is a central purpose of the Adaptation Financing Accountability Initiative – see PIDS, 2017.

2 This study analysed 'on-budget' expenditure relevant to climate change from available government budget figures for four countries: Ethiopia, Ghana, Tanzania and Uganda.

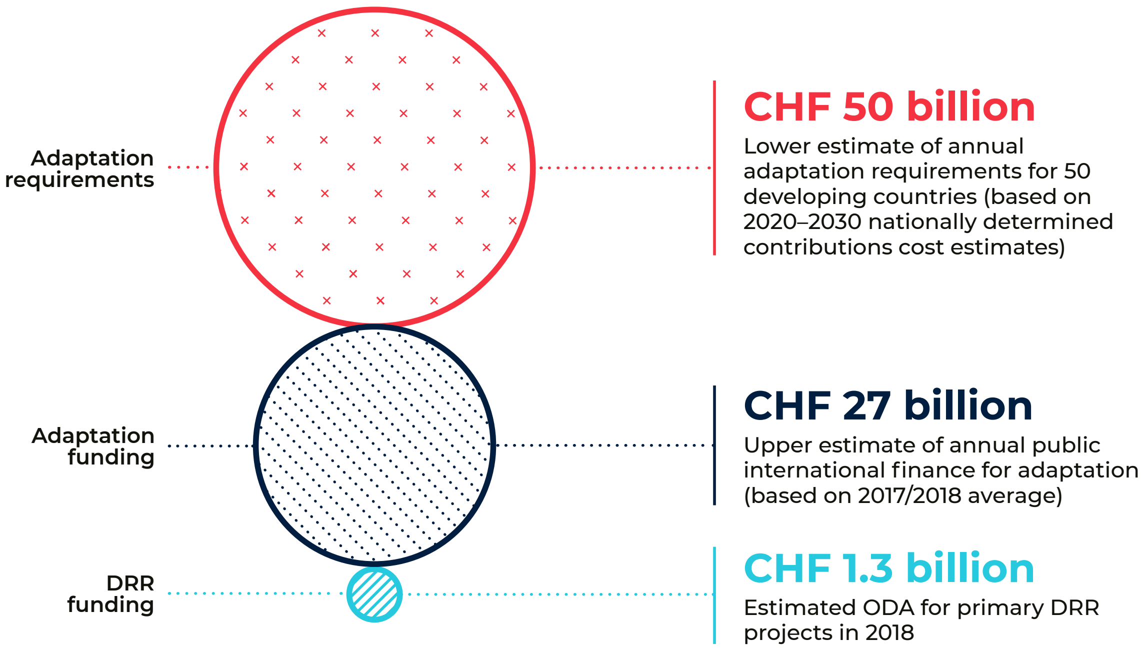
3 These figures are based on an average over the 2017/2018 period, calculated by the Climate Policy Initiative (Buchner et al, 2019) based on the available reported funding, recognizing that there are significant gaps in tracking. This figure is understood to be approximate and is contested: Oxfam International (Carty and Le Compte, 2018) propose a much lower figure – just 5 to 7 billion US dollars (approximately 4.5 to 6.3 billion Swiss francs) from bilateral donors – based on its analysis that official reporting of climate financing is substantially inflated because it tends to include loans at face value (rather than at grant equivalent value) and to overestimate the adaptation relevance of multipurpose contributions.

4 Nationally determined contributions are governments' national post-2020 climate action plans as required under the Paris Agreement on climate change. The 2018 *Adaptation Gap Report* (UNEP, 2018), suggests that the cost estimates may be lower than real requirements for a number of reasons, including a focus on technical costs and an 'adaptation deficit' arising from not factoring in climate change variability and extreme scenarios.

pandemic will undoubtedly make it more challenging to fill this gap (Development Initiatives, 2020a; 2020b).[5] Yet the global shock of the COVID-19 pandemic also creates a collective opportunity to invest in 'building back better' and refocus financial solutions towards green, inclusive and resilient recovery (Meige et al, 2020).

This chapter puts the spotlight not on how much funding there is but where and how it is spent. It looks first at **directing** money to the countries and communities most at risk of climate change crises. It then looks at **designing** 'smart' holistic funding strategies so that all available and potential international funds best support the people facing the worst effects of climate change.

Figure 7.1: Key figures in climate change adaptation and DRR financing



Sources: Estimates of climate change adaptation requirements and funding are as cited and calculated by the Climate Policy Initiative (Buchner et al, 2019). ODA for DRR is as calculated by Development Initiatives from OECD Development Assistance Committee (DAC) data.

Notes: Figures are derived from different sources which have different methodologies and are therefore not directly comparable. All figures are for the latest year of available data and analysis. Climate change adaptation funding estimates include all tracked global public funding for this purpose not only that directed to developing countries, and includes funding with a 'significant' as well as a 'principal' climate change adaptation objective. DRR estimates are for funds with a 'principal' DRR objective only. These figures amount to approximately 50 billion, 28 billion and 1.3 billion US dollars respectively. CHF: Swiss francs.

5 As of July 2020, analysis of available data by Development Initiatives suggested that, depending on the scenario, ODA could fall in both 2020 and 2021, and that it could decline from the 2019 levels of 153 billion US dollars (150 billion Swiss francs) to 128 billion US dollars (125 billion Swiss francs) by 2021.

7.1 DIRECTING FINANCING TO VULNERABLE PLACES AND PEOPLE

7.1.1 Prioritizing the most vulnerable places

1. The current situation: where does the funding go?

International support for adaptation and risk reduction should be targeted to the countries which are most vulnerable to the effects of climate change and disasters. This commitment is written into the UN Framework Convention on Climate Change and into the objectives of global climate funds including the Green Climate Fund (GCF) and the Adaptation Fund.[6] The Sendai Framework for Disaster Risk Reduction also notes the importance of international support paying particular attention to countries with higher vulnerability and risk levels (UN, 2015b).

So, how well are these intentions and commitments being met – are the countries most vulnerable to climate and disaster risks actually being prioritized? This is easier asked than answered, firstly because there is no consensus about which countries are the most vulnerable, and secondly because of gaps and complications in reporting where the money goes.

Climate- and disaster-vulnerable countries are broadly understood to have a combination of high exposure to climate- and disaster-related risks and low capacity to manage them, but there is no agreement on how to measure this, and therefore how to prioritize. For DRR, the Sendai Framework lists a wide range of categories that "might warrant particular attention" (UN, 2015b).[7] For climate finance, the Paris Agreement on climate change points to least developed countries and small island developing states (UN, 2015a, article 9), but this broad and non-exhaustive list leaves much room for interpretation in funding allocation. For example, the GCF, explicitly sets aside half its resources for least developed countries and small island developing states, but the Adaptation Fund does not.

At the same time, the way that financing is reported and recorded makes it difficult to get reliable figures for how much is being spent on what and where it goes. There are 'markers' to flag financing for climate change adaptation and DRR in international aid reporting, but gaps and idiosyncrasies mean that while some financial resources go uncounted, others may be over-counted[8] (see Beecher, 2016; Carty and Le Compte, 2018; Peters et al, 2016).

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6 For example, the GCF states that it aims for geographic balance, with special attention to particularly vulnerable countries including least developed countries and small island developing states with half of its adaptation resources reserved for these. The Adaptation Fund states that it aims to pay special attention to most vulnerable countries.

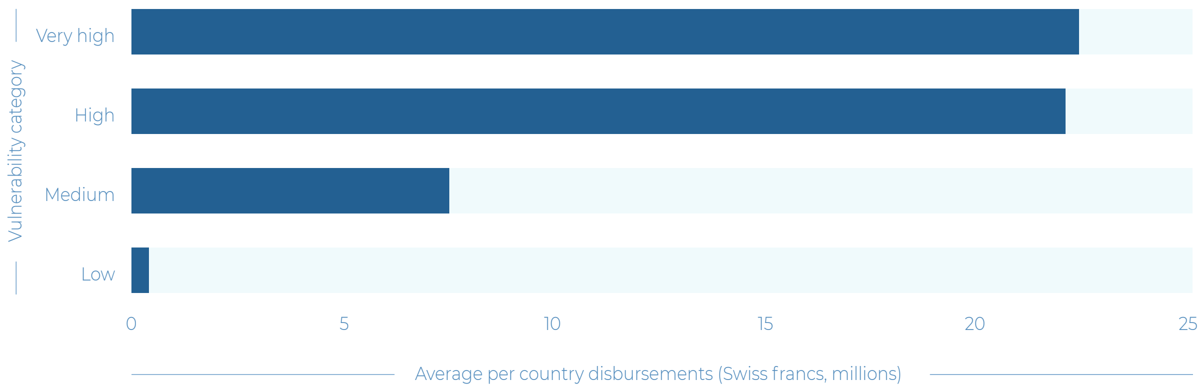
7 The Sendai Framework for Disaster Risk Reduction states "disaster-prone developing countries, in particular the least developed countries, small island developing states, landlocked developing countries and African countries, as well as middle-income countries facing specific challenges, warrant particular attention in view of their higher vulnerability and risk levels, which often greatly exceed their capacity to respond to and recover from disasters… Similar attention and appropriate assistance should also be extended to other disaster-prone countries with specific characteristics, such as archipelagic countries, as well as countries with extensive coastlines" (UN, 2015a).

8 Oxfam International (Carty and Le Compte, 2019) suggests that official reporting of climate financing is substantially inflated because it tends to include loans at face value (rather than at grant equivalent value) and to overestimate the adaptation relevance of multipurpose contributions.

Yet, however it is defined and counted, funding for climate change adaptation and DRR does not appear to consistently prioritize the most vulnerable countries with the very highest levels of climate- and weather-related risk and lowest capacity to manage those risks.[9] Multiple previous analyses of climate change adaptation flows agree on this point (Saunders, 2019) and our analysis of aid spending also supports it. Diverse approaches to targeting may mean a broad spread of support, but also that some countries are left behind.

Analysis of ODA spent on climate change adaptation reveals a mixed picture. At first glance it is positive: looking at all ODA with a principal climate change adaptation objective does suggest a vulnerability-based distribution. On average, countries with high and very high vulnerability receive more total funding than those with medium and low vulnerability (see Figure 7.2).

Figure 7.2: Average per country ODA for climate change adaptation against levels of vulnerability to climate change and levels of climate and weather-related disaster risk, by category, 2018



Sources: OECD DAC; ND-GAIN; INFORM Index

Notes: Vulnerability score calculated from combined scores from ND-GAIN (climate change vulnerability) and INFORM (disaster risk). INFORM score includes only weather-related hazards, combined with vulnerability and coping capacity scores. Funding figures represent disbursements for 2018. Average per country calculated based on total for each vulnerability group divided by the number of countries. See Methodology for more details.

9 The World Disasters Report uses an assessment of the most vulnerable countries based on a combination of long-term climate vulnerability (based on ND-GAIN) and shorter-term climate- and weather-related disaster risk (based on INFORM).

However, there are limits to what these averages can tell us about where climate change adaptation financing is targeted. While higher volumes of funding do often go to countries facing the highest levels of vulnerability to disaster risk and climate change, this is not consistently the case. Many highly vulnerable countries are left behind, receiving relatively little.[10]

Once the size of the population is taken into account, the funding disparities are even starker, and more highly vulnerable countries appear to be left behind (see CCA funding in 2018, p. 312). None of the 20 most vulnerable countries were among the 20 highest per person recipients. Somalia, the most vulnerable, for example, ranks only 71st for per person funding disbursements.

None of the countries with the five highest per capita funding, had high or very high vulnerability - and notably, none of them were classed as fragile contexts. Of the 43 very high-risk or high-risk countries receiving less than 1 Swiss franc per person, 34 were classed as fragile contexts (OECD, 2018b).

Somalia, 2019. None of the 20 most vulnerable countries were among the 20 highest per person recipients of climate adaptation financing. Somalia, the most vulnerable, for example, ranks only 71st for per person funding disbursements.

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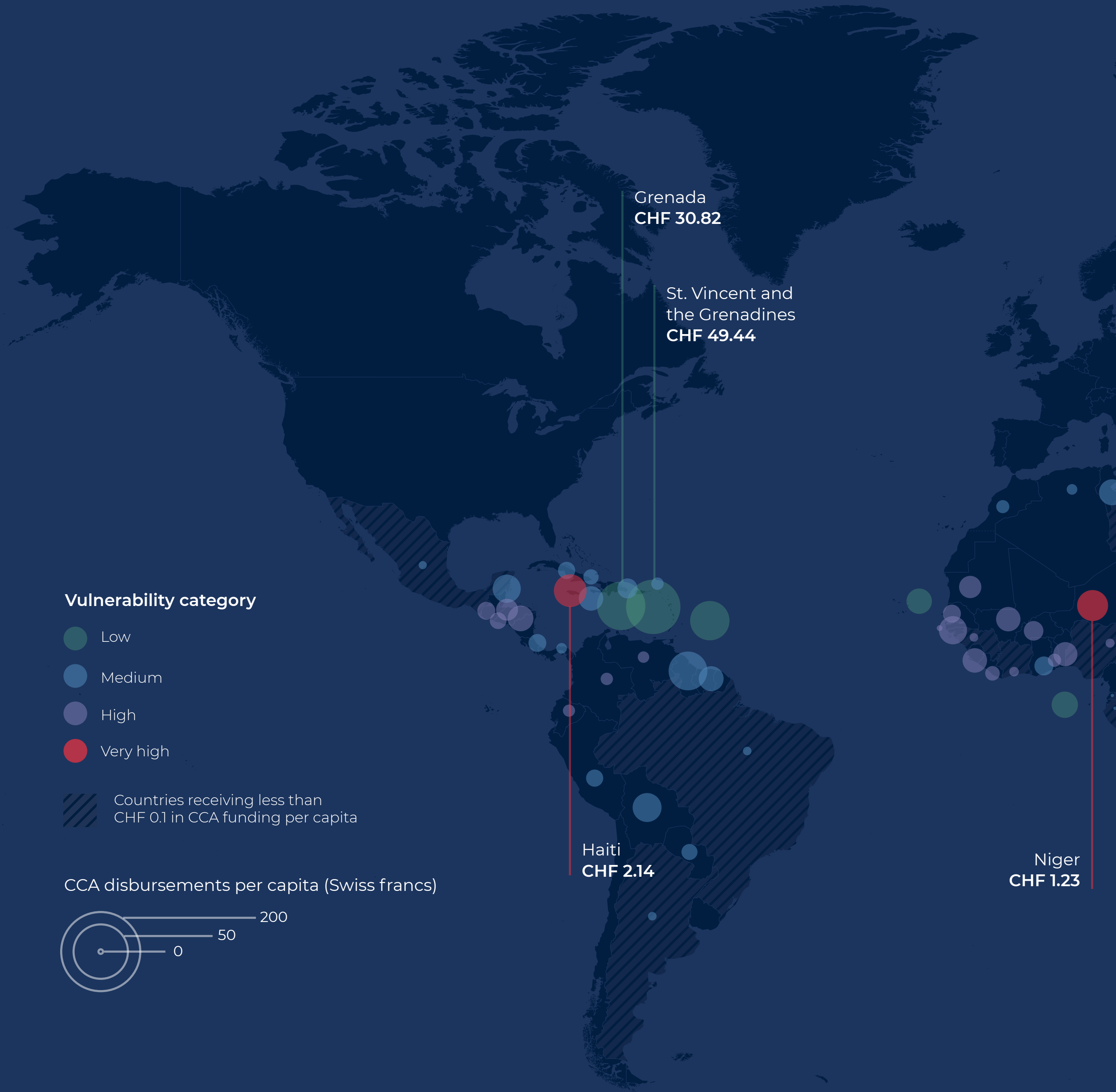
10 The two most widely recognized composite indices for showing disaster and climate change risk are the ND-GAIN index, which scores countries' vulnerability to climate change based on projections of exposure against sensitivity and coping capacity – and so gives a longer-range picture, and the INFORM Index, which scores countries' crisis risk based on recent patterns of hazards against capacities – and so gives a more immediate picture. Combining these scores in this analysis gives an indication of which countries are facing both high imminent disaster risk and severe longer-term impacts of climate change.

CCA FUNDING IN 2018

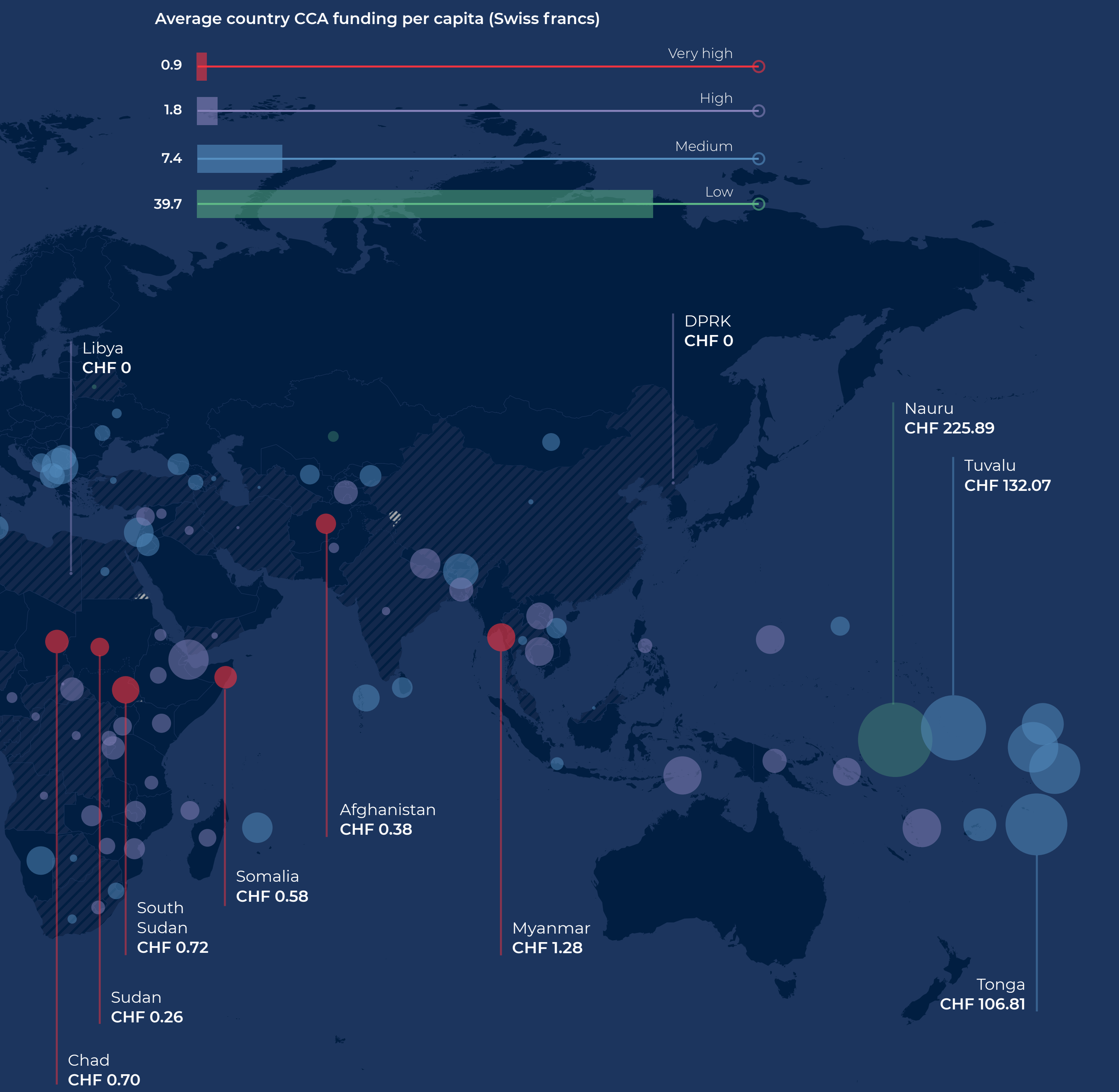
ODA for climate change adaptation against levels of climate-vulnerability



Sources: OECD DAC; ND-GAIN; INFORM Index; UN Population Division

Notes: Climate-vulnerability score calculated from combined scores from ND-GAIN (climate change vulnerability) and INFORM (disaster risk). INFORM score includes only weather-related hazards, combined with vulnerability and coping capacity scores. Funding figures represent per capita disbursements for 2018.

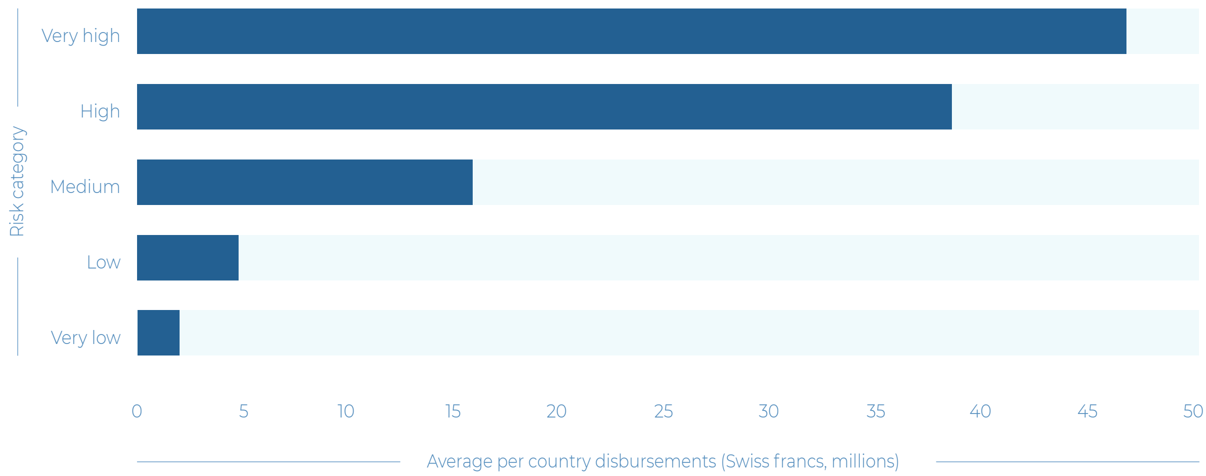
This is a snapshot only, and highlights countries where there is a discrepancy between need and level of funding. Bubble sizes are log-scaled. CHF: Swiss francs.


Average country CCA funding per capita (Swiss francs)
0.9
Very high
1.8
High
7.4
Medium
39.7
Low
Libya
CHF 0
DPRK
CHF 0
Nauru
CHF 225.89
Tuvalu
CHF 132.07
Afghanistan
CHF 0.38
Somalia
CHF 0.58
South Sudan
CHF 0.72
Myanmar
CHF 1.28
Tonga
CHF 106.81
Sudan
CHF 0.26
Chad
CHF 0.70

South Sudan, 2018. Women from South Sudan prepare the soil for planting seeds. Less than half of the population is able to produce, collect or purchase sufficient food to meet their basic needs. Although South Sudan is classified as one of the most high-risk countries, the country receives comparatively little funding for DRR.

New analysis of international aid for DRR using new keyword searches and markers (Development Initiatives, 2020a, see Methodology) reveals a similar pattern of inconsistent targeting to that of climate change adaptation funding. Again, the totals and averages suggest a positive relationship between levels of disaster risk and distribution of DRR funding – on average, more funding goes to countries at higher risk (see Figure 7.3).

Figure 7.3: Average per country ODA for DRR by level of disaster risk, 2018



Sources: Development Initiatives derived from OECD DAC; INFORM Index; UN Population Division

Notes: ODA DRR disbursement figures were calculated by applying a combination of markers and keywords – see Methodology for full details. INFORM risk scores represent a combination of exposure to weather-related hazards (and excluding geophysical hazards) as well as vulnerability and coping capacity scores. Risk quintile thresholds are derived from INFORM.

But as with climate change adaptation, once we examine the country distribution behind these averages, we see that while there is some correlation of higher spending for higher-risk countries, this is not true for all. None of the very highest-risk countries were among the highest funding recipients and several high-risk countries including Eritrea and Djibouti received less than many much lower-risk countries.

Again, once population size is factored in (see DRR funding in 2018, p. 316), targeting appears to be much more amiss, with many vulnerable countries left behind. None of the countries classed as very high risk received more than 10 Swiss francs per person. The most high-risk countries, Somalia, Afghanistan, Myanmar and South Sudan, all received less than 3 Swiss francs per person – compared with the 186 Swiss francs per person disbursed to Tonga which is low disaster risk according to INFORM. Again, fragility appears to be a factor: of the 18 very high or high-risk countries[11] receiving less than 1 Swiss franc per person, 14 were classed as fragile contexts.[12] None of the 15 highest per person recipients were at very high risk of disasters, and none were fragile.

11 Those with an INFORM score of over 50.

12 According to OECD *States of Fragility 2018* – see Methodology.

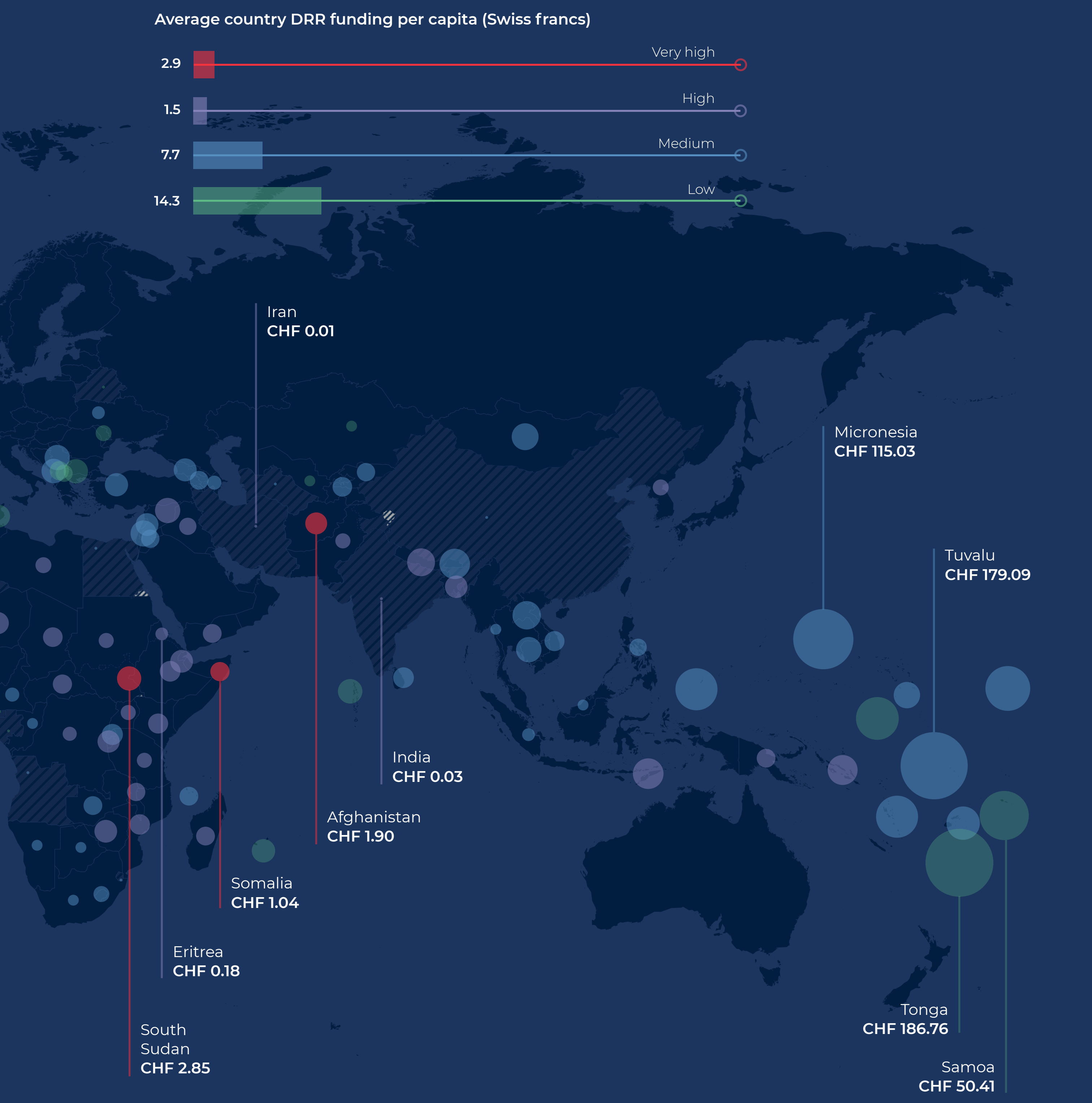
DRR FUNDING IN 2018

ODA for disaster risk reduction funding against levels of disaster risk

Sources: Development Initiatives derived from OECD DAC; INFORM Index; UN Population Division

Notes: ODA DRR disbursement figures were calculated by applying a combination of markers and keywords – see Methodology for full details. INFORM risk scores represent a combination of exposure to weather-related hazards (and excluding geophysical hazards) as well as vulnerability and coping capacity scores. Risk quintile thresholds are derived from INFORM. Countries highlighted provide comparative examples of DRR disbursements per person.

Bubble sizes are log-scaled. CHF: Swiss francs.



Average country DRR funding per capita (Swiss francs)
2.9
Very high
1.5
High
7.7
Medium
14.3
Low
Iran
CHF 0.01
Micronesia
CHF 115.03
Tuvalu
CHF 179.09
India
CHF 0.03
Afghanistan
CHF 1.90
Somalia
CHF 1.04
Eritrea
CHF 0.18
South
Sudan
CHF 2.85
Tonga
CHF 186.76
Samoa
CHF 50.41

> Capacity strengthening is a two-way street. Truly locally owned, participatory financing models can expand donors’ understanding of the local realities of climate change and of what works in different contexts.

2. The barriers: what hinders better targeting of the most vulnerable countries?

Funding fails to prioritize the most vulnerable countries for many reasons. Donor preferences are a familiar factor: historical, political and trade ties have long influenced where bilateral aid goes, even when it claims to be based on need (Bermeo, 2017; IFRC, 2018a). And political incentives and disincentives extend not only to *where* funding goes, but also *when* and *for what*: hard-wired biases can favour acting after a crisis, rather than investing in reducing risk (Clarke and Dercon, 2016; IFRC, 2018a): short-term thinking or the 'tragedy of the horizon'[13] results in both under-allocation and misallocation (Carney cited in GCA, 2019).

Concerns about aid effectiveness also steer spending. Donors must weigh up allocating funds to the places which are most vulnerable, against allocating to where programming opportunities are greatest: a trade-off between investing finite funds in the places where a difference most needs to be made, or in the places where they see they can make the most difference. Donor imperatives to reduce transaction costs and show results and returns therefore often favour large-scale, 'shovel-ready' investments in low-risk contexts (ICAI, 2014; Soanes et al, 2017).

This means that those countries which are less finance ready miss out. In many of the most vulnerable countries, national institutions' lack of 'readiness' to use international climate funds – even those dedicated for improving readiness – feeds into a loop of exclusion and underinvestment. Of the 30 countries deemed 'least ready',[14] 29 were fragile contexts. The poorest and most weakly governed countries find themselves unable to navigate funding opportunities, reach the stringent criteria to qualify for funds, meet high fiduciary standards, or carry the administrative burden of donors' and funds' many heavy and unaligned requirements[15] (ICRC, 2020; Nasir et al, 2017). While some multilateral climate funds, including the Adaptation Fund, have contributed to readiness packages in fragile states including Burundi and Chad, these are not enough to overcome the barriers (Peters and Budimir, 2016) and few invest with sufficient money and attention span.

Absorption capacity also constrains funding. Adaptation approaches tend to be incremental: in other words, they presuppose countries have the basic systems and infrastructures to adapt – for example, drainage systems – and institutions that can be supported to manage these. But many highly vulnerable countries lack these pre-conditions: they require climate-informed development to build infrastructures and institutions in the first place, rather than adaptation-specific funding to upgrade them for a changing climate. But, as many of the most vulnerable countries are fragile and affected by conflict, they also miss out on such long-term development investment, instead receiving short-term cycles of humanitarian funding.

3. The way forward: how to better direct financing to the most vulnerable countries

An obvious first step to improving targeting is more visibility about where funds are being directed and on what basis. If governments, donors and funds are to live up to their intentions to prioritize the most vulnerable countries, their metrics and allocation criteria for achieving this must be clear and accountable.

13 A phrase coined by Mark Carney, Governor of the Bank of England, to sum up the tragic irony that by the time climate change is a defining factor for financial stability, it could already be too late.
14 According the ND-GAIN readiness index. Data downloaded May 2020.
15 Nasir et al observe that as of 2017 only four least developed countries had managed to accredit national entities with the GCF – meaning that out of the 59 accredited implementation agencies for the Fund, only five were in least developed countries – and only two of these (in Senegal and Ethiopia) had had projects approved (Nasir et al, 2017).

That means openly sharing frameworks for defining vulnerability and investing in compiling the best possible methods for understanding which countries are at highest short- and longer-term risk of the effects of climate change. This does not mean all donors should target the same countries, but there should be a rational, evidence-based means for ensuring that none of the most vulnerable places fall through the gaps.

This must go hand in hand with better tracking of funds, so that the gaps can be well identified and filled. The OECD's recent introduction of a marker to improve DRR tracking in its aid reporting system is a step in the right direction, but this needs to be consistently used by donors to yield better data.[16] The Rio markers for identifying climate change adaptation spending are a decade older than the DRR marker, but there is still a need for much greater clarity and rigour in reporting to show the value of contributions (Buchner et al, 2019; Carty and Le Compte, 2018).[17] And of course, evidence of the *quantities* of funding must be accompanied by evidence of *quality*. Funding must be disbursed in a timely, predictable manner that best reaches people at risk,[18] evidenced in tracking of the speed of disbursements, as well as the duration of funding agreements.

Donors must assume that conflict and fragility are not an 'externality' in DRR and adaptation (Peters, 2019a), but an integral part of vulnerability, as work in countries including Mali, Central African Republic, Iraq and Yemen clearly shows (ICRC, 2020). Knowing this, donors must find ways to adapt their blanket eligibility and compliance requirements according to the context, and to support state and non-state institutions and organizations to meet these. Readiness should be seen as reciprocal – as well as requiring and supporting recipients to be more ready to receive their funds, donors must find ways to become more ready and agile to fund in these difficult settings, including investing in support systems. Examples of what is possible range from Afghanistan, where the GCF has invested in readiness and bilateral donors have invested in developing a Climate Finance Framework (see Box 7.2) to Lebanon, where bilateral donors have supported the Disaster Risk Management Unit in the Prime Minister's Office (Peters, 2019a).

7.1.2 Reaching the most vulnerable people

1. The situation: where does funding reach?

Better targeting international support to the *countries* most vulnerable to climate change is of course no guarantee that it will reach the *people* at most risk of its effects. Country funding figures tell us little about whether and how those funds benefit places and social groups with very different risk profiles – for example, women in the flood-prone southern regions of Afghanistan or marginalized ethnic groups in the conflict-

16 Being able to better track which resources are going where is not only important for accountability and decision-making, it can also help to steer donor choices. As the OECD explained in its recent creation of a DRR marker in aid reporting, pulling DRR out as an objective to be tracked across all allocations – rather than just a subcategory of emergency aid – can provide "an incentive for donors to mainstream DRR into development assistance, and to promote the idea that DRR is a development priority, not just a humanitarian one" (OECD, 2017).

17 This includes greater clarity of and adherence to common reporting standards including on showing the concessionality of loans and reporting them at grant-equivalent values, and of agreeing the value of a programme's climate component. Presently these appear to be subjectively and divergently applied by donors.

18 The UN Framework Convention on Climate Change sets out ten criteria for adaptation finance albeit with broad, non-official definitions (Pauw et al, 2016). It should be: adequate, predictable, sustainable, scaled up, new and additional, provided with improved access, balanced allocation between adaptation and mitigation, prioritized to the most vulnerable developing countries, mobilized by developed countries, and transparent. Many of these qualities resonate with commitments on humanitarian aid, set out in the principles of good humanitarian donorship and in the Grand Bargain on Humanitarian Financing – including that it should be transparent, flexible, multi-year and localized.

affected regions of the Philippines. While national-level public goods and infrastructures are important, adaptation and risk reduction ultimately have to work at local level (Mfitumukiza et al, 2020).

While the national-level financing picture is unreliable, the local-level picture is almost entirely unknown. One preliminary analysis of a set of climate and development funds estimates that 10% of this climate finance is directed in the first instance at the local level.[19] This figure comes with caveats, only covers a fraction of bilateral funding and does not indicate how locally owned the contributions are (Soanes et al, 2017). But it is a clear indication of the paucity of adaptation funding that is available and accessible to local organizations, a problem mirrored in the struggles to localize humanitarian assistance (see for example, IFRC, 2019).

2. The barriers: what gets in the way of reaching the most vulnerable people?

Marginalization amplifies vulnerability. The Paris Agreement and the Sustainable Development Goals recognize that national adaptation and risk reduction priorities might leave behind or fail to reflect the priorities of certain groups. Populations who are most economically, socially and politically excluded often live in places most exposed to hazards. Meanwhile structural marginalization deprives these populations both of the means for resilience and the direct or indirect benefits of centrally led national action. Without careful design and scrutiny, climate finance and DRR support aligned to national plans can risk reinforcing rather than counteracting this exclusion.

There is international agreement that locally led, inclusive and participatory approaches are essential as part of an equitable, whole-of society approach – this is explicit in the Paris Agreement and the Sendai Framework (see Chapter 6). Yet climate adaptation financing tends to favour bulk spending through central governments over tailoring and targeting locally, and directly financing local organizations. There are limited incentives for supporting a diverse portfolio of small-scale programmes or growing new partnerships with local organizations and institutions (Soanes et al, 2017). There is pressure to minimize transaction costs, impact tends to be measured in programmes delivered rather than lives protected, and success is often indicated by the scale of investments (ICAI, 2014).

These high barriers for local organizations and few incentives for donors to address them, mean little direct funding. For example, of 48 project grants for flood resilience and management awarded by the GCF, only 2 went to national NGOs (ZFRA, 2020) – amounting to just 4% of the funding.

Local needs may also go unaddressed because they are unseen. In the absence of systems to collect and analyse locally disaggregated data, or partnerships to channel the experience and expertise of local communities, the risk reduction and adaptation needs of many of the people most at risk can go missing in the national policies and plans that international donors align with. Not only does this create serious gaps, it can also mean false economies as high-cost national investments miss the mark for large segments of the population and so become ineffective and unsustainable.

19 This 2017 estimate by researchers at the International Institute for Environment and Development is based on a word search of the Climate Funds Update database covering 12 climate funds and 4 relevant development funds including the major multilateral as well as some bilateral funds. It is part of a larger project which aims to improve the tracking and distribution of climate funding to the local level.

3. The way forward: how to better reach the most vulnerable communities

Many of the solutions for better targeting the most vulnerable countries can be extended to targeting the most vulnerable communities. In their planning and local risk governance, national and local authorities must set out clear policies and processes to identify and prioritize the people at highest risk (see Chapter 6). Donors and international climate funds must explicitly require and support approaches to fair targeting that consider equity, not just economic return. Resource tracking must then follow – tracing direct and indirect funding flows to the local level provides a basis for monitoring progress, evaluating impact and identifying gaps. In Nepal, for example, civil society groups worked with ministries to complete a gender-focused climate change poverty impact assessment in the agriculture sector. The findings of this people-centred analysis led to improved gender tracking in climate budget planning (Government of Nepal, 2018).

Financing also needs to be designed in a way that enables local institutions, organizations and enterprises to access funds. The Global Commission on Adaptation has a dedicated 'Locally Led Action Track' which is working with 28 partner organizations to convene dialogues between regional grassroots leaders and donors. This is part of its work to ensure that local actors are better recognized, included and financially supported for their work to find effective climate adaptation solutions.[20] There are initiatives to build on, including mechanisms in the GCF and Adaptation Fund to 'enhance direct access' by simplifying procedures for smaller grants. Funds must also be sustained to support the technical and management capacities of local organizations (Terpstra et al, 2015; Wilkinson et al, 2014), and to build national focal points' political and practical support for subsidiarity (Soanes et al, 2017).

Capacity strengthening is, of course, a two-way street. Truly locally owned, participatory financing models can expand donors' understanding of the local realities of climate change and of what works in different contexts. Devolved financing models, which are actively inclusive and grounded in grassroots expertise and knowledge (see Chapter 6) can foster action which is more cost effective, sustainable and impactful (Soanes et al, 2017), and improve the evidence base for future action.

There are many good examples of locally driven DRR and climate change adaptation financing to learn from and replicate. For example, the Kenya Red Cross has been supporting county-level governments to devolve climate finance and planning to local level, and to develop frameworks for disaster risk management which allow forecast-based action funds to be created.[21] In the Philippines, an alliance of civil society organizations (CSOs) – including the Philippine Red Cross, academia and the private sector – has connected with community groups under a new climate change adaptation framework. This brings diverse stakeholders together with local government authorities to ensure that plans and funding proposals are co-owned, informed by realities on the ground, and connected to the development of local climate change action plans. In 2019, this framework resulted in the Philippines' first locally led process for developing an adaptation proposal for the GCF. The project supports multi-hazard impact-based forecasting and early warning systems, linking to local actors to enable them to act on climate information ahead of upcoming disasters.

20 For further information on the GCA's Locally Led Action Track, see: World Resources Institute, no date.
21 For further information on a World Bank programme which supports county-level financing and planning in Kenya, see World Bank, 2019.

BOX 7.1: COMMUNITY-LED PRIORITIES IN DEVOLVED CLIMATE FINANCING

In Kenya, Mali, Senegal and Tanzania, a devolved climate finance mechanism has been piloted by consortia of government and NGOs to fund resilience-building investments at the local level. It directly involves communities in identifying, planning and overseeing investments – bridging a 'bottom-up' approach to designing and prioritizing financing to existing 'top-down' decentralized planning and budgeting processes. Projects funded under the pilots have included improving water and livestock facilities, boosting weather stations and providing solar energy.

Using customized structures of commissions and committees, the approach builds on local knowledge of how climate change affects different parts of society, actively including people who are often marginalized in decision-making. At the same time, it strengthens countries' decentralization infrastructure and institutions, building foundations for governments to routinely ensure that planning is climate resilient and context relevant.

Flexibility and adaptive management are core principles, building in support and space to adapt to changing risks, opportunities and evidence. In Kenya in 2020, devolved climate finance processes enabled planning committees to link to COVID-19 preparedness and response consultations. In Mali, in response to the 2017 floods, the process helped communities prioritize livelihoods and food security resilience investments.

Based on DCF Alliance, 2019; Soanes et al, 2017; *and interviews with staff at the International Institute for Environment and Development.*

7.2 DESIGNING SMART FINANCING FOR CLIMATE CHANGE AND DISASTER RISKS

7.2.1 Using joined-up frameworks

1. The situation: how does the current financing landscape join up?

Smart climate crisis financing is not just a case of deliberately directing funds to the right places, it also involves designing the right funding strategies for each context. This means creating a coherent approach which uses different types and sources of funding to their different strengths to address the different risks and impacts of climate change. Specific funding streams for DRR and climate change adaptation are therefore an important part of a wider whole of development and humanitarian assistance for resilience and response, as Figure 7.4 shows.[22].

The many different categories of global public financing involved in averting and addressing climate-related disasters tend to be discussed and operated as if they were clearly delineated. But they actually have broad definitions and blurry boundaries, making it difficult for even the well-initiated to navigate and understand them as a whole. For example, DRR crosses several categories of funding including climate change adaptation, a category which, itself, does not have an official international definition (Watson and Schalatek, 2020).

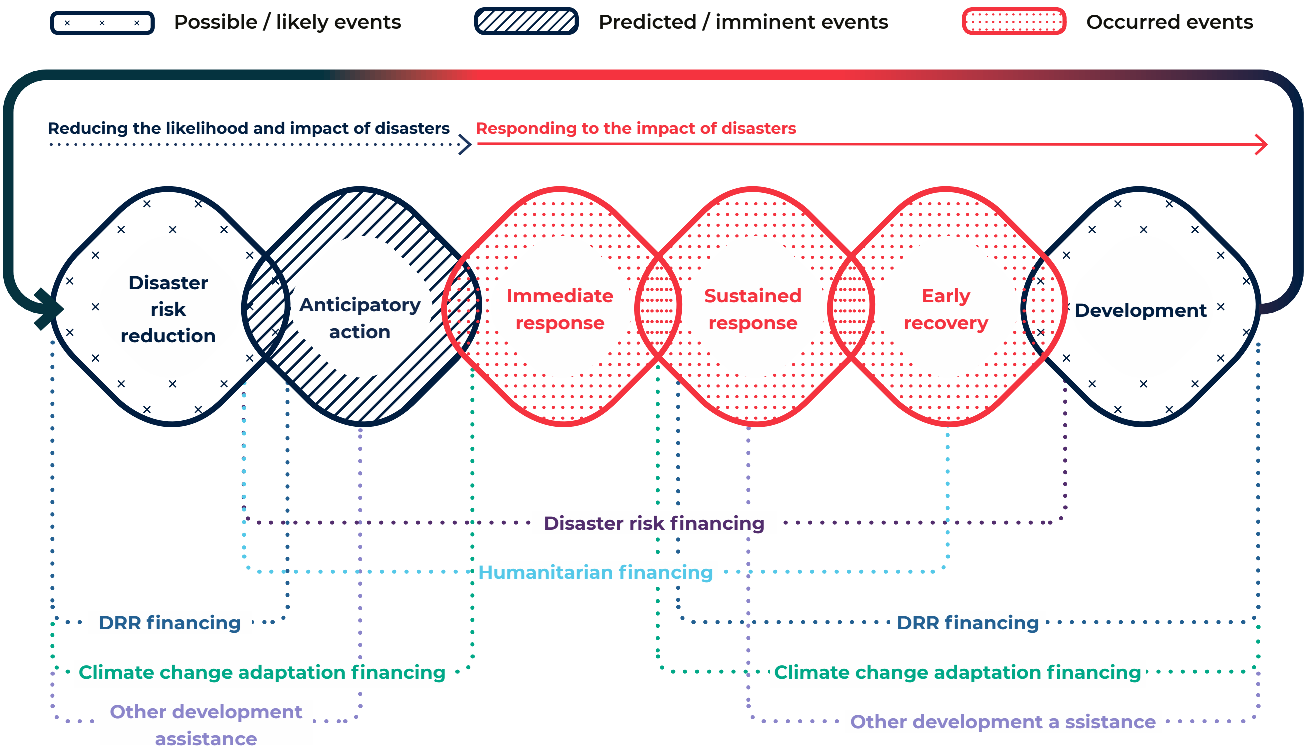
2. The barriers: what gets in the way of a joined-up approach?

While the overlaps in Figure 7.4 might suggest convergence, the reality is incoherence. As previous chapters show, the international aid architecture and domestic structures are characterized by siloed frameworks, institutions and technical communities of practice. Although the soft boundaries between categories of aid should enable flexibility and collaboration, all too often financing operates in fragmented silos (OECD/World Bank, 2016; Peters et al, 2016). Fragmented financing does not just reflect this incoherence, it perpetuates it – entrenching institutional and delivery divisions.

As well as creating blinkered financing approaches at odds with the complex realities of climate change and disaster risk (OECD, 2020a), this fragmentation can also leave real financing gaps with real-life implications. For example, in 2017 the GCF declined to approve funding to project proposals to support the adaptive capacity of communities in Senegal and Ethiopia, on the grounds that these were deemed to be more 'development' than 'climate change adaptation' (Nasir et al, 2017; Phakathi, 2017), This prompted CSOs to raise concerns of 'artificial' distinctions, of preference to invest in quantifiable technological projects, and of a disregard of the links between climate change vulnerability and other development deficits (SCRIBD, 2017).

22 Indeed, the Sendai Framework for Disaster Risk Reduction explicitly recognizes the importance of coherence with wider sustainable development policies, plans, practices and mechanisms (UN, 2015b).

Figure 7.4: The financing landscape



Note: This simplified figure does not represent the scale nor precise scope of each category of funding but is intended as a broad representation of the relevant domains of each to the risks and effects of climate change-related disasters.

More recently, CSOs have continued to raise concerns that the 'schism' between climate finance and other development assistance can mean that it fails to benefit from important development know-how[23] (Adaptation Fund et al, 2020).

At the same time, the connections between climate and development finance must be meaningful, not just nominal rebranding. This is a long-standing concern: for example, around the 2009 UN Climate Change Conference in Copenhagen, many developing countries raised fears that mainstreaming climate adaptation meant eroding the commitment to additional financing, over and above the agreed 0.7% GNI target for ODA (Klein, 2010).

23 The Adaptation Fund, Climate Wise Women, the Global Resilience Partnership and the World Resources Institute organized regional virtual dialogue between grassroots organizations, development partners and donor representatives, which reflected on successes and lessons learned in furthering locally led climate adaptation action in Africa.

3. The way forward: how to create a coherent approach

Discussions around coherence may be old, but there are new opportunities to bridge aid financing silos. Over the past decade, 'resilience' and 'nexus' frameworks have sought to find common ground in shared objectives, addressing people's acute needs as well as the longer-term risks and vulnerabilities people face. Although these are works in progress (Poole and Culbert, 2019), they can create entry points for action and joined-up financing approaches. For example, in Chad where the effects of climate change are deepening food insecurity, the joint international agency/government drought and food insecurity plan brings together humanitarian, risk reduction and adaptation approaches, instead of trying to impose a separate DRR process ill-suited to the context (Peters, 2016).

Donors do not need to choose between preserving the principles and purposes of each category of aid and pursuing a joined-up approach. They can ring-fence budgets to invest in standalone adaptation, risk reduction and principled humanitarian response at the same time as supporting complementarity and collaboration within and between the agencies and institutions they fund. Predictable and sustained funding is fundamental to this, so that agencies can direct their energy towards thinking strategically about common issues, rather than chasing short-term grants for discrete single-approach projects (Mawhorter, 2020).

At a global level, system change is still needed for a concerted approach to financing the risks and impacts of climate change – to improve connections between multilateral institutions and within the departments of bilateral donors. Some signs of this are emerging in UN reforms and the efforts of some donors to put the triple nexus of humanitarian, development and peace approaches into practice (Dalrymple and Swithern, 2019). While global institutions may be slow to reform, multi-stakeholder planning processes in high-risk countries can forge practical connections – combining a holistic view of international support and national resources and generating clear demand for coherent financing (see Box 7.2).

BOX 7.2: A JOINED-UP APPROACH TO AFGHANISTAN'S CLIMATE CHANGE FINANCING FRAMEWORK

Afghanistan received international support to develop a Climate Change Financing Framework, based on a model trialled in several South Asian settings, known as a Financing Framework for Resilient Growth. This five-step approach supports governments to look across all their budgets and carefully analyse estimated costs of climate change damage, the climate change relevance of current expenditure, projected future financing, potential financing gaps and realistic opportunities and plans to fill these.

In Afghanistan, this process resulted in 2017 in the creation of the Climate Finance Unit which works with all relevant line ministries, enhancing understanding of climate-related finance, mainstreaming climate change in national plans and policies, and identifying priority projects for investment.

The Afghan experience suggests two lessons for other countries. Firstly, this approach generates a holistic mapping of climate and disaster risks, financing flows and gaps as the basis for a strategic plan of action. As it becomes more established, it could also incorporate new and emerging models for early warning and multi-hazard risk metrics. Secondly, it is an example of what can be done in fragile contexts. It shows that institutional support is possible, and how working with national stakeholders generates a depth and coherence of analysis that builds on the inter-connections between enhancing adaptation and reducing resource-related conflicts.

Based on Resch et al (2017) and an interview with Action on Climate Today.

Afghanistan, 2019. Sar Asyaab village, Chimtaal district, Balkh province. After years of drought, flash floods caused deaths and damage across many provinces.

© Afghan Red Crescent Society / Meer Abdullah Rasikh

7.2.2 Creating smart financing plans

1. The concept: how does layered financing work?

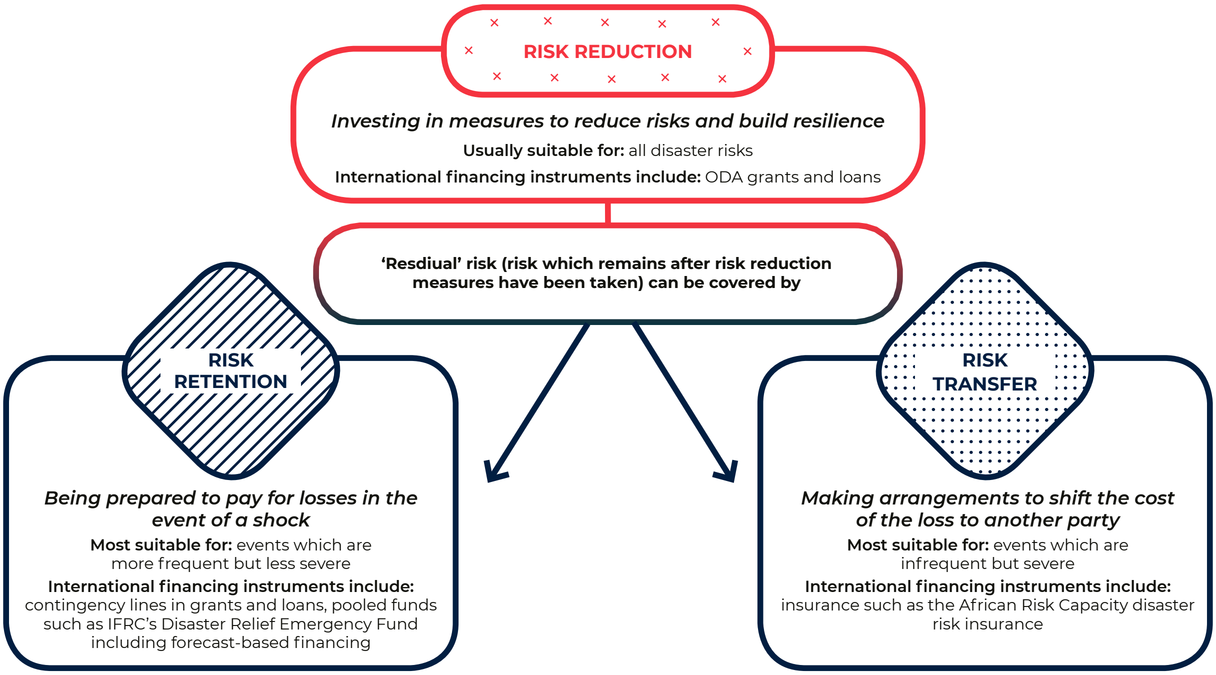
As well as de-siloing aid approaches, there needs to be a joined-up approach to using financing tools: joined-up, smart financing for addressing the risks of climate-related disasters requires combining the right financial instruments in the right way. This can draw on the idea of 'layering' which is used in disaster risk financing.

Layered financing works on the principle that in the first instance, risk should be reduced as much as possible. A certain level of risk is however bound to remain: some of it can be absorbed, or 'retained', but, for extreme events, provision can be made to transfer the risk, for example through insurance mechanisms (World Bank, 2018). The aim is comprehensive coverage, using a toolkit of complementary financing mechanisms so that the right funds are readily available in the right places, at the right time, for the different stages, severity and frequency of disasters (see Figure 7.5). Agreeing all of this upfront means that roles, rules and resources are pre-positioned and predictable – rather than appealing to the discretion of donors after a disaster hits (Clarke and Dercon, 2016; Poole et al, 2020).

Each of the financing instruments can draw on a mix of types and sources of financing – development, climate, humanitarian and domestic and international, public and private. A smart layered financing plan avoids 'holes', for example where a country invests minimal savings into contingency funds for recurrent localized droughts but is paying high premiums to insure against rarer large-scale flooding (Harris and Jaime, 2019).

Layering is a central principle of disaster risk financing and primarily focused on short-term extreme shocks rather than the incremental effects of climate change, but the broad idea is being applied to wider crisis financing (Poole et al, 2020) as a way of thinking about coherent financing plans. Some CSOs are also looking to develop a layered portfolio so they can be well-positioned to effectively manage crisis risk. The Start Network is exploring how anticipation and response funds can work together with its insurance mechanism, and other potential instruments, as part of a coherent financing facility. And the IFRC's forecast-based financing also sits within a broader portfolio of instruments (see Box 6.3).

Figure 7.5: Layering financing for managing disaster risks



2. The barriers: what prevents strategic planning for financing?

It is critical to start with the right end of the telescope – with the ultimate purpose and impact, rather than the instrument (Harris and Jaime, 2019; Pauw and Klein, 2015; Poole et al, 2020). Too often, financing approaches are not comprehensive, focusing funds and attention on a single mechanism to the neglect and detriment of smart strategic approaches to managing risk. For example, Senegal and Malawi are typical of a large group of countries which paid substantial sums into insurance-type policies for major hazards, but lacked basic national DRR funds or contingency reserves (Harris and Cardenes, 2020). This has been a particular critique of the recent surge of interest in disaster insurance – that it is not appropriate for all risks in all contexts, it can be expensive and not cost effective; and it can divert and disincentivize scarce national and international funds from being used for risk reduction (Hillier, 2018; Scherer, 2020).

The highly technical and top-down manner in which many instruments are designed can also prohibit uptake, and result in an uneven financing approach. Like any highly structured market-based financial product, disaster insurance and bonds demand a deep level of financial literacy and transparency to understand whether they are a wise and effective investment (Meenan et al, 2019). Failing to build this literacy and provide this transparency can result in inappropriate choices. And instruments designed top-down by financial managers, actuaries and economists far from the realities of high-risk communities may fail to factor in local knowledge of what is needed and what works. To be effective, and to be part of a smart strategy, high-level mathematical modelling of risk has to be sense-checked against the real-life risks and vulnerabilities people face.

The way forward: how to create holistic, effective financing plans

Momentum is gathering around 'humanitarian disaster-risk financing' approaches which have great potential to share and 'socialize' the idea of layered financing among different providers and interest groups and extend the idea to a wider range of climate change-related risks. Initiatives from the Start Network and the International Red Cross and Red Crescent Movement (see Box 7.3) are developing the principles, pre-conditions and elements for improved humanitarian disaster-risk financing strategies at global, regional and country levels. By bringing diverse technical groups together, these initiatives not only enable complementarity, they also facilitate important mutual understanding. For example by cooperating on risk transfer mechanisms, humanitarian agencies and national or local responders become more informed about risk financing and so more able to strategically use insurance-based models; meanwhile insurance providers become more attuned to the real-life implications of their mathematical risk models (Harris and Jaime, 2019).

Inclusive, multi-stakeholder processes are crucial for effective financing strategies – participatory design of financing approaches increases their sustainability and relevance to the real risks and impacts people face. They are also an opportunity to sense-check and supplement high-level assumptions and metrics against local knowledge and granular data (Harris and Cardenes, 2020). While civil society voices are often absent in disaster-risk financing design, there is much opportunity to address this as the field evolves (Montier et al, 2019). This is also important to close the accountability and evidence gap around many risk financing instruments (Hillier, 2017) and accelerate improvements based on what really works for at-risk communities.

Ecuador, 2019. Staff and volunteers receive forecast-based financing training and test early action protocols. IFRC's Disaster Relief Emergency Fund now encompasses a new fund designed to release money based on triggers for pre-agreed early action plans.

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BOX 7.3: INTERNATIONAL RED CROSS AND RED CRESCENT NETWORK'S ANTICIPATORY FINANCING WITHIN A FINANCING TOOLKIT

The International Red Cross and Red Crescent Network has a wide portfolio of financing approaches to support action across the disaster timeline. Across the Network, there is an ambition to 'double up' investments in climate action, including for climate-smart DRR, early action and preparedness.

In 2018, the scope of the IFRC's Disasters Emergency Relief Fund was officially expanded to reach beyond providing resources for disaster and emergency response, to encompass forecast-based early action. With support from the German Federal Foreign Office and the German Red Cross, a new forecast-based action fund was embedded in the Fund, designed to release money based on specific triggers for pre-agreed early action plans. In 2018–2019, this received nearly 3.75 million Swiss francs and committed/allocated 1.9 million Swiss francs, in six countries. This included its first-ever allocation which was triggered by meteorological forecasts of an extreme 'dzud' winter in Mongolia and enabled the Mongolian Red Cross Society to take anticipatory action to protect vulnerable herder families. The forecast-based action fund complements quick release preparedness funds held by several national societies which can support early action including the Philippines Red Cross (see Chapter 4 for more details).

At the same time, the Network is exploring how it might make use of risk transfer instruments, such as insurance. For example, in 2020, the IFRC worked with the World Bank to explore the feasibility of using the Southeast Asia Disaster Risk Insurance Facility (SEADRIF) to provide predictable support for forecast-based action by the Philippines Red Cross and the Myanmar Red Cross Society.

In addition to specific funds and instruments, a predictable flow of flexible financing is key for the Network, both to provide the risk retention contingency to respond to changing needs and to invest in the necessary technical and structural capacities for disaster risk management. As part of the Risk-informed Early Action Partnership, the IFRC is mapping the coverage of its early action financing and capacity worldwide so that funds can best be directed to fill gaps.

Based on information provided by IFRC and German Red Cross staff (IFRC, 2020a; 2020b)

7.3 CONCLUSIONS AND RECOMMENDATIONS

Writing about the financial reaction to the COVID-19 pandemic, the Head of the International Monetary Fund observed that “a global crisis like no other needs a global response like no other” (Georgieva, 2020). It demands unprecedented action, she noted, because it is more complex, more uncertain and more global than other crises. We can say the same about the current and impending humanitarian impacts of climate change. And while the repercussions of the pandemic may make it harder to find funds, they also provide a wake-up call on the importance of smart financing to reduce disaster risks and adapt to climate change. They show how a new scale and repertoire of investments can be deployed to intentionally target the most vulnerable places and people; and provide an opportunity to build back with green, inclusive and climate- and disaster-resilient economies (Meige et al, 2020).

International assistance is just one piece of the climate crisis response jigsaw, but for the populations most vulnerable to climate change, it can be a critical one. It is widely agreed that it is neither morally or financially defensible for aid to come largely in an ad-hoc, post-hoc manner after a disaster has hit – financing must be arranged upfront to adapt to the effects of climate change, reduce the risk of disasters and anticipate their impacts. There is a clear responsibility for developed countries to meet their commitments to provide this financing, and also for all those involved in spending it to ensure it is best directed and designed to make the most difference for the people who need it most.

We need a concerted effort to target the most vulnerable places

Commit to making accountable allocations

- Bilateral donors and multilateral funds must develop clear frameworks to identify where the most vulnerable places are, and be accountable to clear commitments to allocate funds accordingly. This should be backed up by targeted funding windows to prioritize ‘forgotten’, in particular fragile, contexts.

Apply rigour and consistency in tracking financing

- Bilateral and multilateral donors need to improve the visibility of financing so that gaps can be identified and addressed. This involves much more rigour and consistency in applying the Rio and DRR markers, particularly in indicating the DRR and climate change adaptation value of mainstreamed programmes, and in finding ways to track volumes and impacts of funding to the local level.

Tailor regulatory requirements to the context

- Donors and multilateral fund managers should build on good practice to enhance access to funds, particularly in fragile contexts. This means a two-fold approach to readiness: increasing specific investments in readiness as part of long-term support to institution strengthening at national and subnational levels, at the same time as tailoring realistic regulatory requirements to the context.

Ensure inclusive access to funds for affected populations

- To make sure funds are relevant to, and accessible at, local level, direct access initiatives must be extended to a wider range of local organizations and support for inclusive devolved financing must be scaled up. Donors and the international, national and local agencies who receive their support need to commit to actively involving affected populations and harnessing their expertise throughout the funding cycle – from fund design, to proposal, allocation, implementation and evaluation stages.

We need an outcome-driven approach to designing funds

Share the common purpose of funding for outcomes for people

- The ultimate purpose of addressing the risks and effects of climate change must connect financing silos (see Chapter 6). This requires donors to create and exploit flexibility in their funding structures to **fund according to outcomes for people rather than category of aid input**. It also calls for a **systematic integration of climate risk into development financing**: climate-smart development investments into resilient services and infrastructures in the places where the foundations for incremental approaches to adaptation and risk reduction are missing.

- As governments and international financial institutions formulate COVID-19 economic stimulus packages, invest in 'building back better' by focusing on financial solutions towards green, inclusive and resilient recovery that benefit the people who need it most.

Ensure contributions together form a coherent plan

- Donors, financial intermediaries, domestic authorities and implementing agencies together with civil society must ensure their contributions form part of a comprehensive, risk-informed financing plan that addresses the different layers of risk. These need to come together under multi-stakeholder national and subnational plans, so that choices of financing instruments are well-informed and led by need and impact and leave no one behind.

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Kenya, 2019. Victaline Lepore, a Red Cross volunteer, helps engage her community in preventing diseases. Kenya is one of the hotspots for emerging infectious diseases. But if diseases are detected and reported early, this can significantly prevent outbreaks from occurring. This can only be done with and through communities.

8 LOOKING TO THE FUTURE

Conclusion and recommendations

Mozambique, 2019. Cyclone Idai and the following floods created the worst humanitarian crisis in Mozambique's recent history. John Lucas, 23, worked alongside Emergency Response Unit delegates to set up tents and prepare the Cholera Treatment Centre site.

WE CAN DO THIS

What do we do about climate change? It is beyond urgent for countries, particularly the largest emitters, to make the transformational changes to their energy, agricultural and transport sectors (among others) needed to stop temperatures rising ever upward at such an unsustainable rate. Rather than a light at the end of the tunnel, disaster-related indicators show we are headed for a brick wall.

The frequency and intensity of climatological events are increasing substantially, with more category 4 and 5 storms, more heatwaves breaking temperature records and more heavy rains, among many other extremes. Food insecurity, direct and indirect health impacts, and displacement are likewise on the rise. The humanitarian impacts are already evident today, and the IFRC estimates that the caseload of people needing humanitarian assistance following such events could nearly double to 200 million a year by 2050 unless action is taken (IFRC, 2019).

The global response to COVID-19, while still very far from a general success at the time of writing, has shown that nations around the world can mobilize, take unprecedented steps affecting their entire economies, and find the necessary resources to robustly face a major global threat. We can (and must) mobilize at least the same level of energy and boldness to reduce the calamitous path of global carbon emissions and mitigate global temperature rise. The recent experience of the pandemic has also created a window of opportunity to take step changes in preparedness for future events. A global catastrophe of the magnitude of COVID-19 could finally open this window wide enough for us to look directly into the face of the climate crisis.

What we will see through this window is that the resources we need to effectively adapt to current and imminent climate-driven disaster risks are absolutely within our reach. Yes, more money must be spent. But the relative gaps that need to be filled are almost trivial in the perspective of the COVID-19 economic bailouts that were underway at the time of writing. By way of example, Chapter 6 noted an annual shortfall of 50 billion Swiss francs between identified annual adaptation needs of 50 developing countries and the funding provided. This would be the equivalent of just 6% of the 750 billion Euro (802 billion Swiss franc) COVID-19 economic bailout scheme agreed by EU leaders in July 2020 (BBC, 2020) or 2% of the 2.2 trillion US dollar (2.1 trillion Swiss franc) COVID-19 stimulus bill adopted by the USA in March (Cochrane and Stolberg, 2020). Shaping these very investments toward a green and adaptation-focused recovery would be an excellent way to start. Moreover, upfront investment in risk reduction, early warning and early action will reduce response and recovery costs by factors ranging from 2:1 to 10:1 (Global Commission on Adaptation, 2019).

We also need some innovations and new ways of thinking, particularly in making more practical use of scientific information, matching up early warning with swifter anticipatory action on the ground and breaking out of our self-imposed conceptual, regulatory and institutional silos. Yet we already have most of the tools and knowledge we need to succeed, thanks in significant part to the unglamorous work of the global disaster risk reduction (DRR) community in recent decades.

In many ways, the global COVID-19 pandemic has provided a taste of the devastating series of new disaster risks that are unfolding around the world due to the warming climate. Global successes and failures of national control measures can, with important caveats, be read daily in COVID-19 testing data. As the examples discussed in this report make clear, if we were able to speed up the script on climate disasters, the advantages of early action and the costs of inaction would flash just as dramatically in front of our eyes. Our choices now will have a similarly decisive impact.

We need to shake off business as usual and instead back up words with action. This means implementing existing commitments on resilience (and integration of climate change adaptation and disaster risk management (DRM) in the Sustainable Development Goals (SDGs), Sendai Framework for Disaster Risk Reduction and Paris Agreement on climate change, doing a much better job of ensuring that we prioritize support for the people most at risk and insisting on tangible results at community level.

> The recent experience of the pandemic has created a window of opportunity to to make major changes in preparedness for future events. A global catastrophe of the magnitude of COVID-19 could finally open this window wide enough for us to look directly into the face of the climate crisis.

HERE'S HOW

By becoming climate smart

It is time to become climate smart in our development choices and our approach to DRM. For both, the key is to ensure that we are taking full account of and acting on what scientific models tell us about upcoming risks, which may be very different from those of even the most recent past.

In a world already replete with people highly exposed to natural hazards, we must, at the least, ensure the resilience of our critical infrastructure against reasonably predictable weather extremes and rising sea levels. In light of these growing risks, we need also to develop a much more thorough and nuanced understanding of existing vulnerabilities and capacities – and not just in a national aggregate, but at community level.

For DRM programming, both long-term and medium/seasonal forecasts can be critical for planning and investment, and even short-term forecasts can be used to trigger rapid anticipatory action. We must ensure that our early warning systems reach and can be understood and used by the people they are meant to protect. We must also make sure that our investments in warning are matched by investments in early action or these warnings will not save lives. Helpful commitments along these lines are included in the objectives of the Risk-Informed Early Action Partnership (REAP) launched at the UN Climate Action Summit in 2019. Over 30 states and agencies have signed up to REAP's commitments, with more invited to do so. While nothing new, continuously improving our capacity and readiness for rapid response to disasters after they strike must also be part of our plan.

One critical innovation that has proved its worth at pilot level (including by some National Societies) is anticipatory approaches. These aim to reduce human suffering, losses and damage by assisting the most vulnerable populations ahead of an imminent disaster. They link predictions that a hazard might turn into a disaster to measures to prevent or at least reduce the forecasted impact. Actions include providing cash, sanitation and hygiene kits and shelter toolkits as well as safeguarding livelihood measures such as evacuating livestock. They are carried out when the forecast reaches a pre-determined threshold and are typically backed-up by a pre-arranged financing agreement. It is time to take this approach to scale by incorporating it in national DRM laws, policies and plans, and in the procedures and practices of humanitarian donors and organizations.

By getting our priorities right

Our collective goal is to keep everyone as safe from disasters as possible, and our top priority and focus should be the people most vulnerable and most exposed to risk. This may seem obvious, but we are not consistently acting this way.

As already noted, international climate (and DRR) finance is not keeping pace with adaptation needs in low income countries. Moreover, allocations of funding are not prioritizing the countries with the very highest risk and lowest capacity, particularly when funding is assessed on a per person basis.

This is partly explained by donor concerns about aid effectiveness, transaction costs and the challenge of building resilience in complex settings, especially situations of armed conflict. But it is not the way to save lives.

This is not only an issue for donors. A number of states have adopted legal and policy frameworks for climate change adaptation and DRR that greatly over-promise governmental activities in light of the capacity they have been willing to finance from their own resources. A clear mandate to focus on the most vulnerable people – and to ensure these people participate in decision-making – is also missing from many DRM laws, national adaptation plans and DRR strategies.

While the most vulnerable groups vary widely from place to place, slum dwellers, indigenous communities, persons in remote locations, older people, persons with disabilities and persons with diverse sexual orientation, gender identity and expression and sex characteristics are among those most frequently left behind.

For humanitarian organizations, another priority must be doing no harm – this means taking a much more serious approach across the sector to greening our own activities and operations, in particular our carbon footprint and impact on the environment. We cannot offer much of a solution if we are part of the problem.

By integrating and localizing our approach

Integration may not sound like a particularly revolutionary approach to the global climate crisis, but it is indispensable. While not quite managing to come fully together themselves, the main global regulatory frameworks (the SDGs, the Sendai Framework and the Paris Agreement) call – to varying degrees – for integrated and coherent approaches to climate change adaptation, DRR and development. However, few national DRM laws and policies fully integrate climate change adaptation and some states employ parallel and separate institutional mechanisms and planning processes. Silos also plague international finance sources, with climate (and other environmental), development and humanitarian funding streams often operating in uncoordinated ways, leaving gaps in coverage.

Among these gaps is support for local responders and community-level action. Multilateral climate finance sources in particular are notoriously difficult for civil society to access. A particular collective blind spot is support for the long-term institutional capacity of local disaster responders, which falls through the cracks. Humanitarian, development and climate financing decision-makers each think that one of the others should handle this issue. Meanwhile, at domestic level, resources for community-level implementation of national disaster plans and policies are often lacking.

> Our collective goal is to keep everyone as safe from disasters as possible, and our top priority and focus should be the people most vulnerable and most exposed to risk. This may seem obvious, but we are not consistently acting this way.

And the timing couldn't be better

As this report was being finalized, hundreds of thousands of new cases of COVID-19 were still being reported every day, affecting countries all over the world. Global economic growth was projected to contract by nearly 5%, the number of acutely food insecure people was projected to rise to 121 million, and over a 100 million children were at risk of missing measles vaccines, among other catastrophic indirect effects (Omtzigt and Pople, 2020). Both the IFRC and the UN had issued their largest ever humanitarian appeals to address the crisis, while DRM officials, humanitarian organizations and donors alike were finding their ability to function severely hampered by lockdown and control measures, with no definite end in sight.

Yet this is the right time to face up to climate disasters. Why? First, because we must. Despite a short-term decrease in climate emissions during lockdown, CO_2 levels continue to top previous records (UN News, 2020). The impacts of past global warming are still being felt in hurricanes, heatwaves and many other extreme events around the world. They won't wait until we are less financially burdened, and have finished responding to COVID-19.

Second, as mentioned earlier, the massive stimulus packages that are being developed around the world are an opportunity to build back better, not only with a **green** recovery but a **resilient and inclusive** one – using relevant funds to invest in making communities safer and more resilient to future disasters (Hepburn et al, 2020; IMF, 2020).

Third, youth around the world have begun to organize around climate change like never before and this is an important opportunity. Their energy and innovation have already achieved "things that many of us who have been working on it for 20-odd years have failed to achieve" (Bradley, 2019) and can do even more if agencies and experts work harder to support their leadership.

Finally, as already mentioned, we now know that we have the capacity to step up when fully attuned to a global crisis, finding resources where none seemed available and taking unprecedented and rapid steps at containment. Climate change is every bit as threatening to our long-term survival and well-being as COVID-19. We have the time to react effectively before it's too late. Let's not miss our chance.

SUMMARY OF RECOMMENDATIONS

For governments

- Design investments, including COVID-19 financial stimulus packages, to promote a green, resilient and inclusive society, investing in climate change mitigation and adaptation.
- Ensure that major infrastructure, such as schools, hospitals, child and senior care facilities, seawalls, power plants and water and sanitation facilities, is designed (and where possible retrofitted) to withstand projected climate and weather extremes and rising sea levels, making use of environmental impact assessments as a regulatory tool.
- Review DRM laws, policies and plans to ensure they are climate smart. understood and implemented. They should consider key innovations such as forecast-based action and financing, linked to shock-resistant social protection systems.
- Invest and design integrated and people-centred early warning and early action systems that assure timely delivery of actionable warnings at community level, as well as an adequate protective response.
- Ensure decentralized access to funding for adaptation and DRM activities, particularly at the municipal level.

For humanitarian (and other relevant civil society) organizations

- Embrace and strengthen climate adaptation, in particular in urban settings, and in contexts where development practitioners are less present, such as complex crises.
- Scale up the use of forecast information in planning and learn from successes in forecast-based triggers for early action.
- Continue to strengthen rapid response and scale up capacity for disasters that cannot be avoided.
- Take responsibility to transparently report and improve on global and local climate and environmental footprints, strengthen the environmental sustainability of humanitarian activities and impact, and make stronger links to the environment throughout humanitarian work.

For multilateral and bilateral donors

- Design COVID-19 support packages that enable a green, resilient and inclusive recovery investing in climate change mitigation and adaptation.
- Increase ambitions to match the adaptation needs of the most vulnerable developing countries.
- Ensure allocations of climate and DRR finance cover countries that are at the very highest risk and lowest capacity.
- Change procedures so that multilateral climate finance can be accessed at local level for community-led resilience building as well as for strengthening long-term institutional and response capacities.
- Scale up support for anticipatory approaches so that many more people can receive assistance ahead of predictable shocks.
- Support humanitarian organizations to achieve a greener approach (which should include adequate budgeting for strengthening systems and allow for sustainable procurement) and coordinate among themselves to avoid contradictions in their demands on funding recipients.

For climate change institutions and experts

- Embrace and promote adaptation to disaster risk caused by climate change as a critical goal of global and domestic climate action, alongside mitigation.
- Connect analytical tools (as well as policy and financing instruments) for long-term adaptation with short-term forecast-based action, and post-disaster response.
- Redouble efforts, in cooperation with humanitarian and development partners, to ensure that communities receive timely and understandable scientific information about climate-driven risks.
- Build on the experience of the humanitarian and DRR communities in managing shocks, which includes the need for multi-stakeholder approaches, and a strong focus on implementation at the local level.

For everyone

- Ensure that the most vulnerable people are addressed as a matter of priority in climate change adaptation and DRM.
- Listen better to the voice of communities, to understand local knowledge, coping mechanisms, practices and needs related to climate risk, and to design culturally appropriate programmes.
- Support and empower the leadership of local civil society and communities in climate change adaptation and DRM efforts.
- Work together across silos to address climate-driven disaster risks.

Lebanon, 2016. Syrian refugee children at an informal temporary settlement. Vulnerable groups vary widely from place to place and our role as humanitarians must be to focus on the most vulnerable, wherever they are.

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COMMITMENT OF THE IFRC

In December 2019, the IFRC network adopted a new ten-year strategy (Strategy 2030) identifying climate change as the top global challenge we will seek to address. We committed, among other things, to:

- **integrate** climate risk management – including adaptation and mitigation – across all of our programmes, operations and advocacy and adopt better environmental management in our approaches to addressing exposure and vulnerability
- **focus** on the causes of vulnerability in livelihoods, food shortages, health and climate-related displacement, and in urban environments
- **embrace** the early action models, scientific forecasts, innovation and financing that can improve our response
- **raise** our collective voice to encourage the right level of ambition on both adaptation and mitigation and to ensure people in vulnerable situations are not left behind
- **strengthen** the Red Cross and Red Crescent Green Response Framework and strive to reduce our own climate and environmental footprint.

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ANNEXES

METHODOLOGY

Disaster data

EM-DAT

EM-DAT is the International Disaster Database from the Centre for Research on the Epidemiology of Disasters (CRED) at the Université Catholique de Louvain. It collects and compiles information on disasters from public sources, UN agencies including WHO, non-governmental organizations, insurance companies and research institutes, and secondary data from press agencies.

EM-DAT disaster data covers:

- Climate- and weather-related events:
  - meteorological: storms – tropical cyclones, extratropical storms and convective storms (such as tornadoes, storm surges, hail, lightning, severe storms, derecho, sandstorms, winter storms), extreme temperatures (cold waves and heatwaves)
  - hydrological: floods – riverine, pluvial/flash floods, landslides and mudslides related to hydrological events
  - climatological: droughts, wildfires.
- Geophysical: earthquakes, volcanic activities, landslides related to mass movement.
- Biological: epidemics (only emergency outbreaks), insect infestation, animal accidents.
- Technological: transport accidents (air, boat, train and road) which also include migrant boat accidents, industrial accidents (including nuclear explosions and dam breaks).

EM-DAT does not include war, conflict or conflict-related famine as disaster events. Further details are available from EM-DAT (no date).

For a disaster to be entered into the EM-DAT database, at least one of the following criteria must be fulfilled:

- 10 or more people reported killed

- 100 or more people reported affected
- declaration of a state of emergency
- call for international assistance.

The EM-DAT data used in this report was downloaded on 1 September 2020.

EM-DAT data limitations around damage and affected people

- **Damage:** Damage and cost estimation of disasters is largely underreported in EM-DAT: 78% of records do not contain this information.
- **Affected people:** Estimates of the number of people affected and killed by disasters is not comprehensively reported: 33% of records do not contain the number of people affected, and 21% do not record the number of deaths.
- **Other hazard information: Data on the intensity (magnitude) of climate- and weather-related disasters is limited:** 53% of extreme temperature events, 58% of wildfires and 65% of floods do not include information on their measurable intensity. The precise duration of hazards is not known in 15% of records. Availability of precise location is also poor (90% of records do not include GPS locations).

EM-DAT calculations of number of events and countries affected

Disaster events are recorded by country in the EM-DAT database: this means a single event which impacts several countries appears multiple times. To calculate the number of independent events, a unique identifier was generated based on the following fields available from EM-DAT: 'Disaster type', 'Seq' and 'Year'. Total numbers of people affected and killed were then aggregated by this unique identifier. A data check was done with the ReliefWeb disaster database to validate these events.

Events with 10 or more people reported killed and/or with 100 or more people reported affected are classified as 'significant' events. The analysis presented in Chapters 2 and 3 is based only on disasters classified as 'significant'.

Additional sources for disasters in 2019 and 2020

Based on a data quality review, and to improve the overview of significant disasters in 2019 and 2020, we used secondary sources to supplement EM-DAT data for missing disasters, locations, magnitudes and impacts. These sources are:

- Droughts: ReliefWeb, Famine Early Warning Systems Network (FEWS NET)
- Floods: Dartmouth Flood Observatory, FloodList
- Storms: National Hurricane Center, Japan Typhoon Warning Center, NOAA - IBTrACS, Zoom Earth, ReliefWeb, press reports
- Wildfires: NASA – FIRMS, NOAA - IBTrACS, Monitoring of the Andean Amazon Project, California Department of Forestry and Fire Protection, Global Forest Information System, IFRC, press reports
- Heatwaves: Public Health England

- Earthquakes and volcanic eruptions: NOAA - National Geophysical Data Center (NGDC)
- Epidemics: WHO bulletin, IFRC.

Displacement

Displacement data is sourced exclusively from the Global Internal Displacement Database maintained by the Internal Displacement Monitoring Centre (IDMC). The database was downloaded on 26 May 2020.

Climate projections

Climate science data and projections are sourced from the **Intergovernmental Panel on Climate Change (IPCC), except where otherwise noted**.

The **IPCC** is a key source for climate science: an international body of scientists from 195 member countries set up to provide policy-makers with regular assessments of the scientific basis of climate change, its impacts and future risks, and options for adaptation and mitigation. It does not conduct its own scientific research, but rather assesses the published literature.

The IPCC issues **assessment reports**, the latest of which is *Fifth Assessment Report (AR5)* published in 2014, as well as **special reports** requested by the UN Framework Convention on Climate Change (UNFCCC). It is working on *AR6* which is expected to be published in 2022, and has recently released the *Special Report on Global Warming of 1.5 degrees* (SR15), the *Special Report on the Ocean and Cryosphere in a Changing Climate*, and the *Special Report on Climate Change and Land*.

Given the challenges of accuracy with future projections, statements about the future climate summarized by the IPCC include confidence level. In cases where specific climate projections are cited, we include projections for RCP4.5[1] which represents a medium stabilization scenario (where greenhouse gases in the atmosphere stabilize due to a substantial reduction in emissions) as well as RCP8.5, which represents a high emissions scenario, in order to indicate a range of possible futures.

Country analysis – disaster risk and climate vulnerability

Disaster risk

The **INFORM** index quantifies national disaster risk based on historical exposure to hazards, vulnerability and coping capacity. Further details are available from INFORM (no date).

For this analysis, disaster risk was calculated based on INFORM's hazard and vulnerability scores for weather-related events (cyclone, flood and drought), and overall copying capacity score. This score is normalized with a range from 0 to 100 (100 is the higher risk).

1 RCP stands for a representative concentration pathway – a projection of greenhouse gas concentration with a trajectory over time as adopted by the IPCC. The IPCC uses four pathways for climate modeling based on different potential levels of greenhouse gases emissions over time.

INFORM 2017 was used for this analysis to match the Notre Dame Global Adaptation Index (ND-GAIN), for which 2017 is the latest available data year.

Climate vulnerability

ND-GAIN quantifies national vulnerability to climate disruptions, while also assessing a country's readiness to leverage investment for adaptive actions. Vulnerability is calculated as a combination of exposure, sensitivity and adaptive capacity, while readiness incorporates economic, governance and social components. This score is presented as a range from 0 to 100 (100 is lowest vulnerability). Further details are available from ND-GAIN, 2015. ND-GAIN 2017 was used for this analysis, as this is the latest available data year.

Overall vulnerability

For comparison between INFORM and ND-GAIN, we invert ND-GAIN's vulnerability score:

Inverted ND-GAIN = 100 - ND-GAIN score.

To measure vulnerability based on climate change and also the impact of climate change on natural hazards, we calculate the overall vulnerability by combining the INFORM score and the inverted ND-GAIN score as a simple average:

Overall vulnerability = (INFORM + Inverted ND-GAIN) / 2.

A number of countries are not included in the ND-GAIN Index – for these countries, we use only the INFORM score.

To compare short-term (vulnerability to disaster risk from INFORM) and long-term vulnerability (overall vulnerability), we apply quintile thresholds which align with INFORM risk levels to the overall vulnerability score:

- Very low: 0 to 19
- Low: 20 to 34
- Medium: 35 to 49
- High: 50 to 64
- Very high: 65 to 100.

Humanitarian response

IFRC GO is a publicly available data source that provides information on disasters that have triggered an IFRC Disaster Relief Emergency Fund (DREF) emergency appeal or Red Cross Red Crescent Movement-wide appeal. It also contains plans of action, field reports, surge deployments, situation reports and more, and displays these in an easy-to-use interface as well as through maps, charts and infographics. The IFRC launched the GO platform in 2018 to channel emergency operations information across the Red Cross and Red Crescent network.

Costs of climate disasters – past and future

The Cost of Doing Nothing report (IFRC, 2019a) is the basis for past and future projections of the humanitarian cost of climate disasters. Average per capita (person) costs are calculated across two sets of data: the IFRC system (IFRC GO) and the UN Office for the Coordination of Humanitarian Affairs (OCHA) appeals system (OCHA FTS). These costs are based on data from 2000 to 2018, excluding conflict-overlapping disasters. In the IFRC system, per capita costs are generated based on disaster type and country income group; data within the OCHA appeals system is based on an overall average. Confidence intervals (90%) are calculated by a bootstrap (IFRC, 2019b).

The historical share of the global population affected by disasters is calculated based on EM-DAT for storms, droughts and floods; numbers of people affected are annualized to account for multi-year disasters. The average global share of people affected by climate disasters is calculated for 2000 to 2019. Annualized observed totals are recorded for 1970 to 2019.

Historical annual total costs of response are calculated for 1970 to 2019 based on the observed number of people affected multiplied by the range of average per capita costs calculated from within IFRC and OCHA appeals. A 10-year moving average is calculated based on the highest calculated estimated costs – in line with the projected pessimistic scenario presented by *The Cost of Doing Nothing* report.

Projected total costs are calculated for 2030 and 2050 based on *The Cost of Doing Nothing*'s pessimistic scenario. This is SSP4 with unbalanced growth, and an increase in the share of global population affected by disasters according to estimates by World Bank's Shock Waves. These projected values are interpolated for 2020 to 2050 and a 90% confidence interval is calculated based on the underlying per capita cost uncertainties. Note that the confidence interval represents the uncertainty in a ten-year moving average.

Regulatory frameworks

Analysis of climate change-related components of disaster risk management laws was built on data provided by the forthcoming IFRC Global Disaster Risk Management Law Index, a tool developed by the IFRC Disaster Law Programme that, at the time of writing, will be soon available online. The Index gives an overview of domestic disaster risk management (DRM) laws and policies from around the world, and the extent to which they address key disaster law themes. It also provides guidance on DRM systems in each country, focusing on the entire DRM spectrum – ranging from risk reduction to preparedness, response and recovery, including references to climate change adaptation and thematic considerations such as protection issues. In particular, DRM laws of 105 countries were categorized against a defined matrix of indicators by a core team of legal experts from international law firms and academic partners.

Analysis of climate laws and policies with a focus on adaptation was developed based on the Climate Change Laws of the World database, developed by the Grantham Research Institute at the London School of Economics and the Sabin Center for Climate Change Law at Columbia Law School. This covers all UN and UNFCCC parties, including the European Union, as well as a number of countries, regions and territories that are not UN or UNFCCC members (such as Taiwan, and State of Palestine) The database includes laws and policies that have been passed by legislative branches or published by executive branches, and that are no longer in draft form. It includes legislation at national level only, with the exception of EU legislation. For more information see GRI, no date.

Development finance

Development finance data is sourced from the Organisation for Economic Cooperation and Development (OECD) Development Assistance Committee (DAC).

As noted in Chapter 7, funding to both climate change adaptation and disaster risk reduction (DRR) is not consistently marked in reporting to the OECD DAC. This means that the figures presented in this report are understood to be estimates based on the best available data, rather than precise totals.

Climate change adaptation funding

Climate change adaptation funding is calculated from OECD DAC Creditor Reporting System (CRS) 2018 data, the latest available year of data at time of writing. Data reflects funding commitments rather than disbursements, as comparable disbursement data for bilateral donors and multilateral donors is not currently available.

For all subsets, we select development finance activities marked as 'principally targeted' to climate adaptation objectives following the Rio marker approach. The decision to include only 'principal' (Rio marker 1) finance is due to the difficulties (widely discussed in the literature – see for example Carty and Le Comte, 2019) of attributing a funding value to the climate change relevance of those projects marked as Rio marker 2 (significant).

Disaster risk reduction funding

DRR funding was calculated from OECD DAC CRS 2018 data, the latest available year. Analysis of the OECD DAC data was conducted by Development Initiatives, using a unique methodology which combined DRR funding marked under relevant codes and a multi-language keyword search of other official development assistance. Further details are available from Development Initiatives, 2020.

To calculate funding per capita (person), we use UN Population Division estimates for 2020.

Data catalogue

Topic	Dataset name	Timeframe	Geographic scope	Source
CLIMATE CHANGE				
Temperature	Annual mean temperature anomalies	1880–2019	Global, Region	NCDC/NOAA – Climate at a Glance
	Temperature and precipitation extremes indices	1951–2019	Global, Grid	Climdex
	Future temperature and precipitation data	2020–2099	Country	World Bank – Climate Change Knowledge Portal
Precipitation	Global Precipitation Severity Index	1951–2019	Global, Grid	Climdex

Topic	Dataset name	Timeframe	Geographic scope	Source
Sea ice	Average monthly sea ice extent and area	1978–2020	Region	NSIDC
	Antarctic and Greenland ice mass balance	1980–2019	Region	IMBIE
Glacier	Global glacier mass change	1950–2019	Glacier	WGMS
Sea level	Global mean sea level	1993–2020	Global	NASA – Sea Level Change
HAZARDS				
Disasters	EM-DAT International Disaster Database	1900–2020	Country	CRED
	Disaster database	1980–2020	Event	ReliefWeb
	IFRC Operations	1919–2020	Event	IFRC GO
Earthquakes	Global historical earthquakes	2150 BCE–2020	Event	NGDC
Volcanic eruptions	Global historical volcanic eruptions	2150 BCE–2020	Event	NGDC
Tsunamis	Global historical tsunamis	1950–2020	Event	NGDC
Droughts	Water stress projection	2020, 2030, 2040	Country	WRI – Aqueduct Project
Floods	Global significant floods	1985–2020	Event	Dartmouth Flood Observatory
	Floods projection	2030, 2050, 2080	Grid	WRI – Aqueduct Project
Landslides	Global landslide hazard	2020	Grid	GFDRR Lab
	Earthquake-triggered landslide hazard	2020	Grid	GFDRR Lab
Storms	Historical cyclones	1851–2020	Event	NCDC/NOAA – IBTrACS
	European severe storms	2009–2020	Event	European Severe Weather Database
Wildfires	Global fire archives	2000–2020	Grid	NASA – FIRMS
Epidemics	Historical disease outbreaks (secondary data)	1996–2020	Event	WHO – Disease outbreaks
	Active health emergency	On going	Event	WHO Health Emergency Dashboard

Topic	Dataset name	Timeframe	Geographic scope	Source
IMPACT				
People	Burden deaths related to natural disasters	1990–2017	Global, Country	IMHE – Global Burden of Disease Collaborative Network
	Internal displacement related to natural disasters	2008–2018	Global, Region	IDMC
Damages	Damaged critical infrastructure attributed to disasters	2005–2018	Global	UN Office for Disaster Risk Reduction
	Disasters economic losses	1990–2017	Event, Region	SwissRe – Sigma Explorer
VULNERABILITIES				
Fragility	Fragility	2015–2020	Country	OECD – State of Fragility
	Global Fragility Dataset	2000–2014	Country	Stauss Center – State Fragility
Food insecurity	Integrated Food Security Phase Classification (IPC)	2009–2019	Subnational	FEWS NET
Disaster risk	INFORM Risk Index	2010–2020	Country	INFORM
Climate change	Climate change adaptation country index	1999–2018	Country	ND-GAIN Country Index
Vulnerable population	Proportion of urban population living in slums	1990–2014	Country	World Bank – DataBank
	Low elevation coastal zone urban-rural population and land area estimates	1990, 2000, 2010, 2100	Grid	Center for International Earth Science Information Network
	Global Internal Displacement Database	2003–2019	Country	IDMC
	Population-based metrics of subnational climate exposure	2016	Country	Strauss Center – State Fragility
Poverty	Population living below $1.90 a day (% of total)	1981–2018	Country	World Bank, Development Research Group

Topic	Dataset name	Timeframe	Geographic scope	Source
DEVELOPMENT				
Population	Population by country	1950–2020	Country	UN Population Division
	Historical population data	1700–2000	World, Region	Hyde
	World Population Prospection	2020–2100	Country	UN Population Division
Development	Human Development Index	1990–2018	Country	UNDP – HDI
	GDP (current US dollar prices)	1960–2019	Country	World Bank – GDP
	Surface area	1961–2018	Country	World Bank – DataBank
Country group	Small island developing states	-	Country	UNDP
FINANCE AND POLICIES				
Development finance	OECD DAC External Development Finance	1973–2018	Country	OECD DAC - CRS
Climate change	OECD–climate-related external development finance flows	2000–2018	Country	OECD – Statistics
Laws and policies	IFRC Global Disaster Risk Management Law Index	2010–2020	Country, regional, international	IFRC – Disaster law
	Climate legislation and policies	1947–2020	Country	Climate Change Laws of the World

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GLOSSARY

The definitions of the terms given here relate to their use in the *World Disasters Report 2020*.

Adaptation finance: "Initiatives and measures to reduce the vulnerability of natural and human systems against actual or expected climate change effects" (IPCC, 2007). The Rio Marker, created to track OECD DAC-reported climate finance, defines adaptation as where a project: "intends to reduce the vulnerability of human or natural systems to the current and expected impacts of climate change, including climate variability, by maintaining or increasing resilience, through increased ability to adapt to, or absorb, climate change stresses, shocks and variability and/or by helping reduce exposure to them."

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)

Anticipatory finance: Anticipatory action happens at the cusp of risk financing and humanitarian response: once there is a high probability of a crisis, but before it occurs. It aims to reduce or mitigate the impact of crises, using predictions of imminent shocks or stresses. Anticipatory finance is pre-positioned funding, either bilateral or pooled, which is triggered once evidence of an imminent crisis meets certain criteria. Anticipatory financing requires four elements to be in place: predictive information, triggers and decision protocols; early action planning; financing mechanisms; and delivery channels.

Climate change mitigation: Action that reduces the rate of climate change. Climate change mitigation is achieved by limiting or preventing greenhouse gas emissions and by enhancing activities that remove these gases from the atmosphere (IPCC, no date). An increase in these gases has the effect of wrapping a thick blanket around the earth, raising the average temperature of its atmosphere. One of the main greenhouse gases is carbon dioxide, which is released when burning fossil fuels.

Climate change adaptation: What we do to adjust to the changing climate – that is the 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 aid adjustment to expected climate change and its effects (IPCC, 2012). Adaptation is not only about measures to deal with longer-term changes such as increased temperatures and sea level rise, but also includes disaster risk reduction in the face of weather- and climate-related events.

Climate finance: Financial resources – local, national, international, private or public – mobilized to fund actions that support mitigation and adaptation to the impacts of climate change. According to UNFCCC: "Finance that aims at reducing emissions, and enhancing sinks of greenhouse gases and aims at reducing vulnerability of, and maintaining and increasing the resilience of, human and ecological systems to negative climate change impacts" (UNFCCC, 2014). However, there is no agreed international definition of what constitutes climate finance, or common rules on how to report it. Definitions vary between donors and funds (Beecher, 2016; Watson and Schalatek, 2020).

Climate-smart programming: There is no universally accepted definition. 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).

Disaster: A serious disruption of the functioning of a community that exceeds its capacity to cope using its own resources (UNDRR, no date). There are many potential causes of such disruption, including natural and technological hazards, industrial accidents, mass movements of populations and infectious and contagious diseases, as well as various factors that influence the exposure and vulnerability of communities. Disasters are included based on a 'significance' threshold as used by EM-DAT, defining disasters as incidents where more than 10 people were killed, or more than 100 affected. This report looks at disasters triggered by natural hazards – that is by biological, geophysical and climatological hazards.

Disaster risk financing: A broad and non-official term which is used to describe the broad set of financing flows, instruments and mechanisms which aim to address the risk of disaster. Unlike disaster risk reduction and climate financing, it does not link to any specific agreement or reporting framework, but is a descriptive term used in different ways by various actors.

Disaster risk management: The application of disaster risk reduction policies and strategies to prevent new disaster risk, reduce existing disaster risk and manage residual risk, contributing to the strengthening of resilience and reduction of disaster losses. Disaster risk management actions can be prospective, corrective or compensatory; the latter is also called residual risk management (UNDRR, no date).

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. (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).

Ecosystem-based disaster risk reduction: The sustainable management, conservation and restoration of ecosystems to reduce disaster risk, with the aim of achieving sustainable and resilient development (Estrella and Saalismaa, 2013).

Ecosystem-based adaptation: The use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people adapt to the adverse effects of climate change (CBD, 2009).

Environmental sustainability: A state in which the demands placed on the environment can be met without reducing its capacity to allow all people to live well, now and in the future (GEMET, 2020b). While environmental sustainability is broader than climate action, limiting climate and environmental impacts can both contribute to mitigating climate change, for instance by reducing emissions and greening practices, and to strengthening people's resilience to climate change (GEMET, 2020b; IUCN, no date; IUCN 2015).

Environmental degradation: A process through which the natural environment is compromised in some way, reducing biological diversity and the general health of the environment. It can be entirely natural in origin, or accelerated or caused by human activities (GEMET, 2020a). Environmental degradation is both an impact of climate change, and a compounding risk to communities affected by climate change.

Environmental footprint or impact: The impacts which activities can have on the environment, including through greenhouse gas emissions (the latter also known as 'carbon footprint').

Extreme climatological events are rare for the place where they occur and appear in the top or bottom of the range (in terms of temperature, wind speed, volume of rain and so on) observed for that location. Not all extreme events will lead to a disaster, as this will depend on a variety of factors including location, levels of exposure and vulnerability of the people in the affected area, and whether it occurs simultaneously with other shocks or hazards (IPCC, 2012).

Exposure: The situation of people, infrastructure, housing, production capacities and other tangible human assets located in hazard-prone areas. Measures of exposure can include the number of people or types of assets in an area. These can be combined with the specific vulnerability and capacity of the exposed elements to any particular hazard to estimate the quantitative risks associated with that hazard in the area of interest (UNDRR, no date).

Forecast-based financing: A programme that enables access to humanitarian funding for early action based on in-depth forecast information and risk analysis. Its goal is to anticipate disasters, prevent their impact, if possible, and reduce human suffering and losses. A key element of forecast-based financing is that the allocation of financial resources is agreed in advance, together with the specific forecast threshold that triggers the release of those resources for the implementation of early actions. The roles and responsibilities of everyone involved in implementing these actions are defined in the Early Action Protocol. This ensures the full commitment of implementation among the involved stakeholders (IFRC, no date).

Geoengineering: A broad set of methods and technologies that aim to deliberately alter the climate system in order to alleviate the impacts of climate change. Most, but not all, methods seek to either 1) reduce the amount of absorbed solar energy in the climate system (solar radiation management) or 2) increase net carbon sinks from the atmosphere at a scale sufficiently large to alter the climate (carbon dioxide removal). Scale and intent are of central importance. Two key characteristics of geoengineering methods of particular concern are that they use or affect the climate system (such as atmosphere, land or ocean) globally or regionally and/or could have substantive unintended effects that cross national boundaries. Geoengineering is different from weather modification and ecological engineering, but the boundary can be fuzzy (IPCC, 2012b).

Hazard: A process, phenomenon or human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation. Hazards may be natural, anthropogenic or socionatural in origin. Natural hazards are mostly associated with natural processes and phenomena. Anthropogenic hazards, or human-induced hazards, are induced entirely or mainly by human activities and choices (UNDRR, no date). This term does not include the occurrence or risk of armed conflicts and other situations of social instability or tension which are subject to international humanitarian law and national legislation. Several hazards are socionatural, and associated with both natural and anthropogenic factors, including environmental degradation and climate change.

Loss and damage The harms resulting from sudden-onset events (climate disasters, such as cyclones) as well as slow-onset processes (such as sea level rise). Economic losses can be understood as the loss of resources, goods and services that are commonly traded in markets. Non-economic losses can be understood as the remainder of items that are not commonly traded in markets (UNFCCC, 2013).

Nature-based solutions: 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). They include ecosystem-based disaster risk reduction and ecosystem-based adaptation (see separate definitions).

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, 2020).

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 preserving and restoring its essential basic structures and functions through risk management (UNDRR, 2020).

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).

Sustainability: Achieving a balance between environmental, social and economic demands. Sustainable development refers to development that meets the needs of the present without compromising the ability of future generations to meet their own needs (World Commission on Environment and Development, 1987).

Technological or human-induced disasters: Events that are caused by humans and occur in or close to human settlements. These can include environmental degradation, pollution and transport or industrial accidents. They can also include fires, explosions and structures that collapse, or may be connected to leaks of nuclear, biological or chemical materials, including contamination and radiation (IFRC, no date).

Vulnerability: "The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt" (IPCC, 2014). UNDRR defines vulnerability as the "conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards" (UNDRR, 2017).

DATA TABLES

DISASTER EVENTS, 1960–2019

	Climate and weather				Geological		Biological		All disasters
	Storm	Flood	Drought	Other climate and weather	Earthquake	Other geological	Outbreak	Other biological	
1960s	176	151	31	38	85	14	28	0	**523**
1970s	231	236	36	70	89	20	46	0	**728**
1980s	379	462	61	151	150	43	117	0	**1,363**
1990s	603	789	71	290	217	60	369	2	**2,401**
2000s	660	1,499	121	371	249	59	535	1	**3,489**
2010s	589	1,298	106	362	231	43	220	1	**2,850**
All	**2,638**	**4,435**	**426**	**1,282**	**1,021**	**239**	**1,315**	**4**	**11,360**

Sources: EM-DAT, FAO/FEWS NET, Dartmouth Flood Observatory, ReliefWeb and IFRC GO.
Notes: Events are only included where more than 10 people were killed, or more than 100 affected.

DEATHS BY DISASTER TYPE, 1960–2019

	Climate and weather				Geological		Biological		All disasters
	Storm	Flood	Drought	Other climate and weather	Earthquake	Other geological	Epidemic	Other biological	
1960s	133,891	32,394	1,510,650	6,294	52,080	5,392	9,457	0	**1,750,158**
1970s	357,300	70,746	119,081	8,977	439,839	546	9,894	0	**1,006,383**
1980s	45,936	51,512	557,268	11,934	59,810	25,250	43,902	0	**795,612**
1990s	210,943	95,401	3,113	18,687	103,553	1,637	93,918	0	**527,252**
2000s	171,775	53,813	1,147	99,795	453,622	513	58,574	0	**839,239**
2010s	27,592	46,972	258,035	86,147	267,663	1,463	54,864	0	**742,736**
All	**947,437**	**350,838**	**2,449,294**	**231,834**	**1,376,567**	**34,801**	**270,609**	**0**	**5,661,380**

Sources: EM-DAT and FAO/FEWS NET

NUMBER OF PEOPLE AFFECTED BY DISASTER BY TYPE, 1960–2019

	Climate and weather				Geological		Biological		All disasters
	Storm	Flood	Drought	Other climate and weather	Earthquake	Other geological	Epidemic	Other biological	
1960s	30,245,783	42,374,639	117,899,704	4,006,487	4,073,242	511,416	478,275	0	**199,589,546**
1970s	52,539,673	218,877,106	263,706,885	139,595	16,757,344	369,837	2,238,824	0	**554,629,264**
1980s	141,405,317	468,400,677	593,546,376	3,882,575	32,969,714	663,397	1,689,442	0	**1,242,557,498**
1990s	224,066,597	1,436,605,223	309,913,523	12,547,702	24,622,267	2,050,571	13,574,854	2,200	**2,023,382,937**
2000s	397,233,409	951,524,335	755,616,713	89,106,787	82,543,498	1,455,767	4,946,567	500,000	**2,282,927,076**
2010s	323,999,906	673,350,671	690,171,258	15,333,850	35,302,611	3,558,531	5,275,953	2,300,005	**1,749,292,785**
All	**1,169,490,685**	**3,791,132,651**	**2,730,854,459**	**125,016,996**	**196,268,676**	**8,609,519**	**28,203,915**	**2,802,205**	**8,052,379,106**

Source: EM-DAT

DISASTERS BY CONTINENT, 1960–2019 (EVENT BASED)

	Africa	Americas	Asia	Europe	Oceania	All disasters
1960s	62	160	245	40	17	**523**
1970s	97	192	359	47	33	**728**
1980s	210	336	640	112	66	**1,363**
1990s	440	578	1,061	231	100	**2,401**
2000s	925	686	1,452	321	123	**3,489**
2010s	622	620	1,305	212	110	**2,850**
Weather-related	**1,480**	**2,146**	**4,028**	**791**	**365**	**8,781**
Geophysical	**73**	**284**	**716**	**135**	**60**	**1,260**
Biological	**804**	**142**	**318**	**37**	**24**	**1,319**
All	**2,356**	**2,572**	**5,062**	**963**	**449**	**11,360**

Sources: EM-DAT, FAO/FEWS NET, Dartmouth Flood Observatory, ReliefWeb and IFRC GO.
Note: The statistics used here are event based: a storm is classified as one event even if it affects more than one country, but as more than one event if it impacts more than one continent. This means totals are not always the sum of the regional events or number of hazards. This only covers disasters triggered by natural hazards

TOP 50 DEADLIEST DISASTERS TRIGGERED BY NATURAL HAZARDS, 2019

Event name	Type	Hazard	Affected countries	Deaths	Affected people
DRC & Congo: Measles outbreak - January 2019	Biological	Outbreak	DRC	6,045	446,246
DRC: Ebola outbreak – 2019	Biological	Outbreak	DRC	2,235	3,444
Western Europe: Heatwave – July 2019	Climate and weather	Extreme temperature	Austria, Belgium, France, Germany, Netherlands, UK	2,241	Unknown
Cyclone Idai – March 2019	Climate and weather	Storm, Flood	Malawi, Madagascar, Mozambique, Zimbabwe	1,294	2,813,558
Philippines: Dengue outbreak – 2018–2019	Biological	Outbreak	Philippines	809	164,194
DRC & Congo: Cholera outbreak – Jan 2019	Biological	Outbreak	DRC	732	39,000
Yemen: Cholera outbreak – December 2019	Biological	Outbreak	Yemen	713	461,542
Western Europe: Heatwave – June 2019	Climate and weather	Extreme temperature	Belgium, France, Germany, Italy, Spain	704	Unknown
Western Europe: Heatwave – August 2019	Climate and weather	Extreme temperature	Belgium, UK	508	Unknown
Hurricane Dorian – September 2019	Climate and weather	Storm	Bahamas, USA	379	15,000
Central and Latin America: Dengue Outbreak – June 2019	Biological	Outbreak	Costa Rica, Guatemala, El Salvador, Honduras, Colombia, Nicaragua	334	273,057
Philippines: Measles outbreak – February 2019	Biological	Outbreak	Philippines	333	22,967
Yemen: Dengue outbreak – December 2019	Biological	Outbreak	Yemen	219	59,486
Cyclone Maha – November 2019	Climate and weather	Storm	India	178	Unknown
Japan: Heatwave – July 2019	Climate and weather	Extreme temperature	Japan	162	18,347
India: AES Outbreak – January 2019	Biological	Outbreak	India	121	418
Indonesia: Floods - March 2019	Climate and weather	Flood	Indonesia	115	227,937
India: Heatwave – May 2019	Climate and weather	Extreme temperature	India	112	450
Cyclone Hagibis – October 2019	Climate and weather	Storm	Japan, Guam	119	390,470
Kenya: Floods - October 2019	Climate and weather	Flood	Kenya	100	19,000
Kenya: Tapach Landslide – November 2019	Climate and weather	Landslide (H)	Kenya	97	120
Pakistan: Dengue outbreak – September 2019	Biological	Outbreak	Pakistan	95	53,834

Event name	Type	Hazard	Affected countries	Deaths	Affected people
Chad: Measles outbreak – May 2018	Biological	Outbreak	Chad	90	4,227
India and Pakistan: Sandstorm - April 2019	Climate and weather	Storm	Pakistan, India	89	135
Cyclone Fani – April 2019	Climate and weather	Storm	Bangladesh, India	89	20,010,045
Afghanistan and Pakistan: Floods - February 2019	Climate and weather	Flood	Pakistan	25	129,122
Iran and Iraq: Floods March 2019	Climate and weather	Flood	Iran, Iraq	85	10,006,961
Indonesia: Sulawesi Landslides - January 2019	Climate and weather	Landslide hydromet (H)	Indonesia	84	6,643
Typhoon Lekima – August 2019	Climate and weather	Storm	China, Taiwan, Philippines, Malaysia	74	108,000
South Africa: Floods – March 2019	Climate and weather	Flood	South Africa	73	1,000
Nigeria: Measles outbreak – January 2019	Biological	Outbreak	Nigeria	72	22,000
Cyclone Phanfone – December 2019	Climate and weather	Storm	Philippines, Caroline Islands	63	3,200,000
Uganda: Landslides – June 2019	Climate and weather	Landslide (H)	Uganda	61	129,953
Peru: Floods – February 2019	Climate and weather	Flood	Peru	61	8,379
India: Storms North India – June 2019	Climate and weather	Storm	India	60	Unknown
Nigeria: Floods – September 2019	Climate and weather	Flood	Nigeria	57	50,000
Sudan: Floods – August 2019	Climate and weather	Flood	Sudan	54	100,000
Cameroon: Bafoussam City Landslide – October 2019	Climate and weather	Landslide (H)	Cameroon	54	Unknown
Cyclone Kenneth – April 2019	Climate and weather	Storm	Mozambique, Comoros, Tanzania	53	2,745,405
Central African Republic: Measles outbreak – January 2019	Biological	Outbreak	Central African Republic	53	3,600
Cyclone Bulbul – November 2019	Climate and weather	Storm	Bangladesh, India	52	381,506
Chad: Tibesti Landslide – September 2019	Climate and weather	Landslide (H)	Chad	52	37
China: Shuicheng Landslide – July 2019	Climate and weather	Landslide (H)	China	51	40
Albania: Durres Earthquake Durres – November 2019	Geophysical	Earthquake	Albania	51	92,095
Afghanistan: Floods – March 2019	Climate and weather	Flood	Afghanistan	51	1,281

Event name	Type	Hazard	Affected countries	Deaths	Affected people
South Sudan: Korok Village – 2019	Climate and weather	Wildfire	South Sudan	50	12
Bangladesh: Cold wave – October 2019	Climate and weather	Extreme temperature	Bangladesh	50	4,500
Burundi: Floods – December 2019	Climate and weather	Flood	Burundi	40	250
Afghanistan: Landslide – January 2019	Climate and weather	Landslide (H)	Afghanistan	40	Unknown
Paraguay: Floods – March 2019	Climate and weather	Flood	Paraguay	39	519,197

Sources: EM-DAT and FAO/FEWS NET

TOP 50 DISASTERS BY NUMBER OF AFFECTED PEOPLE, 2019

Event name	Type	Hazard	Affected countries	Deaths	Affected people
Cyclone Fani – April 2019	Climate and weather	Storm	India, Bangladesh	89	20,010,045
Afghanistan: Drought – 2018–2019	Climate and weather	Drought	Afghanistan	Unknown	10,600,000
DPRK: Drought 2019	Climate and weather	Drought	DPRK	Unknown	10,100,000
Iran and Iraq: Floods – March 2019	Climate and weather	Flood	Iran, Iraq	85	10,006,961
East and Southern Africa: Drought – 2019	Climate and weather	Drought	Angola, Botswana, DRC, Eswatini, Lesotho, Malawi, Mozambique, Namibia, South Africa, United Republic of Tanzania, Zambia, Zimbabwe	Unknown	9,342,644
India: Drought – 2018	Climate and weather	Drought	India	Unknown	8,200,000
Pakistan: Drought – 2018–2019	Climate and weather	Drought	Pakistan	Unknown	5,000,000
Cyclone Phanfone – December 2019	Climate and weather	Storm	Philippines, Caroline Islands	63	3,200,000
Cyclone Idai – March 2019	Climate and weather	Storm	Mozambique, Malawi, Zim-babwe, Madagascar	1294	2,813,558
Cyclone Kenneth – April 2019	Climate and weather	Storm	Mozambique, Tanzania, Comoros	53	2,745,405
Kenya: Drought – 2014–2020	Climate and weather	Drought	Kenya	Unknown	2,600,000
Typhoon Kammuri – November 2019	Climate and weather	Storm	Philippines, North Mariana Islands	4	1,993,898
Somalia: Drought – 2015–2020	Climate and weather	Drought	Somalia	Unknown	1,500,000

Event name	Type	Hazard	Affected countries	Deaths	Affected people
Cyclone: Pabuk – January 2019	Climate and weather	Storm	Thailand, Viet Nam, Myanmar, Malaysia	10	720,885
Southeast Asia: Drought – 2019–2020	Climate and weather	Drought	Viet Nam, Philippines, Thailand, Lao PDR	Unknown	701,558
Paraguay: Floods – March 2019	Climate and weather	Flood	Paraguay	39	519,197
Yemen: Cholera outbreak – December 2019	Biological	Outbreak	Yemen	713	461,542
DRC and Republic of the Congo: Measles outbreak – Jan 2019	Biological	Outbreak	DRC	8,959	446,246
Philippines: Davao Earthquake – December 2019	Geophysical	Earthquake	Philippines	14	394,565
Typhoon Hagibis – October 2019	Climate and weather	Storm	Japan, Guam, Northern Mariana Islands	106	390,470
Cyclone Bulbul – November 2019	Climate and weather	Storm	Bangladesh, India	52	381,506
Bolivia: Floods February 2019	Climate and weather	Flood	Bolivia	34	335,540
Central and Latin America: Dengue outbreak – June 2019	Biological	Outbreak	Nicaragua, Colombia, Honduras, El Salvador, Guatemala, Costa Rica	334	273,057
Somali: Floods – October 2019	Climate and weather	Flood	Somalia	Unknown	270,000
Philippines: Sultan Kudarat Earthquake – October 2019	Geophysical	Earthquake	Philippines	23	260,703
Indonesia: Earthquake Ambon – September 2019	Geophysical	Earthquake	Indonesia	31	247,418
China: Earthquake Yibin – June 2019	Geophysical	Earthquake	China	13	244,220
Syria: Floods – March 2019	Climate and weather	Flood	Syria	2	235,000
Indonesia: Floods – March 2019	Climate and weather	Flood	Indonesia	115	227,937
Philippines: Dengue outbreak – 2018 – 2019	Biological	Outbreak	Philippines	809	164,194
India: Monsoon – August 2019	Climate and weather	Flood	India	25	134,500
Pakistan: Mirpur Earthquake – September 2019	Geophysical	Earthquake	Pakistan	39	130,398
Uganda: Landslides – June 2019	Climate and weather	Landslide (H)	Uganda	61	129,953
Afghanistan and Pakistan: Floods – February 2019	Climate and weather	Flood	Afghanistan, Pakistan	88	129,122
Algeria: Cold wave – January 2019	Climate and weather	Extreme temperature	Algeria	8	125,025
Typhoon Faxai – September 2019	Climate and weather	Storm	Japan	3	120,000
Typhoon Lekima – August 2019	Climate and weather	Storm	China, Taiwan, Philippines, Malaysia	74	108,000

Event name	Type	Hazard	Affected countries	Deaths	Affected people
Sudan: Floods – August 2019	Climate and weather	Flood	Sudan	54	100,000
Madagascar: Measles outbreak – October 2018	Biological	Outbreak	Madagascar	Unknown	98,415
DRC: Floods – October2019	Climate and weather	Flood	DRC	Unknown	98,000
Albania: Earthquake Durres November – 2019	Geophysical	Earthquake	Albania	51	92,095
Typhoon Tapah – December 2019	Climate and weather	Storm	Republic of Korea, Japan	2	85,391
Mozambique: Floods – September 2019	Climate and weather	Flood	Mozambique	10	63,000
Cyclone Podul – August 2019	Climate and weather	Storm	Philippines, Viet Nam	10	61,502
Yemen: Dengue outbreak – December 2019	Biological	Outbreak	Yemen	219	59,486
China: Monsoon – 2019	Climate and weather	Flood	China	13	56,351
Indonesia: Floods – June 2019	Climate and weather	Flood	Indonesia	2	55,495
Pakistan: Dengue outbreak – September 2019	Biological	Outbreak	Pakistan	95	53,834
Nigeria: Floods – September 2019	Climate and weather	Flood	Nigeria	57	50,000
Cambodia: Floods – September 2019	Climate and weather	Flood	Nigeria	7	50,000

CLIMATE VULNERABILITY AND FRAGILITY, 2017

Country	Disaster risk and climate vulnerability indexes			Vulnerability and fragility classifications	
	Climate Disaster Risk (INFORM)	Climate Change Adaptation (ND-GAIN)	Overall vulnerability score	Overall vulnerability	Fragility (OECD)
	0–100	0–100	0–100		
Somalia	84	20	82.0	Very high	Extremely fragile
Afghanistan	69	31	69.0	Very high	Extremely fragile
Chad	62	25	68.5	Very high	Extremely fragile
Myanmar	68		68.0	Very high	Fragile
Haiti	66	31	67.5	Very high	Extremely fragile
South Sudan	67		67.0	Very high	Extremely fragile
Niger	61	30	65.5	Very high	Fragile
Sudan	60	30	65.0	Very high	Extremely fragile
Eritrea	54	26	64.0	High	Extremely fragile
DRC	57	29	64.0	High	Extremely fragile
Mozambique	62	35	63.5	High	Fragile
Papua New Guinea	62	35	63.5	High	Fragile

Country	Disaster risk and climate vulnerability indexes			Vulnerability and fragility classifications	
	Climate Disaster Risk (INFORM)	Climate Change Adaptation (ND-GAIN)	Overall vulnerability score	Overall vulnerability	Fragility (OECD)
	0–100	0–100	0–100		
Madagascar	57	32	62.5	High	Fragile
Yemen	58	33	62.5	High	Extremely fragile
Bangladesh	60	35	62.5	High	Fragile
Central African Republic	50	27	61.5	High	Extremely fragile
Ethiopia	58	35	61.5	High	Extremely fragile
Pakistan	61	38	61.5	High	Fragile
Iraq	61	39	61.0	High	Extremely fragile
Liberia	53	32	60.5	High	Fragile
Mauritania	57	36	60.5	High	Fragile
Kenya	57	36	60.5	High	Fragile
Syria	58	38	60.0	High	Extremely fragile
Solomon Islands	58	38	60.0	High	Fragile
Mali	52	33	59.5	High	Extremely fragile
Djibouti	57	38	59.5	High	Fragile
Burundi	50	32	59.0	High	Extremely fragile
Malawi	53	35	59.0	High	Fragile
Tanzania	55	37	59.0	High	Fragile
Zimbabwe	50	33	58.5	High	Fragile
Uganda	52	35	58.5	High	Fragile
India	59	42	58.5	High	
Guinea-Bissau	48	32	58.0	High	Fragile
Nepal	55	39	58.0	High	Fragile
Guatemala	58	43	57.5	High	Fragile
Burkina Faso	48	35	56.5	High	Fragile
Senegal	50	39	55.5	High	
Honduras	52	41	55.5	High	Fragile
Congo	44	34	55.0	High	Fragile
Nigeria	47	37	55.0	High	Fragile
DPRK	55		55.0	High	Fragile
Micronesia	45	36	54.5	High	
Sierra Leone	46	37	54.5	High	Fragile
Vanuatu	48	39	54.5	High	
Timor-Leste	50	41	54.5	High	Fragile
Libya	50	59	54.5	High	Fragile
Guinea	44	36	54.0	High	Fragile
Cambodia	47	39	54.0	High	
El Salvador	52	44	54.0	High	
Côte d'Ivoire	44	37	53.5	High	Fragile
Lao PDR	45	39	53.0	High	Fragile
Philippines	49	43	53.0	High	
Angola	40	35	52.5	High	Fragile
Zambia	43	38	52.5	High	Fragile
Cameroon	43	39	52.0	High	Fragile
Comoros	43	39	52.0	High	Fragile
Rwanda	46	42	52.0	High	Fragile

Country	Disaster risk and climate vulnerability indexes			Vulnerability and fragility classifications	
	Climate Disaster Risk (INFORM)	Climate Change Adaptation (ND-GAIN)	Overall vulnerability score	Overall vulnerability	Fragility (OECD)
	0–100	0–100	0–100		
Colombia	54	50	52.0	High	
Venezuela	45	42	51.5	High	Fragile
Nicaragua	45	42	51.5	High	
Ecuador	47	44	51.5	High	
Togo	39	37	51.0	High	
Gambia	40	38	51.0	High	Fragile
Tajikistan	44	42	51.0	High	Fragile
Lebanon	47	45	51.0	High	
Iran	52	50	51.0	High	Fragile
Benin	35	35	50.0	High	
Lesotho	40	40	50.0	High	
Guyana	41	42	49.5	Medium	
Indonesia	44	45	49.5	Medium	
Namibia	44	45	49.5	Medium	
Bolivia	38	40	49.0	Medium	
Belize	40	42	49.0	Medium	
Turkmenistan	37	40	48.5	Medium	
Egypt	43	46	48.5	Medium	Fragile
Jordan	46	49	48.5	Medium	
Equatorial Guinea	32	36	48.0	Medium	Fragile
Sri Lanka	42	46	48.0	Medium	
Azerbaijan	46	50	48.0	Medium	
Mexico	46	50	48.0	Medium	
Eswatini	35	40	47.5	Medium	Fragile
Algeria	40	45	47.5	Medium	
Peru	45	50	47.5	Medium	
Bosnia and Herzegovina	42	49	46.5	Medium	
South Africa	43	50	46.5	Medium	
Tonga	33	41	46.0	Medium	
Viet Nam	38	46	46.0	Medium	
Serbia	42	51	45.5	Medium	
Gabon	32	42	45.0	Medium	
Ghana	35	45	45.0	Medium	
Dominican Republic	37	47	45.0	Medium	
Morocco	40	50	45.0	Medium	
China	43	53	45.0	Medium	
Thailand	43	53	45.0	Medium	
Turkey	46	56	45.0	Medium	
Palestine	45		45.0	Medium	Fragile
Bhutan	35	46	44.5	Medium	
Botswana	36	47	44.5	Medium	
Fiji	37	48	44.5	Medium	
Panama	39	50	44.5	Medium	
Ukraine	41	52	44.5	Medium	
Samoa	34	46	44.0	Medium	

Country	Disaster risk and climate vulnerability indexes			Vulnerability and fragility classifications	
	Climate Disaster Risk (INFORM)	Climate Change Adaptation (ND-GAIN)	Overall vulnerability score	Overall vulnerability	Fragility (OECD)
	0–100	0–100	0–100		
Kyrgyzstan	38	50	44.0	Medium	
Kiribati	44		44.0	Medium	
Tuvalu	44		44.0	Medium	
Suriname	32	45	43.5	Medium	
Armenia	40	53	43.5	Medium	
Russia	45	58	43.5	Medium	
Maldives	26	40	43.0	Medium	
Mongolia	38	52	43.0	Medium	
Cuba	30	45	42.5	Medium	
Uzbekistan	32	47	42.5	Medium	
Georgia	41	57	42.0	Medium	
Marshall Islands	42		42.0	Medium	
Moldova	33	50	41.5	Medium	
Albania	33	50	41.5	Medium	
Tunisia	31	49	41.0	Medium	
Brazil	32	50	41.0	Medium	
Paraguay	28	47	40.5	Medium	
Jamaica	29	48	40.5	Medium	
Costa Rica	34	53	40.5	Medium	
Dominica	37	56	40.5	Medium	
Seychelles	27	48	39.5	Medium	
Oman	33	54	39.5	Medium	
Romania	30	52	39.0	Medium	
Malaysia	35	57	39.0	Medium	
Antigua and Barbuda	24	47	38.5	Medium	
Trinidad and Tobago	24	48	38.0	Medium	
Montenegro	29	53	38.0	Medium	
Argentina	26	51	37.5	Medium	
North Macedonia	30	55	37.5	Medium	
Kuwait	24	50	37.0	Medium	
Bahamas	26	52	37.0	Medium	
Saint Kitts and Nevis	27	53	37.0	Medium	
Cyprus	32	58	37.0	Medium	
Bulgaria	29	56	36.5	Medium	
Chile	33	61	36.0	Medium	
Mauritius	26	55	35.5	Medium	
Greece	29	58	35.5	Medium	
Croatia	26	56	35.0	Medium	
Palau	35		35.0	Medium	

Sources: ND-GAIN 2017, INFORM Index 2017, OECD States of Fragility 2018
Notes: The INFORM data is screened to only look at disaster risk (connected to climate- and weather-related hazards). Low-risk countries are not shown.

THE FUNDAMENTAL PRINCIPLES OF THE INTERNATIONAL RED CROSS AND RED CRESCENT MOVEMENT

Humanity

The International Red Cross and Red Crescent Movement, born of a desire to bring assistance without discrimination to the wounded on the battlefield, endeavours, in its international and national capacity, to prevent and alleviate human suffering wherever it may be found. Its purpose is to protect life and health and to ensure respect for the human being. It promotes mutual understanding, friendship, cooperation and lasting peace amongst all peoples.

Impartiality

It makes no discrimination as to nationality, race, religious beliefs, class or political opinions. It endeavours to relieve the suffering of individuals, being guided solely by their needs, and to give priority to the most urgent cases of distress.

Neutrality

In order to enjoy the confidence of all, the Movement may not take sides in hostilities or engage at any time in controversies of a political, racial, religious or ideological nature.

Independence

The Movement is independent. The National Societies, while auxiliaries in the humanitarian services of their governments and subject to the laws of their respective countries, must always maintain their autonomy so that they may be able at all times to act in accordance with the principles of the Movement.

Voluntary service

It is a voluntary relief movement not prompted in any manner by desire for gain.

Unity

There can be only one Red Cross or Red Crescent Society in any one country. It must be open to all. It must carry on its humanitarian work throughout its territory.

Universality

The International Red Cross and Red Crescent Movement, in which all societies have equal status and share equal responsibilities and duties in helping each other, is worldwide.

The International Federation of Red Cross and Red Crescent Societies (IFRC) is the world's largest humanitarian network, with **192 National Red Cross and Red Crescent Societies** and around **14 million volunteers.** Our volunteers are present in communities before, during and after a crisis or disaster. We work in the most hard to reach and complex settings in the world, saving lives and promoting human dignity. We support communities to become stronger and more resilient places where people can live safe and healthy lives, and have opportunities to thrive.