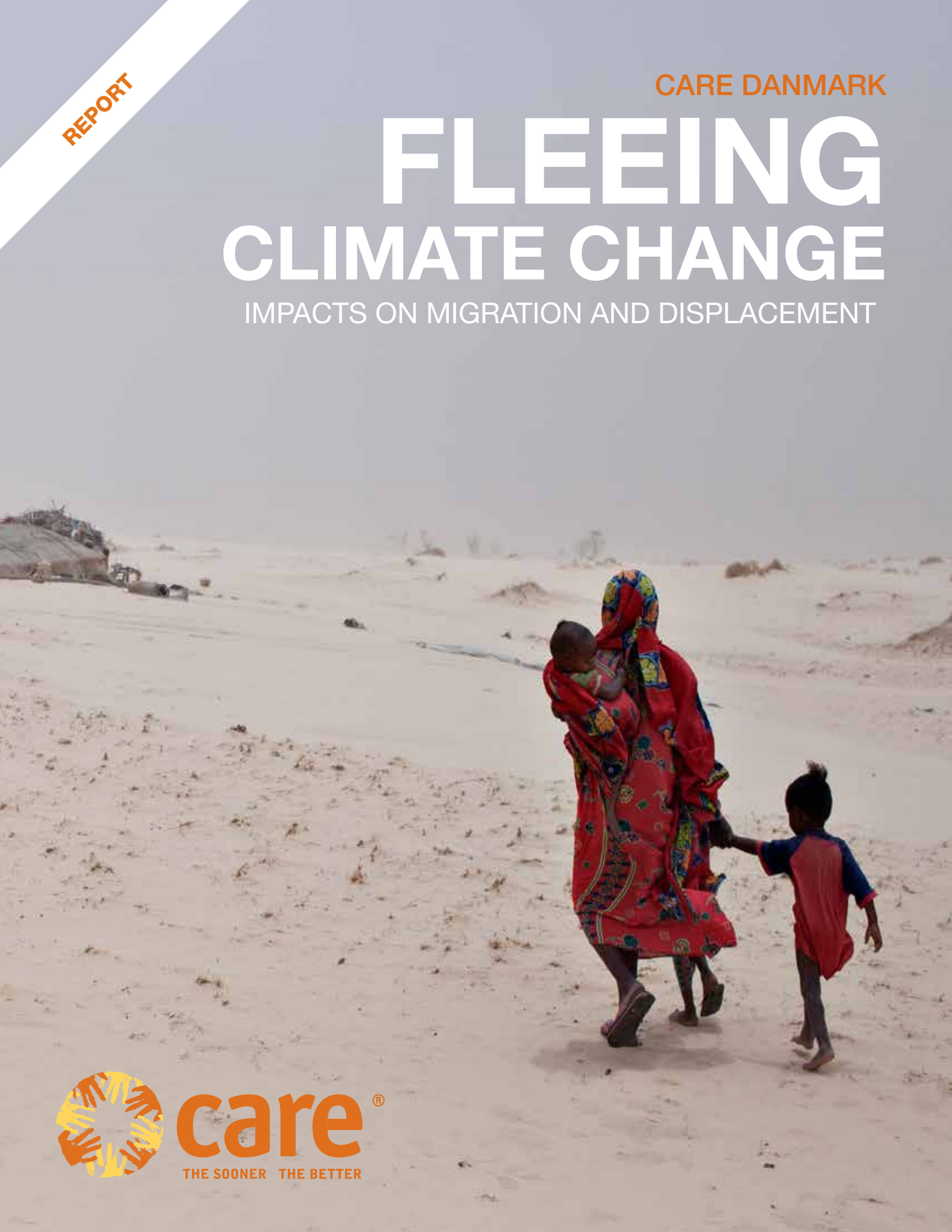
REPORT

CARE DANMARK

FLEEING CLIMATE CHANGE

IMPACTS ON MIGRATION AND DISPLACEMENT



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FLEEING CLIMATE CHANGE: IMPACTS ON MIGRATION AND DISPLACEMENT

November 2016

The contents of this report are based on research and analysis made by Julie-Anne Richards.
The conclusions and recommendations are created by CARE Danmark.

Many thanks to Kit Vaughan, Sven Harmeling, Tonya Rawe, Gareth Price Jones, and Camilla Schramek.

Cover photo:
The photo is taken in Niger in 2010 during a severe drought and food crisis. @ 2010 Jonathan Bjerg Møller.

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PREFACE

In 2015, the world rallied around a set of ground breaking agreements that together bring promise of a sustainable, more prosperous and inclusive global society: A society that also tackles climate change and shows solidarity with the poorest and most vulnerable, leaving no one behind.

Acting on climate change is a litmus test to our commitment to the Global Goals. We have, since the adoption of the Global Goals, seen the 2016 enactment of the Paris climate agreement, the 2016 ICAO agreement on aviation emissions, and the 2016 Kigali agreement on the HFC phase-out. These are all promising signs in our effort to halt climate change, but they are only the very first steps on a long journey to safeguard future generations, and they must be coupled with large-scale efforts to help those that are already seeing their livelihoods undermined by a changing climate.

Leaving no one behind in the face of growing climate change impacts stands out as another litmus test for our resolve to deliver on the deals that the world struck in 2015 - and it does so at the crossroad of climate adaptation and wider sustainable development challenges.

Across the globe, several hundreds of million people will face increased risks to their livelihoods due to the exacerbating effect that climate change can bring to other development challenges because of the changes in precipitation patterns and the volatility and frequency of storms. Most recently, hurricane Matthew demonstrated how hard vulnerable countries can be hit by leaving a trail of destruction, displacing tens of thousands of people, and placing more than a million people in need of urgent assistance in the island of Haiti.

The dire predictions described in this report should remind all of us of the critical need to act at speed and scale in building the resilience of the most impacted and vulnerable societies of the world.

The World Economic Forum has earlier pointed out, in its Global Risks Report 2016, the interconnected risks of failed climate adaptation and involuntary migration. The “Fleeing Climate Change” report further substantiates how successful and continued adaptation is key to avoiding the human cost of migration. The report also finds that the number of people displaced from their homes due to the amplifying effects of climate change is on a stark rise and will continue to do so for decades to come.

The challenge is dual: There is increasing evidence that climate change impacts exacerbate risks of not only migration, but also of wider unrest and conflicts unfolding in weak and poor regions of the world. We have seen climate change appear as a threat-multiplier in the pretext to the war in Syria due to the prolonged drought that preceded the conflict. And recent years have demonstrated that even rich countries can be severely challenged as recipients of large scale migration.

It is therefore in the interest of everybody that root causes of migration - including climate change - are addressed forcefully and intelligently, and that their interlinkages with wider social stability needs are recognized and acted upon accordingly.

It is my hope that the “Fleeing Climate Change” report will help provide a new momentum for the effort to tackle climate change and the root causes for climate-induced migration across the globe.

We need it, and it is urgent.

Connie Hedegaard
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EXECUTIVE SUMMARY

Global temperatures have now risen approximately 1°C above pre-industrial levels. This has already led to significant climatic changes in many places on the planet, thus, challenging food and nutrition security by reducing the productivity of agriculture and negatively affecting small-scale food producers. Climate change is also an increasingly decisive factor behind today's growing number of people who migrate or who are forced into displacement from disaster and are in search of temporary shelter or options that are more permanent. In 2015, weather-related disasters displaced around 14.7 million people, almost twice the number of people (8.6 million) that fled conflict and violence.[1] The links between climate change and displacement are complex, but they are receiving increasing attention. Research points to climate change as an interrelated driver and threat multiplier that interacts with, and reinforces, other factors that push people away from their homes, such as environmental degradation, poverty, and conflict. Thus, tackling poverty and tackling climate change go hand in hand: an intertwined relationship recently highlighted in the Sustainable Development Goals and the Paris Agreement.

This report presents existing findings in order to review the linkages between climate change and displacement. The report shows that the level of climate change mitigation and adaptation undertaken will significantly affect future levels of climate change displacement. Unless governments take strong preventive action and invest in adaptation, climate change-related phenomena such as floods, droughts, famines and hurricanes could push the total number of permanently displaced people as high as 250 million people, between now and 2050.[2] However, already by 2025, up to 2.4 billion people worldwide may be living in areas subject to periods of intense water scarcity, which may temporarily displace as many as 700 million people by 2030.[3] On top of that, the risk of displacement from extreme weather events is projected to grow globally to more than 40 million people per year, up from a current five-year global average of 27.5 million. Such projections of climate-induced migration and displacement need to consider the uncertainties entailed in any such assessments, both those related to climate change and those related to socio-economic development and behavioral patterns.

Climate-induced migration and displacement in the near future

Climate change has different impacts on migration and displacement. This report focuses on three key climatic changes: droughts and changing rainfall, climate-fueled extreme weather events, and slow-onset events such as rising sea levels, desertification, and disappearing glaciers. Fourthly, the report looks at how such impacts might contribute to the outbreak or exacerbation of conflict and violence. This report presents findings in relation to the developing country regions of Sub-Saharan Africa, Middle East and North Africa, South East Asia, South Asia, and the Pacific Islands. It is important to remember, as we have seen from recent history, that migration and displacement in other world regions can also affect developed countries.

These five regions are already facing large climatic challenges and are going to be further impacted in the next one or two decades, as illustrated by the numbers above, since past greenhouse gas emissions have locked in additional temperature rise in the near term. Therefore, immediate adaptation and disaster risk reduction measures are crucial to reduce climate impacts that can force people from their homes. Various studies, including those of CARE' work, show that early investments into disaster risk reduction and adaptation, such as conservation agriculture and participatory weather planning scenario, pay off both socially and economically.

Three scenarios of climate-induced migration and displacement in 2050 and beyond

While the level of global warming is to some degree locked in for the next 15-25 years, looking towards 2050 and beyond, the impacts from climate change on factors that cause migration and displacement still depend on the extent to which today's action will contain global warming. This becomes apparent in relation to three levels of global mean temperature increase above pre-industrial levels (and even higher regional increases) – namely 1.5°C, 2°C, and 3°C – and the associated impacts and adaptation needs within this century. Which of the warming levels we reach, and thereby which scenario comes true, is a matter of political will and choices. The three scenarios are interlinked in such ways that they build upon each other, so many of the consequences listed in the scenario of 3°C, e.g. regarding food and nutrition security, are also present in the two previous scenarios, however to a lesser extent or in fewer areas.

1 *For reference, see "2. Extreme weather events" in the report.*
2 *For reference, see "Future migration from climate change depends on mitigation and adaptation" in the report.*
3 *For references, see "Short-term – climate change is already fueling displacement" in the report.*

1.5°C

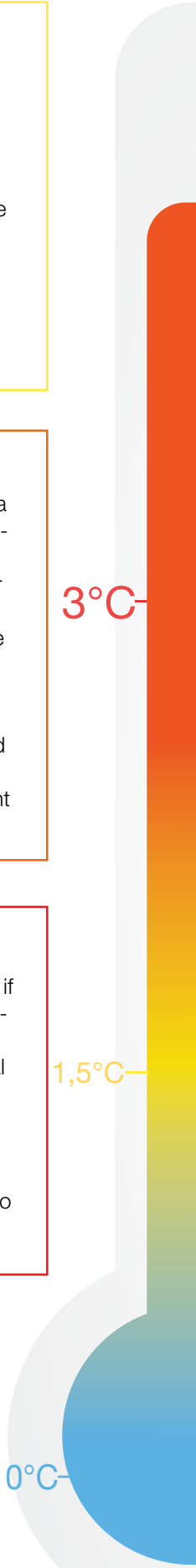
1.5°C is the level of warming that countries agreed to aim for in the Paris Agreement and which is still regarded as achievable with rapid emission reduction action. In this scenario, climate impacts will still be significant in many areas, and downright destructive in others, but uncontrollable and self-accelerating climatic changes may still be contained. Even at a 1.5°C increase, the global sea level rise will, in the long term, inundate vast areas of land, including some of the world's largest cities, such as Bangkok, and thus affect the lives of several millions of people. Salinization of soil will make large tracts of farmland unsuitable for food production and climate change impacts will put stress on other areas and livelihood systems. However, with sufficient financing and appropriate governance frameworks, the need to migrate because of climate change can be limited and based mainly on free and informed choice. In most areas, migration could remain primarily within national boundaries and be voluntary in nature. Volumes of migration would be manageable for national authorities and addressed through development and adaptation plans.[4]

2°C

At 2°C warming, research points to more significant adverse effects, which for many places could cause a hostile, new reality with levels of climate change that would be dramatic and leave no part of the world untouched. The costs of adaptation and unavoidable impacts would be significantly higher. 2°C will exceed the limits to adaptation on a number of fronts; thus, costs related to impacts of climate change that occur despite efforts to reduce mitigation and adapt to climatic changes (loss and damage) will mount. Climate change impacts will be a much stronger contributing force to displacement at this level of warming. Some research suggests that a 2°C warming will lead to a 50 cm sea level rise, which - without any adaptation efforts – could force 72 million people to flee their homes over the century; additionally, many more will be forced to evacuate due to floods, storms, heat, drought, desertification, and conflict over resources. Poverty is likely to increase and become entrenched. As impacts mount, people become more desperate and increasingly choose to relocate – history shows this is the case when two droughts in a row or multiple extreme events have caused people to leave their homes. Migration will shift from temporary to permanent and will be less of a choice: it will become forced displacement.[5]

3°C

3°C is the order of warming we are heading for with current pledges on climate action from governments, if they are actually met. Even higher increases are still a possibility. This scenario should be considered catastrophic climate change, with adverse impacts in many areas that would force large numbers of people in developing countries to flee their homes. There is likely to be a significantly greater number of international migrants, as some areas of the Middle East and Africa could become largely uninhabitable due to rising temperatures. Moreover, increasing droughts and desertification in Africa will further threaten food and nutrition security. Rising sea levels, changing monsoons, and extreme storms would have severe impacts across Asia. Domestic and near-country migration will likely increase, as well as fuel tension, which could cause increased climate-induced insecurity and conflict. Many parts of the world are at risk of entering into permanent crises, as the gap between the level of support provided to poorer countries and what poor countries need could become much bigger.[6]



4 For references, see "1.5°C warming – moderate, but manageable migration impact" in the report.
5 For references, see "2°C warming – a new, hostile reality and significant migration" in the report.
6 For references, see "3°C warming – catastrophic climate change forces people to flee" in the report.

Outcomes of migration

The backdrop for this report is the increasing number of migrants who cross international borders in search of protection and a better life. In 15 years, the global number of international migrants (persons living in a country other than where they were born) has soared from 173 million in 2000 to 244 million in 2015.[7] Yet, this is only a small portion of the people who are displaced – the vast majority of displaced persons are displaced internally, within their own countries. Most people forced to flee do not want to leave their homes or their communities. Attachment to home and to place dominates decision-making and encourages people to stay, to migrate locally when forced out by events like storms and floods, and to return back quickly.

Migration is very complex to understand and always has a big impact. It can be successful when individuals and communities use migration to increase their resilience. Successful migration can be considered a necessary and positive adaptation strategy. However, migration, and in particular forced displacement, is erosive when households are made more vulnerable and forced further into poverty. Additionally, the households who cannot engage in migration and are left behind are significantly worse off because they are exposed to the worst impacts of climate change and have few resources to cope with them.

Even when migration is successful, people face the loss of their ancestral lands, their traditional way of life, their language, community relationships, and sovereignty. In CARE's experience, women are often more negatively affected than men from migration and displacement. For these reasons, where climate change contributes to displacement and exacerbates other factors, in CARE's view, it often contains an element of loss and damage that includes severe human costs. Simply portraying displacement as an adaptation strategy, as is often done, is inappropriate in this context.

Take action now!

It is perilously close, but not too late, to keep climate change within 1.5°C of warming. Even at this level, some people are already being forced to flee the impacts of climate change. We cannot turn our backs on these people. They have suffered a form of persecution in that their livelihoods have been disrupted and torn apart by climate change caused by a world economy and way of life based on fossil fuels.

This report documents how climate change amplifies other drivers of migration and displacement. It will also serve as justification for greatly increased support to adaptation to climate change. Such adaptation is meant to avoid, or at least mitigate the human, social, cultural, and economic losses and damage stemming from forced displacement by climate change. Our common humanity, and shared future, demand that we act swiftly and justly and that we invest in long-term solutions that avert climate change migration and displacement.

1.5°C

2°C

7 *For reference, see "Introduction" in the report.*

ACRONYMS AND ABBREVIATIONS

CGIAR	Consultative Group for International Agricultural Research
CO_2	Carbon Dioxide
COP	Conference of the Parties
ESCAP	Economic and Social Commission for Asia and the Pacific (UN)
FAO	Food and Agricultural Organisation of the United Nations
GDP	Gross Domestic Product
HFC	Hydrofluorocarbons
IBD	Indian Bengal Delta
ICAO	International Civil Aviation Organization
IDMC	Internal Displacement Monitoring Centre
IFAD	International Fund for Agricultural Development
ILO	International Labour Organisation
IOM	International Organisation for Migration
IPCC WGII	Intergovernmental Panel on Climate Change, Working Group II
KNOMAD	Global Knowledge Partnership on Migration and Development
MENA	Middle East and North Africa
SADC	Southern African Development Community
SBSTA	Subsidiary Body for Scientific and Technological Advice
SBI	Subsidiary Body for Implementation
UN	United Nations
UNCCD	United Nations Convention to Combat Desertification
UNDESA	United Nations Department of Economic and Social Affairs
UNDP	United Nations Development Programme
UNGA	United Nations General Assembly
UNFCCC	United Nations Framework Convention on Climate Change
WFP	World Food Programme

INTRODUCTION

Increasing numbers of migrants are crossing international borders in search of protection and a better life. In 15 years, the global number of international migrants (people living in a country other than where they were born) has soared from 173 million in 2000 to 244 million in 2015 (UNDESA 2015). A figure that is likely to continue to rise (UNGA 2016, para 75).

Developed countries have been challenged by this increased migration. It has played a significant role in recent politics, but, unfortunately, the vast majority of political discourse has been cold hearted at best and xenophobic scare mongering at worst.

Yet, the perceived "migration crisis" in many developed countries ignores the fact that the great majority of people forced to move are displaced within national borders, or to neighbouring developing countries. Around 80 percent of all migration is presently within country borders (UNDP, 2009). There were approximately 740 million internally displaced migrants in 2014 (IOM 2014).

Creating a "crisis" out of current migration ignores the fact that there are very few people, outside of indigenous peoples, who are not the product of immigration and who do not benefit from it today. Migration done well can shape individuals, communities and countries for the better. Migrants add immeasurably to the community and culture that they join. Additionally, "migration crisis" rhetoric ignores the necessity of the migration, which often means people are displaced from their homes and lose their belongings and their community. Almost no one chooses to leave his or her family and community.

Finally, the "migration crisis" rhetoric ignores what may be driving, or underlying, the migration. Climate change is already increasing the level of migration around the world, in both direct and indirect ways. The more the world warms and the greater the impacts of climate change are felt, the more people will be forced from their homes and the greater the social upheaval for the migrants, those left behind, and those in receiving communities.

This report collects and summarizes evidence from past reports and research on the links between climate change and migration. It shares CARE's analysis of trends and potential developments. It shows that climate change and migration challenges will increasingly be linked and that migration challenges to the global North will increase dramatically. Fortunately, we still have the opportunity to keep warming to levels that are possible to adapt to – if we act quickly. Moreover, we can choose to reduce risks by investing in adaptation for the most climate-vulnerable. Whilst we always have the opportunity to treat migrants with dignity, and as we would like to be treated, the challenge in doing so will grow exponentially if we fail to reduce emissions, or fund adaptation: the number of migrants could grow beyond our capacity to cope.

PART ONE

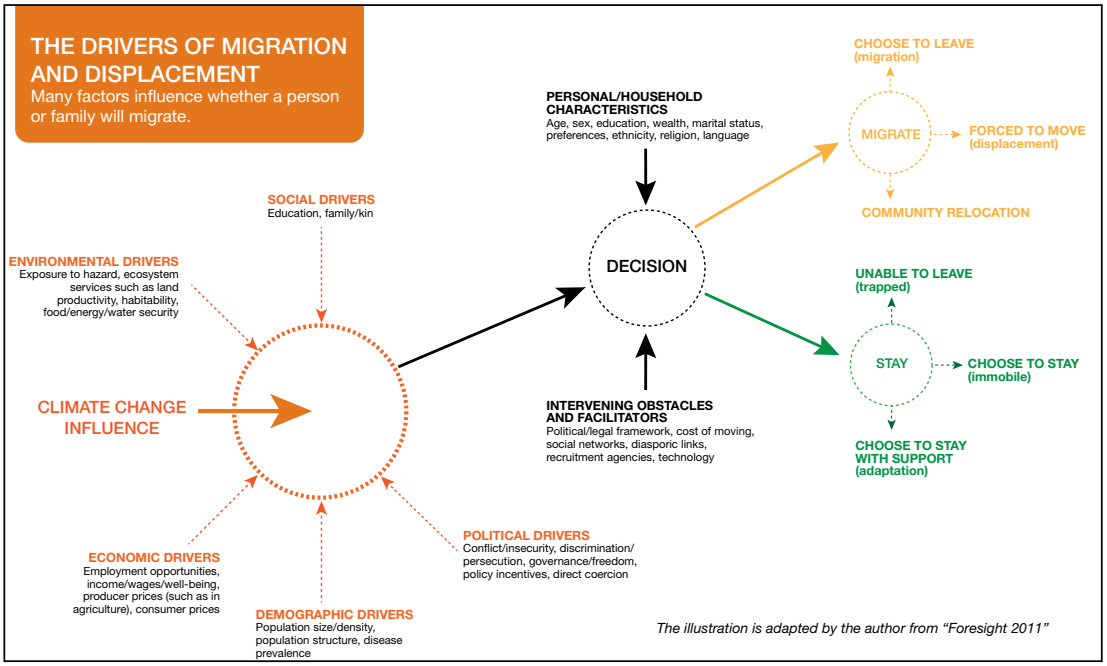
CLIMATE CHANGE MIGRATION – NOT AN EASY CHOICE

Key messages

- The majority of people do not want to leave their home. Many people end up worse off after moving, and communities and countries can experience "brain drain" and lose skills and experience;
- Migration can range from successful, where individuals and communities use it to increase their resilience, to erosive, where households become more vulnerable and are forced further into poverty. It is important to note that households left behind (or trapped) can be significantly worse off than those that migrate;
- Successful migration can be considered adaptation, but migration is more likely to cause loss and damage for people and communities who face losing their ancestral lands, their traditional way of life, their language, community relationships, and sovereignty;
- Calling people who have been forced to leave their homes because of climate change "migrants" rather than "refugees" depoliticises their plight, and ignores the fact that they have been forced to flee (a form of persecution) because of the pollution from primarily developed countries and the fossil fuel industry. We need a new term that reflects this climate injustice.

It is important to make clear that the majority of people do not want to leave their home or their community (IDMC 2016). Attachment to home and to place is very strong. It dominates decision-making and encourages people to stay, to migrate locally when forced to by storms, floods etc., and to return quickly after forced displacement (IPCC AR5 WGII, chapter 12). For some communities, the cultural and psychological connection between people and their land makes them inseparable – for Polynesian Pacific Islanders, their existence is so closely linked to their ancestral land that the word for land is the same as the word for afterbirth (ESCAP, ILO, UNDP 2014).

The decision to move is a complicated one. Threats to physical security are the top push factor (IDMC, July 2016).[8] Climate change directly affects people's livelihoods – droughts make crops harder to grow, storms destroy infrastructure as well as homes, and warmer waters cause fish to disappear. Climate change is also a risk factor for conflict, which we will explore later in the report. The range and complexity of the interactions between climate change, livelihoods, and social, economic and political factors make it largely impossible to distinguish between migrants for whom climate change is the primary driver (see figure, adapted from Foresight 2011).



8 *The second most common reason displaced people leave their homes is a lack of livelihood or income (IDMC, July 2016).*

The outcome of migration is also complex: it depends upon household characteristics, such as poverty and education, and upon the support, or obstacles, available. The different outcomes of migration include the following:

Successful migration, where people have agency over their decisions, their migration is largely short term (seasonal or temporary), their communities remain in-situ for them to return to, and there is every opportunity for them to benefit from the experience and end up better off, for instance through gaining skills, accessing education or strengthening kinship ties (Warner et al 2012);

Survival migration usually involves food insecure and land-scarce households with fewer options to adapt or diversify their livelihoods and less social capital and access to support. Migration is a way to avoid the worst consequences of food insecurity, yet these households are still just getting by and have no chance to escape poverty (Warner et al 2012);

Erosive coping migration, where households with a sparse range of choices, often landless and food insecure, use migration as a last resort to avoid the worst consequences of food insecurity. Migration makes them more vulnerable or prevents them from escaping poverty. These households use a range of coping measures when faced with the impacts of changing rainfall on livelihoods and food availability including: reducing the quality and amount of food they eat, selling assets, or seeking help from others in the village. Entire villages may face similar challenges and be in a poor position to help each other in times of need. Migration may require actions – such as attempting to access credit to pay for migration expenses – that leave the household deeper in poverty (Warner et al 2012);

Community relocation. Communities may be forced to relocate entirely. In successful cases, communities will make the decision to move themselves and be supported to do so, in other cases communities have been moved largely against their will.

Households left behind, also called "trapped populations". They do not possess the assets necessary to migrate. These are often landless or land-scarce households in very poor areas, and are frequently female headed, where a main breadwinner may have left in search of other livelihood options. These households face acute food shortfalls when rainfall varies, and they report having too little to eat at multiple times in a given year. They have few or no diversification options (Warner et al 2012). These households face a double risk: they are more vulnerable to disasters, but less able to move away from them (Black et al 2013).

Successful migration can be considered an adaptation strategy to climate change. However, where migration is forced, that is people have no choice but to flee, and where migration is destructive or erosive, i.e. people are worse off as a result – particularly if they lose assets such as land and houses – then migration is considered loss and damage, as it is referred to in the UN climate change negotiations. Even in "successful" cases of community relocation, there will be loss and damage. As the community will have lost their land, to which they have ancestral ties, and the community will have lost, or have to significantly adjust, their traditional way of life. In unsuccessful cases, losses could include language, community relationships, cultural practices, and sovereignty.

Many people end up worse off after moving. Most experience to date demonstrates negative social outcomes for those resettled (IPCC Ch. 12). For instance, communities resettled by the Philippines government following Typhoon Haiyan (Yolanda) were so unhappy that many of them are moving back to high risk areas in order to be close to employment and community (Ranque and Quetulio-Navarra 2015 and Thomas 2015).

Definition of loss and damage

The adverse effects of climate variability and climate change that occur despite global mitigation and local adaptation efforts (WIM ExCom 2016a).

In CARE's experience, women bear the brunt of the social cost of migration. Women migrants often face multiple forms of discrimination, exploitation and abuse, are often outnumbered by male migrants, and more frequently work in the informal sector (Kawar 2004). When male household members have migrated, the women who are left behind tend to shoulder increased burdens both in their households and as labourers (Warner et al 2012).

Migration can negatively affect the communities and countries, from which the migrants leave, as well. Migration of highly skilled and educated people post-disaster can have a "brain drain" effect, at a time when their skills are most needed to help with the recovery process (Drabo and Mbaye 2011 in KNOMAD 2015). Shumway, Otterstrom, and Glavac (2014) find that counties that experience the greatest impacts from environmental hazards are losing income as a result of migration; income is lost primarily through net out-migration and from income loss caused by out-migrants having higher incomes than in-migrants. The counties experiencing the greatest impacts of environmental hazards are the least able to afford the loss of income.

Typically, the poorest migrate domestically and the more skilled migrate internationally, but these two types of migration are linked. Increasing internal migration, driven by climate impacts, puts pressure on urban systems, including downward pressure on wages, as there are more people in the cities to work. This can lead to the better off within those societies choosing to migrate internationally to improve their conditions (Marchiori, Maystadt, and Schumacher, 2012). Alscher (2011 in KNOMAD 2015) has noted that in Haiti, environmental migrants move intra-island, whereas Dominican migrants migrate internationally, illustrating that migrants from the poorest areas replace migrants from less poor areas.

Displacement itself can make people vulnerable to future hazards, especially for those living in temporary shelters, those without official documents, and those without access to livelihood opportunities, food, water, and health services (IDMC 2015). In addition, many people migrate to areas that have higher employment, but that are also more vulnerable to climate impacts – particularly coastal areas that are subject to flooding and extreme storms (de Sherbinin 2012).

People forced to move by climate change are not legally classified as "refugees," using a strict interpretation of the 1951 Refugee Convention, which says that to qualify as a refugee you need to be fleeing persecution.[9] Hence, people displaced by climate change are usually referred to as displaced people or as migrants. However, using the term migrants, rather than "climate refugees", gives the impression that these people have made a choice. If given a real choice, the vast majority would choose to stay at home with their families and communities, supported by the climatic conditions that enabled their traditional lifestyles. But climate change has taken that choice away. Calling them "migrants", rather than "climate refugees", de-politicises the reality of these migrations and ignores the fact that climate change is a form of persecution against the most vulnerable and that climate-induced migration is a very political matter (Gemenne 2015). Most people are not moving voluntarily – they are being forced to move by climate change, which has been caused largely by developed countries and societal dependence on the fossil fuel industry. Calling them "migrants" undermines the responsibility of the developed countries and the fossil fuel industry. We urgently need to reconsider how we treat all migrants – but particularly migrants whose decision to move has been forced upon them by a changing climate. Adopting a new term that reflects this climate injustice would be a first step. In this report, we suggest "climate-displaced people" and we encourage others to consider this issue and the development of new thinking and new terms to reflect that thinking.

9 The 1951 Convention on Refugees defines refugees as people who are in danger of being persecuted for reasons of race, religion, nationality, membership of a social group or political opinion (UNHCR).

CLIMATE DRIVERS OF MIGRATION AND DISPLACEMENT

Global temperatures have risen approximately 1°C above pre-industrial levels (Met Office, 2015), which has already led to significant climatic changes almost everywhere on the planet. The number of storms, droughts, and floods have increased threefold over the last 30 years with devastating effects on vulnerable communities, particularly in the developing world (Advisory Group on Climate Change and Human Mobility). We examine these impacts below, along with the long-term consequences of climate change and the role of climate change in triggering conflicts.

1. Droughts and changing rainfall

Key messages

- Droughts make it harder to grow crops and reduce food security. Many people in drought-affected areas use seasonal or temporary migration to cope. Additionally, as droughts become more severe and frequent, people are more likely to move permanently;
- Africa is particularly susceptible to drought and displacement from drought, but other regions also suffer;
- 10-20 percent of current migration from Middle East and North Africa has been estimated to be caused by climate change impacts, mostly drought;
- 795 million, or one in nine people in the world, were suffering from chronic hunger in 2014–2016.

Droughts have a huge impact on the movement of people and, over the last thirty years, twice as many people have been affected by droughts as by storms (Environmental Migration Portal 2016). The area affected by drought has increased since the 1970s, with more intense and longer droughts over wider areas, particularly in the tropics and sub-tropics (IPCC 2012). From 1980 to 2008, the yields of three of the four staple crops – wheat, soy, and maize – were reduced (CGIAR 2015).

The decision to migrate during a drought is a complex one. Drought erodes food and livelihood security, particularly for households that rely on rain fed agriculture. Individuals and families in arid regions use short-term migration to cope with bad years or seasons. But as drought becomes increasingly severe and frequent, and as people come to perceive the changes as permanent or deteriorating, they are more likely to migrate permanently (Coniglio and Pesce 2013; UNCCD 2014). It has been estimated that climate change, mostly drought, has been responsible for 10-20 percent of current migration from the Middle East and North Africa, and that this is likely to increase as climate impacts become more severe (Woden et al 2014).

The Where the Rain Falls study of eight rural communities in Thailand, Peru, Vietnam, India, Bangladesh, Ghana, Guatemala, and Tanzania conducted by CARE and the UN University found that all the communities had felt the impacts of climate change.[10] The impacts included shorter rainy seasons that start later, less rainy days per year, more heavy rainfall events, and more frequent, prolonged dry spells during rainy seasons. The households in the research overwhelmingly reported that rainfall variability had negatively affected their ability to grow food and livelihood insecurity. Many of the households, particularly poorer households, found that the seasonal or temporary migration, they normally undertook to cope with droughts and dry seasons, was not helping in the face of increasingly frequent droughts or unpredictable rain. Rather, it was pushing them deeper into poverty, and they were increasingly forced to turn to permanent migration, leaving family members behind more vulnerable or eroding household assets (Where the Rain Falls 2013).

Sub-Saharan Africa is particularly susceptible to drought-related disasters, which affect the food security, nutrition, and health of vulnerable people, and climate change is making it much worse. Seasonal temperatures in the Sahel have already risen by 1.5-2°C, while the incidences of drought and erratic rainfall have increased over the last 40 years (UNCCD 2014). The year of 2015 saw a climate change enhanced El Niño impact the region, causing droughts, driving food shortages, and forcing people to move. Two examples follow:

» In 2015, Ethiopia suffered one of its worst droughts in 50 years, following the failure of two consecutive rainy seasons. More than 80 percent of the country's agricultural yield and the employment of 85 percent of the workforce depend on adequate rainfall. Food insecurity is verging on chronic as farming areas that receive sufficient rain have shrunk over the past 20 years. The livelihoods of around seven million pastoralists have been jeopardised by the cumulative impacts of more frequent drought on livestock losses, rising cereal prices, and lower returns when they sell or trade their animals. Between 50 and 90 percent of crops and livestock have been lost in some areas. Drought contributed to the internal displacement of more than 280,000

10 http://wheretherainfalls.org/

people in Ethiopia between August 2015 and February 2016, according to IOM. In addition, there has been displacement caused by communal conflict in these areas; the effects of drought on competition for pasture and water helped fuel such conflict. The most acute effects of the 2015 drought continue to be felt, with the potential for hundreds of thousands of more people to become displaced if adequate humanitarian assistance is not quickly mobilized (IDMC 2016).

» In Southern Africa, the Southern African Development Community (SADC) estimates that 28 million people were food insecure by early 2016, with 40 million people affected by the worst drought in 35 years. 70 percent of the population depend upon agriculture. Maize prices increased by 60 percent over the five-year average, and in Mozambique food prices are up to 95 percent above average. In Malawi, 39 percent of the country's population face food insecurity and require emergency food assistance. Traditional methods of coping, including seasonal migration to nearby areas, are inadequate with such widespread and devastating drought, and without international humanitarian assistance, people have no choice but to leave their homes or stay and suffer. The UN regional appeal for US§ 1.2 billion was only 19 percent funded as of August 2016 (CARE 2016).

It is not just in Africa where droughts and increasingly erratic rainfall are leading to migration. From 1970 to 1990, an average of 5.1 million people per decade migrated permanently out of high drought risk zones: 2.3 million in Africa, 2.3 million in South-Central Asia, and the remainder in the Caribbean and South-Eastern Asia (de Sherbinin et al 2012). In 2014-16, 795 million people, or about one in nine people in the world, were estimated to be suffering from chronic hunger (FAO, IFAD and WFP, 2015).

In parts of Central America, the Caribbean, and highland areas of South America, insufficient and erratic rainfall from March 2015 led to drought conditions and deepening food insecurity. Countries in the northern part of Central America have faced chronic drought, dry spells, and crop failures for three consecutive years, and communities in the region's "dry corridor" of El Salvador, Guatemala, Honduras, and Nicaragua are experiencing one of the worst droughts in decades, with an estimated 3.5 million people being food insecure. Increasing droughts and subsequent food insecurity lead to higher rates of Mexico-US cross border migration (Nawrotzki 2013 in KNOMAD 2015). In the past, a 10 percent decrease in crop yields have increased emigration rates by 2 percent (Feng et al 2010 in KNOMAD).

Droughts make it harder to grow crops and reduce food security. Many people in drought-affected areas use seasonal or temporary migration to cope.

/Photo: ©CARE/

2. Extreme weather events

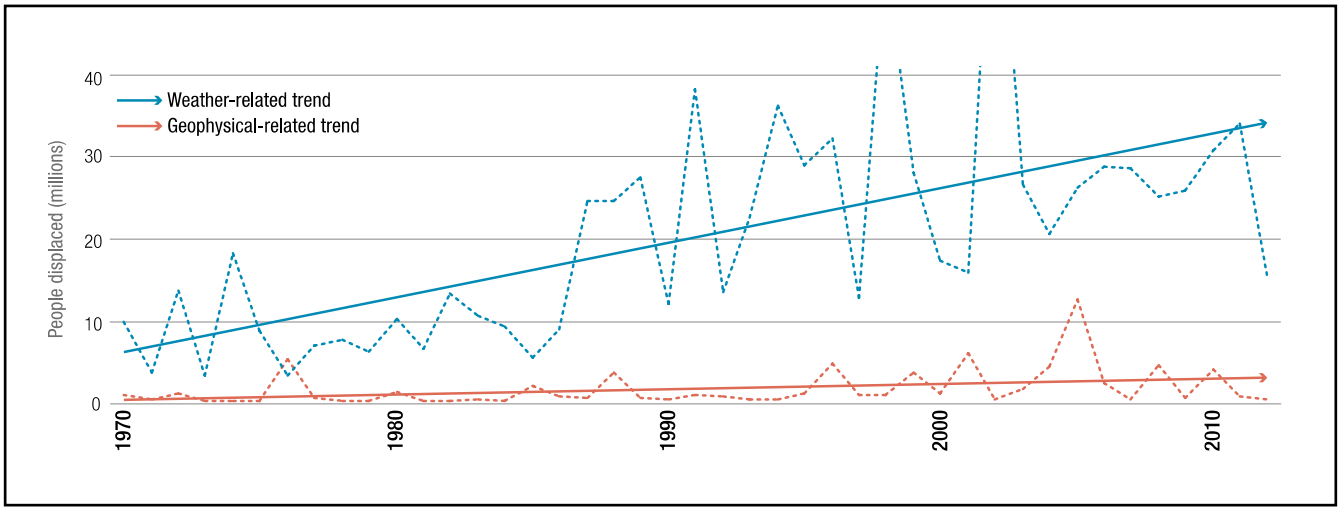
Key messages

- Weather-related disasters forced twice as many people from their homes as conflict and violence in 2015;
- Since 2008, floods, storms, and other extreme weather events have displaced 175 million people living in developing countries. The number of people displaced by weather-related disasters has quadrupled since the 1970s;
- The majority of people displaced by extreme weather events are in Asia. In 2015, some small Pacific Islands had roughly half their population displaced by cyclones.

From 2008 to 2015, close to 175 million people in developing countries were displaced by floods, storms, and other extreme weather events (IDMC 2016). People in developing countries account for 95 percent of total global displacements (Advisory Group on Climate Change and Human Mobility 2015). In 2015, weather-related disasters displaced around 14.7 million people across 113 countries, almost twice the number (8.6 million) that fled conflict and violence (IDMC 2015 and IDMC 2016).

The number of people being displaced by weather-related disasters has more than quadrupled since the 1970s. This increase is driven by both the more frequent occurrence of mega-events since the mid-1980s and by more people being affected by these extreme events (IDMC 2016). Population has increased and people have moved to urban centers towards industrial and tourism jobs, in part driven by increasing drought and uncertain food and livelihood security. Most urban centers are ports and many are low-lying, which has led to a net migration towards regions prone to flood and at risk of cyclones, high winds, storm surge, and sea level rise. Currently, 11 percent of the world population lives within 10 km of the coast. Often, when people move to urban areas, they are forced to live in badly situated slums in flood plains, on steep slopes, or in flimsy housing that is cyclone prone, putting them further at risk (de Sherbenin et al 2012; World Bank 2013).

Displacement trends: geophysical and weather-related hazards

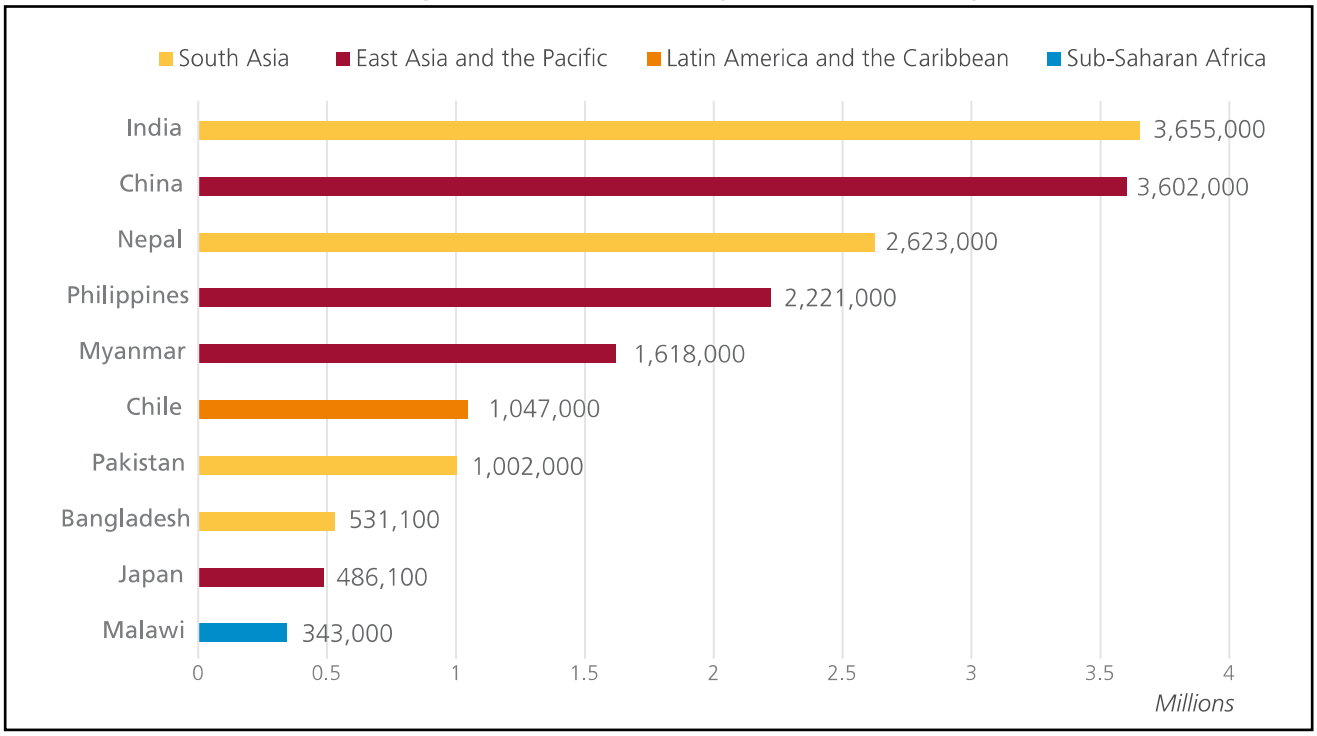


Source: IDMC 2016a

The regions with the most people displaced by extreme weather events are East and South Asia. The graphic below illustrates that in 2015, India, China, the Philippines, Myanmar, Pakistan, Bangladesh, Japan, and Malawi were the countries with the highest level of displacement due to weather-related events that are linked to or exacerbated by climate change (IDMC 2016a).[11]

11 The table also includes Nepal, Chile, and Pakistan (666,000 out of 1 million people), where displacement was caused by earthquakes.

Countries with most new displacements in 2015 (absolute number)



Source: IDMC 2016a

In Bangladesh, displacement due to extreme weather events is becoming increasingly common. An estimated 50 million people are exposed or affected by disasters every five years, with the coasts facing a severe cyclone an average of every three years, and a quarter of the country getting inundated during the yearly monsoon rains. In 2009, Cyclone Bijli and Aila displaced 862,000 people (IOM 2010). Monsoon flooding associated with cyclone Komen, which struck Bangladesh in July 2015, displaced 1.2 million (IDMC 2016). Displacement after disasters is often just short distances, as people prefer to return quickly to their homes. However, damage to infrastructure can make it hard to start fishing and farming again, leaving them no other option than to migrate to cities, sometimes temporarily, in search of work. According to one study, 50 percent of households affected by Cyclone Aila migrated away from affected areas. The migrants who travelled furthest were mostly young men who were categorised as “below poverty line”, with low levels of education. Families and females tended to undertake shorter distance migrations. Trapped populations - mostly women, children and the elderly - survived on the remittances sent by migrants and loans. Another study showed that 22 percent of households affected by tidal-surge floods, and 16 percent affected by riverbank erosion moved to urban areas (Mortreux and Adams 2015).

Other countries in the region, including Myanmar and India, also suffer from major floods and storms. Cyclone Komen caused floods and landslides in neighbouring Myanmar, displacing more than 1.6 million people, and caused widespread destruction. Three million people in India were forced to flee their homes in 2015 as a result of two major flood and storm events (IDMC 2016).

Many of the countries in East Asia and the Pacific are now facing super-heated storms due to climate change, which is displacing larger numbers of people. Multiple typhoons strike the Philippines each year, but in 2013 the strongest typhoon to ever make landfall, Typhoon Haiyan (local name Yolanda), made headlines as it slammed into the Philippines, affecting more than 14 million people and displacing four million (IDMC-IOM 2014). The three strongest storms in the Philippines in 2015 displaced two million people. Typhoon Koppu (local name Lando) was the most severe. It made landfall on Luzon, the country’s largest and most populous island, killing 54 people, displacing around 938,000 and causing severe crop damage (IDMC 2016).

The Philippine’s Government programs to resettle people outside of typhoon affected areas have faced challenges. Following Typhoon Haiyan, the Philippine Government relocated people to areas less exposed to typhoon damage and with better housing. However, many people are choosing to move back to the high risk areas in order to be close to employment and community (Ranque and Quetulio-Navarra 2015; Thomas 2015). This illustrates the challenges in resettlement programs and the importance of community-led programs.

Storms have a huge impact on small Pacific island states including Tuvalu, Vanuatu, Micronesia and Kiribati. These mostly low-lying, coastal populations are very exposed to cyclones. In March 2015, more than half of Tuvalu's population, of around 10,000 people, and a quarter of Vanuatu's, were displaced by tropical cyclone Pam, a category five storm. The disaster forced around a quarter of Vanuatu's population to flee their homes and left around 166,000 people on 22 islands in need of emergency assistance, including nearly 65,000 people who required emergency shelter. Fifteen thousand homes were damaged or destroyed, with the entire country severely affected (IDMC 2016). Towards the end of 2015, an intense drought caused food insecurity in Vanuatu and other countries still recovering from the impacts of Pam (IDMC 2016).

3. Rising sea levels, glacial retreat, and desertification – slow onset events

Key messages

- Slow-onset impacts are expected to force more people to migrate than extreme weather like storms and floods;
- Sea level rise poses a threat to the very existence of some low-lying island countries. In the long term, sea level rise at 2°C warming could submerge land that is currently home to 280 million people globally;
- Glacial retreat is particularly hard to deal with, as land is first flooded with excess glacial melt, and then extreme drought conditions can set in as the primary source of water disappears.

Extreme weather, like storms and floods, is likely to result in mass displacement events. However, in the long term, an overall larger number of people are expected to migrate due to slow-onset impacts from climate change, including desertification, glacial melt, and sea level rise (IOM). As these impacts occur slowly over a long period, they can often be more difficult to deal with. For instance, adaptation could effectively help people to cope with the impacts of climate change up to a certain point, but after that point, adaptation will have decreasing returns and will not be able to reduce harm, thus, people might have no choice but to move. Additionally, at different points in the progress of the slow onset event, different kinds of adaptation might be most appropriate. This makes decisions about what to do and when to change strategies difficult for communities. Some people react to the impact of slow onset events by undertaking migration early in order to diversify their income and provide remittances to family members staying at home. This would also have the advantage of reducing the pressure on resources. However, as these events set in slowly, this type of migration might appear very much like economic migration and not receive the same support as disasters that are more urgent. As humans, we are programmed to deal with big and shocking disasters, rather than the slow and creeping change brought by slow onset events.

Sea level rise

Rising sea levels infiltrate land, making it salty and difficult to grow crops; salt water also infiltrates groundwater, inundates and erodes away land; and higher seas make storms and high tides more damaging. Warmer waters, with a lower pH from additional carbon dioxide, are destroying coral reefs, which would otherwise protect against high waves and storm surges, and removing the breeding ground for fish – a key food source.

Low-lying islands are on the front lines of climate change with many only a few meters above sea level. Island countries that have been identified as at risk of disappearing include Kiribati, Tuvalu, Tokelau, the Maldives and the Marshall Islands, with a combined population of approximately 600,000 (Park 2011).

The response that many give to this plight is that the islanders should just move. However, many Pacific Islanders do not accept migration as an adaptive response to climate change. They feel it would threaten their Pacific identify linked to land and community. In many Pacific island countries, the word for land is the same as the word for people from that place – they are considered inseparable. Similarly, human existence in Polynesia is so closely linked to a person's ancestral lands that the term for land is the same as the word for placenta or afterbirth. Past examples of forced migration have led to a loss of tradition, language, identity, livelihoods and community cohesion. Rising sea levels and relocation also threaten the sovereignty of these low-lying countries (ESCAP, ILO, UNDP 2014).

However, the problem has become so urgent that some communities have begun to plan for relocation. One example is the Carteret islanders who, via the community group Tulele Peisa and in conjunction with the Papua New Guinea Government, have begun to plan for relocation. A committee created a plan to resettle 50 percent of the population by 2020. The people of the Carteret Islands live a traditional way of life which they seek to protect in their relocation to an area within the larger island of Bougainville. It has been estimated that US$5.3 million is required for the period 2009 - 2019 to ensure that the basic needs for a successful resettlement are met. Yet, even this modest amount is proving elusive (Richards and Boom 2015).

Pacific Islanders are not the only low-lying communities at risk of rising sea levels. Other small island states and countries with low-lying regions are at risk. The Indian Bengal Delta (IBD) is particularly vulnerable and includes territory from Bangladesh, India, and the Sundarbans region. The sea level rise already experienced in Sundarbans (3.14 mm per year) is higher than the average global sea level rise and has eroded away land and submerged villages, which forced people to migrate to neighbouring islands. As chars and riverbanks are reshaped, 60,000 people are rendered landless each year.

The top ten developing countries most affected by sea level rise are Vietnam, Bangladesh, Egypt, Malaysia, Thailand, Myanmar, the Philippines, Indonesia, China and Iraq. In the long term, sea level rise at 2°C could submerge land currently home to 280 million people globally (Strauss 2015).

Bangladesh is one of the top ten countries in the world who will be most affected by sea level rise.

/Photo: ©2007 Bill Dowell/

Glacial retreat

Glacier retreat is another pernicious impact of climate change. Glacial retreat results in communities, initially suffering flooding and danger from glacial lakes bursting as the glacier melts, to then face extreme drought conditions once the glacier, often their primary source of water, has disappeared.

CARE's Where the Rain Falls study showed that the people of Peru's Huancayo Province are already affected by the retreat of the Huayatapallana glacier. They face less runoff from the glacier, heavier rains at unexpected times, and longer dry spells during the rainy season. More than a third of the population relied on agriculture for their livelihoods, and farmers report declining yields due to uncertain rains and "tired" soil. For 53 percent of households, the impact of changing rainfall on food production was severe. Although Peru has made great strides in reducing levels of poverty and food insecurity, migration remains an important livelihood diversification strategy, particularly for landless and poor households. To avoid food and livelihood insecurity, half of the households surveyed migrated as a way to increase their income; poor households (below the poverty line and with small land holdings) were twice as likely to migrate; and men were most often the people who migrated to try to find alternate income. This left woman at home to shoulder additional work and emotional burdens. When making their migration decisions, uncertain rainfall and food security ranked higher than issues related to aspirational migration, such as social networks and the pull of "bright city lights" (Warner et al 2012).

Desertification

Increasing droughts, changing rainfall, more extreme weather events and higher temperatures are drivers of desertification (World Bank 2014). Land classified as dry has more than doubled from 10-14 percent in 1950 to 1980, to 34 percent today. Yet, this 34 percent of land is a major source of food security. More than 1.5 billion people in the world depend on degrading land, and 74 percent of them are poor. Desertification and drought causes 12 million hectares of productive land to become barren every year, which is a lost opportunity to produce 20 million tons of grain.[12] It is difficult to see how the world will meet food demand from a growing population if productive land continues to decline. Once productive lands turn marginal, or become deserts, people will have no choice but to "fight or flight" (UNCCD 2014a).

Desertification causes loss of vegetation cover, soil erosion, dust storms, salinization, and a decrease in soil productivity, all of which contribute to a downward spiral that leads to a decrease in agricultural yields, loss of biodiversity, poverty, reduced human wellbeing, and migration (World Bank 2014).

4. Conflict and violence triggered by climate change

Key messages

- Conflict over increasingly scarce resources and displaced people creates tensions, which can exacerbate violence;
- There is an overlap between areas that have suffered droughts and desertification and conflict in the last decade. It is estimated that a 5 percent change in rainfall in Sub-Saharan Africa increased the likelihood of conflict in the following year by 50 percent;
- Over a 60-year period, 40 percent of intrastate conflicts are associated with land and natural resources.

The US National Security Strategy refers to climate change as an "urgent and growing threat to our national security, contributing to increased natural disasters, refugee flows, and conflicts over basic resources like food and water" (White House 2015).

Conflicts are rarely triggered by one single factor. The impacts of climate change, including drought and food insecurity, and displacement of people, can create tensions and exacerbate existing tensions (Schleussner 2016). Weak economic and political systems may not be able to meet or respond quickly enough to these challenges. Drought and other climate change impacts can become intertwined with other drivers of conflict, creating insecurity that is both a cause and a consequence of displacement (IDMC 2016).

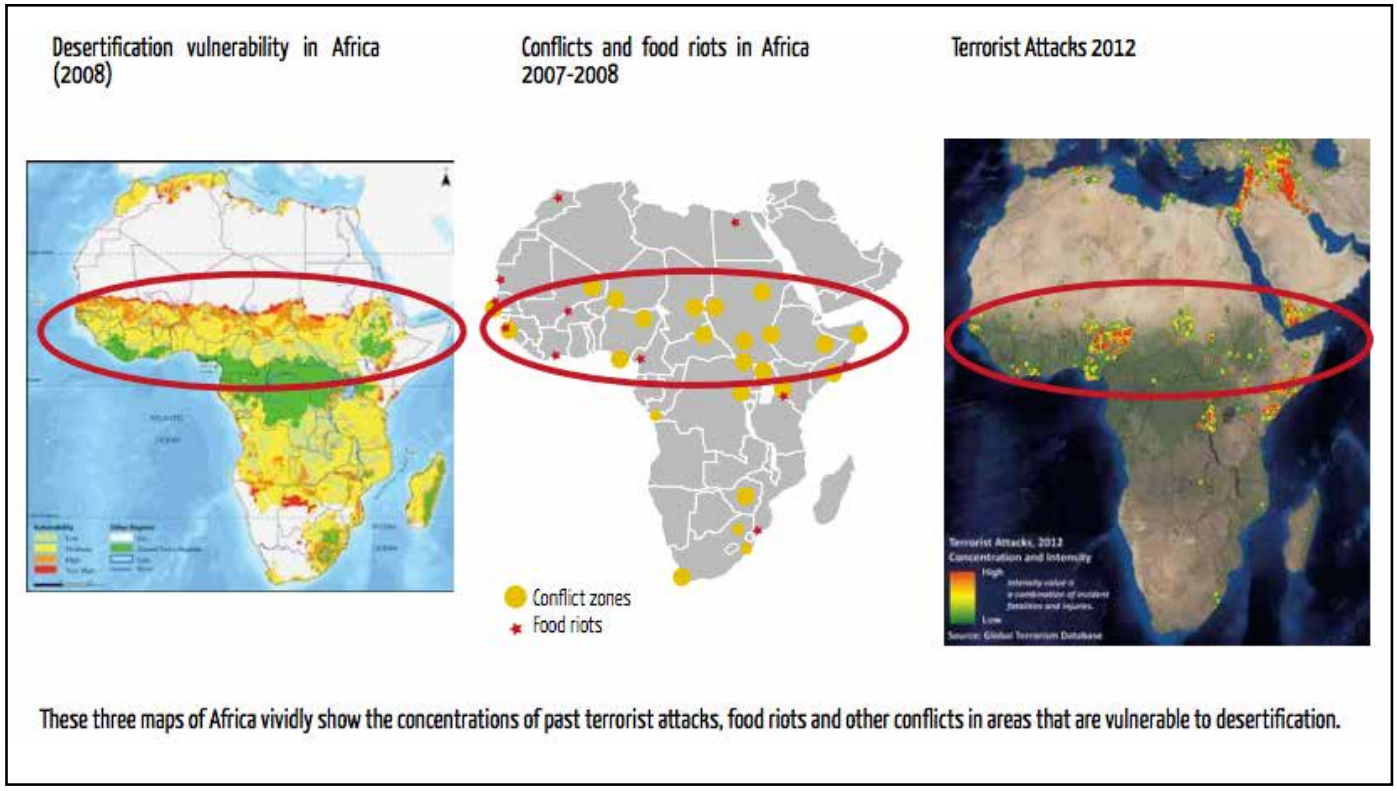
12 In 2008, there were 1,386 million hectares of arable land in the world (FAO Statistical Yearbook – Land Use in UNCCD 2014b p3). At this rate, roughly 8 percent of land is becoming barren a decade.

Increasing temperatures and changing rainfall increase the likelihood of conflict in all regions of the world.[13] In Sub-Saharan Africa, a 5 percent change in rainfall, compared to the previous year, has been estimated to increase the likelihood of conflict the following year by 50 percent (Miguel et al 2004).

Recurrent and severe drought has contributed to competition and clashes between communities, under highly stressed conditions, over access to scarce water and pasture. Communal land tenure systems grant pastoralists equal rights to exploit resources, but, in practice, the use of grazing areas is regulated between and within ethnic groups. When drought pushes one ethnic group to migrate into another's area, tensions between pastoralists, or between pastoralists and settled farmers, can arise (IDMC 2016).

In the last 60 years, 40 percent of intrastate conflicts were associated with land and natural resources (UNCCD 2014). A recent study by Schleussner et al. (2016) found that the economic damage from climate impacts such as droughts, floods, and storms could particularly increase the risk of conflict outbreak in countries that have a high ethnic fractionalization. Similarly, the UNCCD (2014) has noted that, as the effects of climate change undermine livelihoods, inter-ethnic clashes are breaking out within and across states, and fragile states are turning to militarization to control the situation.

The maps below indicate the overlap between areas vulnerable to droughts and desertification and those vulnerable to conflict. In 2007, 80 percent of the major armed conflicts that affected society occurred in vulnerable dry ecosystems, and in 2008, food insecurity triggered riots in over 30 countries. The effects of desertification are increasingly felt globally as victims turn into refugees, internally displaced people, and forced migrants, or as they turn to radicalization, extremism or resource-driven wars for survival (UNCCD 2014).



Source: UNCCD (2014)

13 Burke et al (2015) reviewed the literature and found that a one degree increase in temperature increases the risk of intergroup conflict by 11.3 percent; Hsiang et al (2013) found convergence across studies that climate change is linked to human conflict across all major regions of the world, specifically that for a one degree increase in temperature, or an equivalent change in rainfall, the frequency of intergroup conflict rises 14 percent. They concluded that amplified rates of human conflict could represent a large and critical impact of climate change.

Preceding the Syrian uprising that began in 2011, Syria suffered the worst drought ever recorded from 2007-2010. It caused widespread crop failure, 85 percent of livestock was lost (World Bank 2014), and 1.5 million people migrated from rural to urban fringes, which were overcrowded with poor infrastructure, high unemployment, and crime. The lack of social services, the subsequent increased inequality and hardship, and the ineptitude and brutality of the Assad government drove the developing unrest. Thus, the migration, in response to the severe and prolonged drought, caused and exacerbated a number of factors including unemployment, corruption, and rampant inequality that contributed to the unrest (Kelley et al 2015).

The impacts of climate change in northern Nigeria have created hardship and are interrelated with the negative impacts of Boko Haram activity. Desertification, soil degradation and low rainfall have threatened the livelihood of the 80 percent of northern Nigerians who rely on agriculture. Boko Haram activities have made it harder for people to work their land and visit markets for fear of violence. The combination of environmental and security factors has led to huge increases (45-130 percent) in food prices. Climate impacts have increased poverty and unemployment, two factors that have been associated with higher recruitment opportunities for radical movements such as Boko Haram, hence exacerbating the political situation. Increased displacement has forced herders to move further south in order to graze their cattle and driven herders and farmers into cities. The arrival of people in cities expands the cities into agricultural areas and puts more pressure on urban centers, especially on social services, further exacerbating inequality and the political situation (Métivier in IOM/Sciences Po 2015).

For pastoralists in the Horn of Africa, the impacts of drought and conflict often mingle and amplify one another. Stealing cattle, for example, is one response to drought among pastoralists. Inter-clan conflicts and the presence of armed groups can also inhibit pastoralists' ability to move their animals to grazing areas, making pastoralists and their livestock more vulnerable to droughts. In Somalia, prolonged drought between 2010 and 2012, on top of political instability, conflict and widespread poverty, precipitated a complex emergency and famine that led to huge displacement internally and outside the country (IDMC 2015; IDMC 2016).

As migration, which is a diversification strategy for some communities and, more often, a last resort for survival, is becoming ever more difficult due to the political environment in many countries, vulnerable communities become easy prey for agents of radicalization, political extremism, strife, and conflict, creating political instability globally. These pressures may increase as the population rises (UNCCD 2014). Failing to tackle climate change, poverty and inequality is a recipe for political and economic chaos.

PART TWO

FUTURE MIGRATION AND DISPLACEMENT FROM CLIMATE CHANGE

Key messages

- Unless governments take strong preventive action and invest in adaptation, climate change-related phenomena such as floods, droughts, famines, and hurricanes could push the total number of permanently displaced people as high as 250 million people between now and 2050.

Projecting the number of people forced to flee their homes due to climate change is difficult due to the complex relationship between climate change, livelihoods, food and nutrition security, poverty, inequality, and conflict, amongst other drivers of migration. The most widely cited projection of "environmental refugees" estimated that, by 2050, 162 million people in Bangladesh, Egypt, China, India, and other parts of the world, including small island states, will be vulnerable to sea level rise, and another 50 million to desertification.[14] This forecast has been criticized on a number of fronts. Firstly, it does not take into account people's ability to adapt; as climate change worsens, capacity to adapt is reduced, as illustrated in the sections to follow. Secondly, it is criticized for not taking into account the interaction between climate change and other forms of migration. As already discussed in this report, many climate migrants look like they are economic migrants or they may be fleeing conflicts, for which one of the root causes was climate change. If anything, CARE sees these numbers as conservative estimates. The author of the study, to which most such predictions refer, now believes that, unless governments take strong preventive action and invest in adaptation, the number of people permanently displaced by climate change-related phenomena such as floods, droughts, famines, and hurricanes will be closer to 250 million, between now and 2050 (interview in Christian Aid 2007). In short, unless strong preventive action is taken, between now and 2050, climate change will push hundreds of millions of people into displacement. While it is worth emphasising that such estimates are very uncertain and dependent on multiple factors besides climate change, the sheer magnitude of these numbers are a cause for concern – and preventive action.

In the second half of this report, we consider the impacts of climate change locked in for the short term, and those projected at 1.5°C, 2°C and 3°C scenarios of atmospheric warming above pre-industrial levels. We will make some of our own assessments as to what this means for climate-driven migration. Our analysis is based on projections and pointers in the material, rather than firm projections of migration, which do not exist at present. The scenarios were chosen because the worlds' governments agreed, at the COP21 climate summit in Paris, to keep warming well below 2°C, while aiming to reduce it further to 1.5°C. The current pledges that countries made for the Paris meeting, however, have us heading for 3°C warming. As we will see, even at 2°C warming, we face migration and displacement challenges that are likely to be beyond our ability to cope, while 3°C warming would result in a catastrophic outcome in terms of massive displacement and loss and damages.

All areas of the globe will be affected, and impacts from one region will have impacts elsewhere, but the remainder of this report will focus on the following regions and take into account issues likely to impact on migration in and from these regions:

1. **Sub-Saharan Africa's** food production systems are increasingly at risk from the impacts of climate change. Significant yield reductions already evident under 2°C warming are expected to have strong repercussions on food security and may negatively influence economic growth and poverty reduction in the region. Significant shifts in species composition and existing ecosystem boundaries could negatively affect pastoral livelihoods and the productivity of crop systems and food security (World Bank 2013).

2. **Middle East and North Africa** is particularly impacted by temperature rise, desertification and dust storms, and population centers may become intolerable to humans.

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14 Originating in a study by Professors Myers in 1993, updated in 2002, and cited in Friends of the Earth, Stern and the Global Humanitarian Forum (Foresight 2011, Ionesco 2016).

3. South East Asian rural livelihoods are faced with mounting pressures as sea level rises and important marine ecosystem services are expected to be lost as warming approaches 4°C. Coral systems are threatened with extinction, and their loss would increase the vulnerability of coastlines to sea level rise and storms. The displacement of impacted rural and coastal communities, resulting from the loss of livelihood, into urban areas could lead to higher numbers of people in informal settlements being exposed to multiple climate impacts, including heat waves, flooding, and disease (World Bank 2013).

4. South Asian populations depend on the stability of the monsoon season, which provides water resources for most of the agricultural production in the region. Disturbances to the monsoon system and rising peak temperatures put water and food resources at severe risk. Particularly in deltaic areas, populations are exposed to the multiple threats of increasing tropical cyclone intensity, sea level rise, heat extremes and extreme precipitation. Such multiple impacts can have severe negative implications for poverty eradication in the region (World Bank 2013).

5. Pacific Islands, and other island communities, are likely to suffer heavily from rising sea levels, loss of fisheries, loss of the protective coral reefs, increasing severity of storms and increasing droughts. At certain levels of climate change, some islands will cease to exist, entire countries will be forced to migrate, and the international community will be forced to confront what that means for sovereignty.

SHORT-TERM – CLIMATE CHANGE IS ALREADY FUELING DISPLACEMENT

Key messages

- The level of warming for the next 15-25 years is already locked in and, therefore, adaptation measures are crucial to reduce climate impacts from forcing people from their homes;
- By 2025, up to 2.4 billion people worldwide may be living in areas subject to periods of intense water scarcity, which may displace as many as 700 million people by 2030;
- More than 40 million people face displacement from extreme events each year, up from 27.5m. Projections show an increase in displacement risk across Asia, especially in the Philippines and Afghanistan, but also in China and India.

Mitigation has been insufficient to date, especially from developed countries, therefore high levels of warming and climate impacts are locked in for the next 15-25 years. The extent of emissions reductions undertaken from now will determine the level of climate change in the medium to long-term future (SBSTA and SBI 2015). Therefore, adaptation is crucial to reduce the impacts of climate change in the period up to 2030-40.[15] Without adequate adaptation funding, these goals will not be met and poor people will face even more severe climate consequences.

The world's poorest people are most at risk from the near term impacts of climate change. The IPCC (WGII 2014, Table 13.2) lists the challenges facing them as floods destroy homes, land, and infrastructure. Even in the short term, there is a risk of reaching a tipping point, as reduced rainfall imperils food security. In some areas, this may be further exacerbated by temperatures exceeding those in which it is possible to work outside for more than very short periods, reducing farm productivity and removing, or making more dangerous, other income streams, which frequently involve outdoor work. Water stress will be at high levels for many regions; these stresses will undermine poor people's ability to grow food. There is a high risk that poverty will shift from being transient to chronic and entrenched, and people are likely to be driven from their homes, unless significant adaptation is applied.

Drought and water scarcity

By 2025, up to 2.4 billion people worldwide may be living in areas subject to periods of intense water scarcity, which may displace as many as 700 million people by 2030. It is estimated that 135 million people are at risk of being displaced by desertification (UNCCD 2014a).

15 This is the period of time in which the world's governments agreed to achieve the Sustainable Development Goals.

The global population is currently increasing by 1.2 percent each year, and by 2030 it is expected that the population will grow from 7.3 billion to 8.5 billion (UNDESA 2015), an increase of 16 percent.[16] Thus, even small reductions in food yields, caused by climate change, could have major implications. The UNCCD find that land degradation over the next 25 years may reduce global food production by up to 12 percent, and lead to an increase of as much as 30 percent in world food prices (Sergio Zelaya in SBSTA and SBI 2015). However, it is worth noting that current food shortage problems are caused by unequal distribution of resources.[17] It is likely that near-term challenges could be reduced substantially if governments committed to addressing inequality and resourcing adaptation and resilience sufficiently (CARE and Food Tank 2015).

Extreme weather events

Displacement from extreme weather events is expected to grow globally; more than 40 million people per year are at risk of displacement from extreme weather events, up from a current five-year global average of 27.5 million. The majority of the people at risk live in South and Southeast Asia. These projections from IDMC (2015) take into account only increased population and increased exposure (as more people move to risk areas), which is quite conservative; even higher increases in risk are likely with more intense storms and floods driven by climate change.

These are the changes we could see in four regions of the world as a result of climate change

AFRICA

Drought and water scarcity is most severe in Sub-Saharan Africa, particularly in the Sahel and the Horn of Africa. Africa is the region with the highest population growth and the UN estimates that the African population will increase by 42 percent, from 1.2 billion to 1.7 billion, by 2030 (UNCCD 2014). For Africa, the stress on water resources, reduced crop productivity and livelihood, and food security are likely to grow significantly in the near term (IPCC WGII 2014, Table 22-6). Even without this increased climate stress, approximately 30 percent of the pastoralists in Northern Kenya, Southern Ethiopia, and South-Central Somalia are at risk of becoming permanently displaced from their way of life between now and 2040 (IDMC 2015). With high levels of adaptation, including sustainable land management and modification of land use, drought relief, flood control, and support for locally based adaptation, risk levels may be constrained to roughly present day levels. However, degradation of coral reefs and the subsequent loss of fish stocks will be difficult to adapt to, is likely to lead to reduced fish catch, and affects the fishing industry in some areas. With significant adaptation funding from developed countries, it would be possible to reduce migration driven by climate impacts (IPCC WGII 2014, Table 22-6). Without a significant increase in adaptation by 2020, an estimated 60 million people could move from the desertified areas of Sub-Saharan Africa towards North Africa and Europe (UNCCD 2014).

MIDDLE EAST AND NORTH AFRICA

The Maghreb countries of Egypt, Tunisia, Morocco, and Libya are highly exposed to sea level rise. In Morocco, for example, more than 60 percent of the population and over 90 percent of industry are located in key coastal cities. Alexandria, Benghazi, and Algiers have been identified as particularly vulnerable. One study estimated that a sea level rise of 0.3 m would flood 30 percent of metropolitan Alexandria, by 2025, forcing about 545,000 people to abandon their homes and land, and leading to the loss of 70,500 jobs. There are expected to be 100 million people at risk in coastal cities across the MENA region by 2030, up from 60 million in 2010 (World Bank 2014).

ASIA

Across Asia, drought-related water and food shortages, and heat-related human mortality are expected to increase in the short term. With sufficient efforts to support farmers in adaptation, food insecurity could be kept to roughly current levels. Declining fish stocks, because of reduced coral reef cover, will also require adaptation efforts to maintain existing levels of risk. In arid areas, water shortages will increase significantly, and there is limited capacity to adapt (IPCC, Table 24-1). Asian countries face the brunt of displacement risk from extreme events, like storms, floods. The number of people living in urban floodplains in Asia may rise from 30 million in 2000 to between 83 and 91 million in 2030, and then to 119–188 million in 2060 (Foresight 2011). In South Asia, displacement risk has been projected to increase by 3.7 percent per year (9.2 million people) and in South-east Asia 2.4 percent each year (30 million people).[18]

16 https://esa.un.org/unpd/wpp/Publications/Files/WPP2015_Volume-I_Comprehensive-Tables.pdf

17 The world currently wastes 30 percent of food that it produces and overeating is equal in problem to people not having enough food.

18 IDMC has established a Disaster Displacement Risk Index (DDRI), which projects expected average annual displacement from sudden-onset hazards (like storms, floods, tsunamis, landslides and earthquakes). This does include displacement from earthquakes (which are not related to climate change), but as a proportion displacement from this source is relatively low. These projections assume a "business as usual" scenario in which natural hazards occur with the same frequency and intensity as in the past (so no increase in severity due to climate change is built into the model) and population growth and changes in exposure and vulnerability occur at current rates. Therefore, the projections are conservative.

THE PACIFIC

The impacts facing small islands, including the Pacific Islands, such as rising sea levels, degrading coral reefs, and increased storm intensity, are already severe in the short term. Displacement from extreme events is expected to continue to increase, with 45,600 people projected to be at risk of displacement each year from the South Pacific region (IDMC 2015).

In March 2015, cyclone Pam hit Vanuatu and caused widespread destruction. The intensity and frequency of extreme weather events will increase as a result of climate change.

/Photo: ©2005 - Ben Bohane/

1.5°C

WARMING – MODERATE, BUT MANAGEABLE MIGRATION IMPACT

1.5°C WARMING – MODERATE, BUT MANAGEABLE MIGRATION IMPACT

Key messages

- Climate impacts will still be significant in many areas, but uncontrollable and self-accelerating climate changes may still be contained;
- Nearly half of the Bangkok city area is vulnerable to frequent flooding from 2025, and Manila faces frequent floods and significant economic losses;
- 11 million people live on land that is projected to be flooded every year (without adaptation) in Sub-Saharan Africa.

Small island countries, and others highly vulnerable to climate change, argued successfully that the Paris climate summit should agree on an objective to keep warming within 1.5°C.[19] Even with 1.5°C warming, climate impacts will still be significant in many areas, but uncontrollable and self-accelerating climate changes may still be contained. With sufficient resources, this level of warming will allow most people the opportunity to adapt. For poor people, adaptation finance from developed countries will be essential.

With sufficient adaptation finance, the need to migrate because of climate change can be limited and based on free and informed choice. Migration could remain primarily within national boundaries and voluntary in nature. Volumes of migration would be manageable for national authorities and addressed through development and adaptation plans. It would still be important to ensure that adequate protection is offered to those displaced, both internally and internationally.

Droughts, heat waves and crops

Heat waves are projected to increase by an average of 1.1 months per year globally (Schleussner et al 2016). In a world 1.5°C warmer, it would become increasingly challenging to increase food production to meet growing needs, but the possibility of adaptation would exist for adaptation (Pörtner in SBSTA and SBI 2015). In the tropics, wheat yields are expected to decrease by 9 percent and maize yields by 3 percent, while high-latitude regions may see an increase across crop yields, when the effects of CO_2-fertilisation are taken into account.[20] At 1.5°C, projections, excluding the CO_2-fertilization effect, which is highly uncertain, show reductions for all crop types of about 10 percent globally (Schleussner et al 2016).

Extreme events

Globally, heavy precipitation is expected to increase in intensity by 5 percent and in South Asia by 7 percent. In the face of extreme impacts, like storms, floods and droughts, people typically choose to relocate temporarily and return to their homes as soon as possible. However, if they perceive that changes are permanent, which is likely with climate change, they are more inclined to move permanently and may be more likely to consider moving further, crossing international borders if necessary (Coniglio and Pesce 2013).

Slow onset events (sea level rise and coral reefs)

Global sea level rise in 2100 is expected to be 0.4 m. The end-of-century rate of sea level rise is about 30 percent lower for 1.5°C of warming than for 2°C, which would reduce the long-term sea level rise beyond 2100.[21] At 1.5°C warming, Strauss et al. (2015) calculate that this long-term sea level rise (beyond 2100) would be approximately 2.9 m and inundate land currently occupied by 137 million people.

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19 The Paris Climate Agreement states that countries will pursue efforts to limit the temperature increase to 1.5°C, see Article 2: http://unfccc.int/files/essential_background/convention/application/pdf/english_paris_agreement.pdf

20 The theory is that higher levels of CO_2 in the atmosphere would fertilize plants and stimulate plant growth, hence the term is CO_2 fertilisation. However, CO_2 fertilisation is highly uncertain. It is not clear whether it will happen, particularly at higher temperatures.

21 At 4 mm per year

To protect at least 50 percent of the coral reefs, global warming would have to be limited to 1.1–1.4°C.22 At 1.5°C warming, projections are that 90 percent of corals reefs would bleach annually, but that by the end of the century this proportion would reduce to 70 percent. Keeping warming within 1.5°C gives some reefs a chance to recover (which is lost at 2°C), but it will still have a devastating impact on coral reef systems that nurture fish and provide protection to coastal communities from storms (Schleussner et al 2016).

Violent conflict

Rising temperatures and changing rainfall increase the likelihood of conflict in all regions of the world. At 1.5°C warming, the risk of violent conflict is expected to increase by more than 14 percent, forcing many people to flee their homes (Hsiang et al 2013).[23]

These are the changes we could see in four regions of the world as a result of climate change

AFRICA

Drought risk in Southern and Central Africa is expected to increase and will be exacerbated by increasing temperatures: in summer, unusual heat extremes are projected to increase to cover 20-25 percent of land, and unprecedented heat extremes to cover 3-5 percent.24 This will not only have human health costs, but will also contribute to crop failures, increasing to about one in four years, up from about one in five at present. However, crop yields remain reasonably consistent, only small negative changes are expected, with the exception of sorghum in the Western Sahelian and Southern African regions, which will have significant yield reductions. Livestock will suffer in some areas, forage yields in the Sikasso region in Mali is projected to be down 5 to 36 percent (World Bank 2013).

Sea level rise affecting Africa will be significant, at approximately 0.7 m above present levels by 2080–2100. Without adaptation, this would flood close to 11 million people. The countries most affected are Mozambique, Nigeria, Guinea-Bissau, and Gambia. Mombasa, which has the largest seaport in East Africa, is already affected at a much lower sea level rise of 0.3 m. This would submerge 17 percent of Mombasa and render a larger area uninhabitable or unusable for agriculture because of water logging and salt stress. Tourism resources, such as beaches, historic and cultural monuments, and port infrastructure would be negatively affected (World Bank 2013).

MIDDLE EAST AND NORTH AFRICA

The region's population is projected to double by 2050, which, together with projected climate impacts, puts the region under enormous pressure for water and other resources. Moderate drought is projected to affect the region for half a month each year, and consecutive dry days are expected to increase by 5-10 days in the region. Yields for cereals are expected to reduce by 3-5 percent, with a significant reduction in wheat yields in Tunisia of 10–50 percent. Regionally, other crops are projected to stay steady or reduce only slightly. However, legume yields are projected to reduce by 24 percent, and in some regions potato, sunflower and rice are likely to suffer significant reductions (World Bank 2014).

Heat waves are expected to increase substantially, with 25-33 percent of the region suffering highly unusual heat extremes and 2-5 percent suffering unprecedented heat extremes. Cities that are expected to suffer from heat waves include: Riyadh, Saudi Arabia (81 days); Tehran, Iran (48 days); Abadan, Iran (43 days); Baghdad, Iraq (47 days); Amman, Jordan (31 days); Jerusalem (26 days) (World Bank 2014).

SOUTH EAST ASIA

Regional sea levels are projected to rise approximately 75 cm by 2080-2100. In the case of Bangkok, a 15 cm sea level rise that might occur by 2025, would flood 43 percent of the city area. For Manila, a 29 cm rise would mean a 30-year flood, generating damages worth roughly 15 percent of GDP (World Bank 2013).

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22 Without taking into account the detrimental effects of ocean acidification.

23 Burke et al (2015) reviewed the literature and found that a one degree increase in temperature increases the risk of intergroup conflict by 11.3 percent; Hsiang et al (2013) found convergence across studies that climate change is linked to human conflict across all major regions of the world, specifically that for a one degree increase in temperature, or an equivalent change in rainfall, the frequency of intergroup conflict rises 14 percent. They concluded that amplified rates of human conflict could represent a large and critical impact of climate change.

24 Also West Africa, but projections there are uncertain.

With sea level rise, salt water will penetrate land and previously fresh water. In the Mekong River Delta, a 30 cm sea level rise would affect 1.3–1.7 million hectares, which would be a loss of about 4.7 percent of rice paddies due to inundation and possible agricultural loss of a larger area of 294,000 hectares (about 7.2 percent of the Mekong River Delta) due to salinity intrusion. Flooding and saltwater intrusion are also a significant threat to aquaculture in the region. Adapting aquaculture in south East Asia is estimated to cost from US$ 130 to US$ 190.7 million per year (World Bank 2013).

During the summer, about 50-60 percent of land is projected to be subject to unusual heat extremes, that are currently unknown, and 25-30 percent to unprecedented heat extremes (World Bank 2013).

At 1.5°C warming, about 89 percent of coral reefs are projected to experience severe bleaching (World Bank 2013), significantly reducing the protective power of reefs from storms.

SOUTH ASIA

Sea levels are projected to rise approximately 70 cm by 2080-2100 (World Bank 2013). In the long term (beyond 2100), rising sea levels will affect land currently occupied by 8.1 million people in India and 3.6 million people in Bangladesh (Strauss 2015).

Water availability, and groundwater recharge, is expected to reduce, escalating already existing groundwater stress. This will contribute to significant yield losses from all crops if CO_2 fertilization is not effective. However, if adaptation measures are implemented, then yields may remain approximately flat (World Bank 2013).[25]

Whilst unusual heat extremes would cover approximately 15 percent of land, unprecedented heat extremes would remain virtually absent if warming is kept within 1.5°C (World Bank 2013).

/Photo: ©CARE - Rakhine State/

The majority of people displaced by extreme weather events, like floods and storm, are in Asia.

25 And CO_2 fertilization may have a positive impact (which is highly uncertain), in which case less adaptation is necessary to keep yields flat.

2°C
WARMING – A NEW, HOSTILE REALITY AND SIGNIFICANT MIGRATION

2°C WARMING – A NEW, HOSTILE REALITY AND SIGNIFICANT MIGRATION

Key messages

- At 2°C warming, we will see dramatic climate change, amounting to a completely new and hostile reality. No part of the world will remain untouched.
- Adaptation costs will be extremely high, and 2°C will exceed the limits to adaptation on a number of fronts, hence, loss and damage costs will mount.
- Significant migration and displacement is likely at this level of warming: approximately 72 million from sea level rise and many more from floods, storms, heat, drought, and conflict over resources. It is less likely to be positive migration, and more likely to be displacement and migration that will push people into poverty.

When we move from 1.5°C to 2°C warming, we open up to a completely new reality (Schleussner et al 2016). This will be a world in which all regions of the world will be affected, but especially the tropical regions will feel severe impacts.

While adaptation can reduce the level of risk, at 2°C warming, adaptation costs will be extremely high. 2°C of warming will exceed the limits to adaptation on a number of fronts, especially for poor people. Poverty is likely to increase and become entrenched. The poor will have less water for drinking and agriculture, their homes and possessions will increasingly become destroyed due to storms and floods, and heat waves and warmer temperatures will reduce their ability to work (IPCC WGII, Table 13.2).

As impacts mount, people become more desperate and will increasingly choose to relocate – history shows this is the case, where two droughts in a row or multiple extreme events have caused people to leave their homes. Migration will shift from temporary to permanent: migration will be less of a choice and will become forced displacement.

Drought and water scarcity

Globally, there will be 20 percent less water available (World Bank 2014). Combined with increasing temperatures, this means lower agriculture yields in the tropics for wheat and maize and, in turn, an increasingly unstable supply of food. Tropical regions can experience up to three months of heat waves per year (Schleussner et al 2016).

Extreme events

At 2°C warming, displacement associated with extreme events is expected to remain high, however, migration changes dramatically. For many people, displacement is likely to shift to permanent migration, as options of returning and making a living in the places people come from run out (IPCC WGII, Table 12-4).

Trapped populations are now even more vulnerable to changes in the environment because they do not have the chance to relocate (SBSTA and SBI 2015). Megacities come under increasing pressure, as extreme weather events pose risks for human health, housing, and infrastructure. Displacement is likely to be significantly higher than the 40 million currently at risk.

Slow onset events, including sea level rise

From a 50 cm sea level rise (Schleussner et al 2016), without any adaptation efforts, 72 million people could be forced to flee their homes over the century, 53 million of them from Asia (Nicholls et al, 2010). Whilst adaptation could reduce displacement, it would be expensive, costing US§ 25 billion at 1995 value. Small islands, Africa, and Asia are the most vulnerable, with high and growing exposure and low adaptive capacity. In these regions, adaptation is most likely not to occur or to fail (Nicholls et al). Strauss et al (2015) calculate that long term (beyond 2100) sea level rise would be approximately 4.7 m and inundate land currently occupied by 280 million people. Coral reefs would all but disappear, as would the protection they afford coastal communities and the fishing resources that rely on them (Schleussner et al 2016).

Violent conflict

A 2°C temperature rise will result in a significant increase in the risk of violent conflict in communities that are dependent on deteriorating natural resources, such as agriculture and pastoralism. The IPCC estimates show the risk roughly doubling from present day to 2°C (IPCC WGII, Table 12-4). This will force people to migrate from unsafe areas to safer areas, which in turn will face increasing pressure. It seems very likely that this will lead to migration beyond national boundaries and widespread instability.

These are the changes we could see in four regions of the world as a result of climate change

AFRICA

If the world carries on with the current level of adaptation, the continent will remain in high or very high risk of experiencing severe impacts, such as extreme heats, drought, sea level rise, water availability, crop production, fishery stocks, and food security. There is likely risk of extreme drought in Southern Africa and severe drought in Central Africa (and uncertain projections of increased drought in West Africa), with hyper-arid and arid regions growing by 3 percent. East Africa may receive 10 percent more rain, but projections for this region are uncertain (World Bank 2013). In Sub-Saharan Africa, a 5 percent change in rainfall has been estimated to increase the likelihood of conflict in the following year by 50 percent (Miguel et al 2004).

Sea level rise and extreme weather events are projected to disrupt transport systems, production systems, infrastructure, and public services (water, education, health, and sanitation). In Africa, the number of people living in floodplains of urban areas may rise from 2 million in 2000 to 26-36 million by 2060 (Foresight 2011). At that point, sea level rise is expected to be approaching 0.5 m and is projected to be 0.7 m by 2080-2100 (World Bank 2013), putting many more people in harm's way and potentially forcing them to leave their homes.

At 2°C warming, adaptation options are available, although they will require significantly more funding than currently planned and, even with all adaptation options available, adopted risks will stay at the top end, or above, risks faced today (IPCC WGII Ch. 22 2013).

MIDDLE EAST AND NORTH AFRICA

The Middle East and North Africa will experience extreme temperatures. Heat waves are projected to occur ten times more often than they do now, and the duration of heat waves will prolong dramatically. Between 1986 and 2005, it was very hot for an average period of about 16 days; by 2050, it will be unusually hot for 80 days per year. By 2100, up to 118 days could be unusually hot (Science Daily 2016).

In the summer of 2050, temperatures in some areas will not fall below 30°C at night, and during daytime, they are projected to rise to 46°C. By 2100, midday temperatures on hot days could climb to 50°C. In Mecca, for example, annual maximum temperatures may approach and exceed 55°C (Pal & Eltahir 2016). These are temperatures in which humans cannot survive for extended periods and that will have a significant impact on food security in the region. In addition, sand storms are projected to increase. They have already increased 70 percent since the beginning of the century; Iraq will go from 120 to 300 sand storms a year. Overall, the region will become extremely difficult to live in.

ASIA

South East Asian populations living in deltas are expected to be the most severely affected by rising sea levels and storm surges (Marks 2011; Warner 2010; World Bank 2010b). At 2°C warming, the projected sea level rise in Asia is 60-85 cm by 2080-2100. In Vietnam alone, if the sea level rises up to 1 m (in the longer term), close to five million people may be displaced due to permanent flooding and other climate change-related impacts that result in the flooding of deltas and the coast (World Bank 2013, p95).

Across the continent, flooding in deltas, along the coasts, and in urban areas is highly likely to lead to widespread damage to infrastructure, agriculture, fisheries, and living areas and moderately likely to cause increased deaths, injuries, and diseases. All of which will leave millions without a home and income and with no other option than to migrate.
In South Asia, at above 1.8-2°C of warming, crop yields for rice and wheat (the two most important crops) are expected to decline. Below this level of warming, the increased temperature may be able to be offset by the benefits of CO2 fertilization (but effects of CO2 fertilization are highly uncertain). Assuming CO2 fertilization stays at current levels, a

significant (about one-third) decline in per capita South Asian crop production is projected, which would mean significant imports of food would be necessary, perhaps costing around US$ 15 billion per year in 2050. Bangladesh would be particularly affected (World Bank 2013). In a 2°C world, where other regions are also facing food shortages, such imports have the potential to be a source of tension and conflict.

THE PACIFIC

There are several future risks to the countries in the Pacific under a 2°C scenario. It is expected that sea level rise and increasingly severe storms will cause some islands to become unviable, as many Pacific islands are low-lying. At 2°C warming, prolonged periods of drought, from increasingly severe El Niños, are expected across the Pacific (ESCAP, ILO, UNDP 2014).

The pressure to migrate is likely to be high; at least 350,000 people are at risk of being displaced from the atoll countries of Kiribati, the Marshall Islands, and Tuvalu and populated atolls in the Federated States of Micronesia, Palau, Papua New Guinea, Solomon Islands, and Tonga (ESCAP, ILO, UNDP 2014). While other Pacific island destinations may be the best option for resettlement, these islands will be facing their own climate change pressures. It is therefore likely that many migrants will seek to join the existing diaspora communities in Australia, New Zealand, and the United States (ESCAP, ILO, UNDP 2014).

/Photo: ©www.climatevisuals.org/

In 2015, some small Pacific Islands had roughly half their population displaced by cyclones.

3°C WARMING – CATASTROPHIC CLIMATE CHANGE FORCES PEOPLE TO FLEE

3°C WARMING – CATASTROPHIC CLIMATE CHANGE FORCES PEOPLE TO FLEE

Key messages

- 3°C is the level of warming we are heading for with current pledges of action from governments;
- At 3°C of warming, climate change impacts will be catastrophic to human societies and, as a result, migration and displacement impacts will be truly dramatic;
- Domestic and near-country migration will likely lead to climate-induced insecurity and conflict, thus increasing and fueling tension. Many parts of the world will enter permanent crises;
- Adaptation costs will outstrip willingness and capacity to pay, and loss and damage will mount.

3°C is the level of warming that we are heading for with the current pledges from governments.[26]

At this level of warming, limits to adaptation are exceeded in relation to urban water supply systems, heat-sensitive people, productivity, food security, and the loss of cultural identity. In particular, it is unlikely that adaptation will be sufficient to prevent conflict over land and to prevent significant numbers of people from being displaced (Tschakert in SBSTA and SBI 2015).

At 3°C warming, developing countries could face adaptation costs of US§ 790 billlion per year and loss and damage costs of US§ 1.7 trillion per year, by 2050 (Oxfam 2015). We can expect that developed countries will face even higher costs than this for their own adaptation.[27] It seems very likely that the modest amount of global solidarity that exists to fund adaptation costs in poor countries will diminish in the face of such significant costs at home. If so, this would exacerbate inequality and impacts on poor people.

At 3°C warming, Strauss et al (2015) calculate that long-term (beyond 2100) sea level rise would be approximately 6.4 m and inundate land currently occupied by 432 million people.

These are the changes we could see in four regions of the world as a result of climate change

MIDDLE EAST AND NORTH AFRICA

At 3°C global warming, regional warming in the summer is expected to be 4.5°C above pre-industrial levels. 75 percent of land is likely to be affected by what is now highly unusual heat. Riyadh in Saudi Arabia will go from having 3 days of heat waves to 157 days, Beirut to 126 days, and Tehran to 122 days. The increase in heat waves poses a significant risk to health (World Bank 2014).

Drought, water shortages, and desertification are expected to increase. There will be approximately 1.5 months per year with moderate drought across the region. Water availability and runoff are expected to reduce by more than 15 percent in parts of the region, and the Maghreb is likely to experience up to 50 percent reduced runoff. Hyper-arid or arid areas to increase to approximately 85 percent of total land. Higher risk of desertification will occur in North Africa and the Western Mashrek. The region could see up to 57 percent reductions in crop yields (World Bank 2014).

Beyond 3°C of warming, there could be a loss of 25 percent of the Nile Delta's land area. It has been estimated that at over 3°C of warming, 4.6 million people will be flooded each year in the Middle East by 2100, including nearly 2 million people in Egypt and 1.8 million people in Morocco (World Bank 2014).[28]

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26 Current pledges will result in warming of 2.6–3.1 °C Celsius by 2100 (Rogelj et al 2016).

27 Previous estimates from UNFCCC have shown developed country cost of adaptation between 100 and 150 percent of developing country cost (Fankhauser 2009).

28 Algeria: damages of US$ 6.5 bn and 435,000 people flooded each year; Djibouti: damages of US$ 232 m and 85,000 people flooded each year; Egypt: damages of US$ 6.5 bn and nearly 2 million people flooded each year; Libya: US$ 1.8 bn damages and 39,000 people flooded each year; Morocco: US$ 5.5 bn damages and 1.8 million people flooded each year; Tunisia: US$ 3.5 bn damages and 260,000 people flooded each year.

Increasing water scarcity, drought, desertification, and soil degradation will drive deteriorating rural livelihoods and are likely to force people from their homes. Additionally, sea levels will rise, particularly affecting urban areas and cities where people might otherwise relocate in search of jobs and enough food. Hence, climate change could act as a threat multiplier in the region by placing additional pressure on already scarce resources and reinforcing pre-existing threats, such as political instability, poverty, and unemployment. This can create the conditions for social uprising and violent conflict. Due to food imports and international migration, the Middle East and North Africa are vulnerable to climate change impacts in other parts of the continent and the world (World Bank 2014).

AFRICA

As warming approaches 3°C, large areas of Sub-Saharan Africa are projected to experience locally unprecedented growing season temperatures. Around 70 percent of land is projected to suffer from unusual heat extremes, and 35 percent of land from heat extremes that are currently unknown in the region (World Bank 2013).

At 3°C warming, most areas of Africa are expected to become more arid, particularly Southern Africa, which is likely to be in a permanent state of severe to extreme drought. Additionally, Central Africa is projected to be in a permanent state of severe drought. At 3.5°C, Southern Africa and most of West Africa is expected to experience reductions of up to 50 percent in water available for agriculture. East Africa, Angola, the Democratic Republic of Congo, and most of West Africa, are expected to become water scarce (World Bank 2013). It is likely that significant amounts of arable land will turn to desert.

3°C of warming will make it very hard to grow crops in Africa, with a projected 90 percent reduction in areas suitable for maize, millet and sorghum. If warming is within 3-4°C, there are indications that yields may decrease by around 15-20 percent across all crops and regions of Sub-Saharan Africa. This will mean many people from this region are forced to flee their homes to find jobs and seek food availability (World Bank 2013).

By 2080-2100, sea level rise is projected to be 0.9 m above current levels (World Bank 2013). A sea level rise of 64 cm by 2100 would see close to 11 million people flooded every year (World Bank 2013). Sea level rise of 0.7 m would cause damages to port infrastructure in Dar es Salaam, Tanzania – a hub for international trade that serves several neighboring countries – exposing assets of US$ 10 billion or more than 10 percent of the city's GDP (World Bank 2013).

The triggers for conflict will increase. Dwindling resources, unequal access to resources, increasing inequalities, and increasing poverty and malnutrition have all been shown to increase the risk of conflict and are all expected to be high under a 3°C scenario. Poverty has been projected to increase by 30 percent (World Bank 2013). It is difficult to imagine a 3°C world that does not result in significantly increased conflict in Africa that could spill over into other regions.

By 2050, 200 million people may be permanently displaced due to desertification in Sub-Saharan Africa (UNCCD 2014) and floods and rising sea levels may displace more (IPCC WGII 2014, Table 22-6). This increased migration is likely to lead to human suffering, human rights violations, political instability, and conflict (IPCC WGII 2014, Table 22-6).

SOUTH EAST ASIA

The frequency of strongest category 5 cyclones is projected to increase, with mean maximum surface wind speed increases of 7–18 percent. As sea-surface temperatures rise, tropical cyclone-related rainfall is expected to increase by up to a third, indicating a higher level of flood risk in low-lying and coastal regions. Storm surges associated with tropical cyclones can temporarily raise sea levels by 3-10 meters (World Bank 2013).

At 3°C warming, climate change is projected to cause sea level rise of 0.9 m above present levels by 2080-2100. Land subsidence is likely to add to this, where the weight of cities and drainage and groundwater extraction increase the threat of coastal flooding. Extreme rainfall events and sea level rise is projected to inundate 70 percent of Bangkok (World Bank 2013). Additionally, other countries, such as Vietnam, Myanmar, Thailand, and the Philippines face land loss and possible displacement. The total projected population exposed to sea level rise and increased storm occurrence in South East Asia is 5-22 million (World Bank 2013).

Unusual heat extremes in summer will cover 85 percent of land, and heat extremes, that are currently unprecedented, are projected to cover more than 70 percent. The number of consecutive dry days (droughts) and extreme rainfall periods are both expected to increase. These impacts, combined with sea level rise, place rice harvests at risk. The Mekong River Delta produces about 50 percent of Vietnam's rice. Without adaptation, rice production could decline by roughly 2.6 million tons per year. Rice yield is expected to decline from 6-12 percent in the Mekong River Delta. By 2050, the range for other crops is expected to decrease by 3-26 percent (World Bank 2013).

The projected degradation and loss of coral reefs, decreased fish availability, and pressure on other near-coastal rural production due to sea level rise, within the next few decades, are likely to lead to diminishing livelihoods in coastal and deltaic areas. Additionally, increased migration to urban areas has started to occur. Urban migration may result in more urban dwellers being exposed to climate impacts in the cities of South East Asia, especially new arrivals who are likely to crowd into existing and densely populated informal settlements.

The effects of heat extremes are particularly pronounced in urban areas due to the urban heat island effect; this could result in high human mortality and morbidity rates in cities. These risks are particularly acute, as in the Philippines and Vietnam, where almost 40 percent of the population lives in informal settlements with temporary housing and lack of infrastructure services, and where health threats can be exacerbated quickly due to a lack of and/or damage to sanitation and water facilities. The high population density in such areas compounds these risks.

SOUTH ASIA

South Asia is a hotspot for both population growth and future international migration as a consequence of demographic changes, poverty, and the impacts of climate change. Bangladesh is particularly at risk from extreme river floods, more intense tropical cyclones, rising sea levels and extraordinary temperatures.

At 3°C of warming, South Asia will face severe flooding from an increase in monsoonal rains and sea level rise of 85 cm, by 2080-2100. The high flow of the Indus River could increase by 78 percent and the Ganges by 20 percent. Mumbai has the largest population exposed to coastal flooding in the world; projections indicate a doubling of the likelihood of extreme flooding and a tripling in direct economic costs, without adaptation (and without taking into account sea level rise). The flooded area in Bangladesh could increase by as much as 29 percent at a 2.5°C increase in warming. A sea level rise of one meter is expected to affect 13 million people in Bangladesh, with an additional 4 million people in the surrounding region likely to be affected.

Yet, in dry months, water stress will be aggravated. Drought is projected to increase over Northwestern India, Pakistan, and Afghanistan. Water availability is very likely to decrease as population increases by more than 10 percent per capita across the region; some projections show a decline of up to 37 percent in an already highly water stressed region. Afghanistan could see a decrease in water availability of 50-70 percent. By 2050, water availability in Pakistan and Nepal is projected to be too low for self-sufficiency in food production.

Crop yields, for all crops, are forecasted to decrease if the temperature rises above 2.5°C; particularly, rice crops in Pakistan, dry season crops in Bangladesh, and crops in the Indian States of West Bengal, Bihar, Jharkhand, Orissa, Tamil Nadu, Kerala, and Karnataka.[29] At a temperature increase of 2-2.5°C it is estimated that, by the 2050's, reduced water availability for agricultural production may result in more than 63 million people being unable to meet their caloric demand, other than by importing food. This leaves the region's large population of poor people more vulnerable to food price shocks, and in entrenched poverty.

It is likely that the risk of conflicts over water resources in South Asia will increase; countries potentially involved include India, Bangladesh, Nepal, China, and Afghanistan.

Unusual heat extremes are expected to cover more than 50 percent of land, and unprecedented heat extremes to cover 20 percent. Heat stress is projected to cause a very substantial increase in deaths (World Bank 2013).

29 *If the CO_2 fertilization effect does not occur, and it is highly uncertain, then significant losses occur before 2°C.*

4°C WARMING – BEYOND ADAPTATION INTO MASS MIGRATION

4°C WARMING – BEYOND ADAPTATION INTO MASS MIGRATION

Key messages

- 4°C warming could result if countries backslide on their current pledges for climate action;
- In the 4°C scenario, most of the world's population would be negatively affected;
- Adaptation options will be very costly and, largely, require relocation.

The migration-focused Nansen Initiative concludes: "In the event of a 4°C warming, not only is it likely that climate-induced population movements will be more considerable, but also their patterns could be significantly different, as people might react differently to temperature changes that would represent a threat to their very survival" (Nansen Initiative 2016).

At 4°C warming, more than 80 percent of the world's population is likely to be affected by impacts occurring simultaneously in multiple sectors. Furthermore, these cascading impacts will likely not be confined to one region; rather, they are expected to have far-reaching repercussions across the globe. No region is immune to the impacts of climate change at 4°C (World Bank 2013). There are limited prospects for adaptation to reduce risk, including risk of conflict over land and displacement (SBSTA and SBI 2015).

Risks of food insecurity (in Africa and Asia) and malnutrition (in Africa and Central and South Asia) will be high and very high, respectively. Crop losses, including in South Asia, East Africa, and Latin America of between 20 to 56 percent, would have a devastating local effect, and a dramatic effect on global food prices (Vermeulen, in SBSTA and SBI 2015; World Bank 2013). Additionally, fisheries catch potential would be much lower (SBSTA and SBI 2015) and water availability is projected to be reduced by 50 percent (World Bank 2014).

By 2100, due to climate change and development patterns, and without adaptation, hundreds of millions of people will be affected by coastal flooding and displaced due to land loss, including in East, Southeast, and South Asia (Sedpart in SBSTA and SBI 2015). Long-term sea level rise (beyond 2100) is projected to affect the land currently occupied by 627 million people (Strauss et al 2013). Risks from hurricanes and floods are projected to increase, and will drive migration (SBSTA and SBI 2015).

Poor people will be particularly affected; 4°C will go beyond their limits of adaptation. Risks to those living in drylands are particularly high, with limited or no option to adapt at this level of warming. At 4°C, storms, floods, and rising sea levels will lead to destruction and deterioration of homes, land and infrastructure, health, social networks, sense of belonging, identity, and other cultural elements. Adaptation options will, to a large degree, be limited to relocation, putting extreme pressure on receiving areas and countries. Declining agricultural yields, primarily in already hot climates, will critically affect countries and communities that are highly dependent on agriculture. Adaptation in agriculture is severely limited to impossible in certain areas in a 4°C world. Poor and marginalized people are expected to be unable to compete with industries and other powerful users for access to water. All of which will contribute to shifts from transient to chronic poverty without massive injections of adaptation funding (IPCC, WGII, Table 13-2).

CONCLUSION

The further the escalation of climate change, the more people are forced to flee their homes. Key risks at higher levels of warming are: threats to food security in Africa; large parts of the Middle East and North Africa becoming so hot as to be uninhabitable; water tensions in South Asia over shared rivers resources and people displaced by rising sea levels; extreme storms displacing increasing numbers of people in South East Asia, who will be forced to move permanently; and low-lying island nations ceasing to exist. It seems very unlikely that the world is ready to cope with all of these stressors happening simultaneously, as is expected at 3°C and 4°C of warming. More impacts will lead to more internal displacement and migration, likely leading to conflict over resources. This in turn results in more suffering, more displacement that is international and migration, and potentially more conflict.

This report has documented how climate change amplifies other drivers of migration and displacement and serves as justification for greatly increased support to adaptation to climate change. Adaptation is meant to avoid, or at least mitigate the human, social, cultural, and economic losses and damage stemming from forced displacement by climate change. Our common humanity, and shared future, demand that we act swiftly and justly and that we invest in long-term solutions that avert climate change migration and displacement.

If we want to prevent the potential chaos that could unfold then we need to reduce emissions, invest in resilience and adaptation, address inequality, and improve our approach to migrants. Developed countries, in particular, need to step up in order to protect poor people around the world, and to protect all of us from a too hot planet with tensions boiling out of control.

Based on the findings in this report, CARE Danmark has formulated a set of recommendations designed to prevent or address the climate and migration challenges that we will face in the coming years.

CARE DANMARK'S RECOMMENDATIONS

CARE Danmark urges governments to address the root causes of displacement and forced migration. This includes stepping up efforts to manage and resolve conflicts, combat poverty and gender inequality, and provide timely and sufficient humanitarian assistance.

However, the important lesson from this report is that effectively addressing the root causes of migration and displacement also requires specific and determined actions towards tackling climate change, especially adaptation measures and finance. Based on the findings of this report, CARE Danmark has developed a number of recommendations, primarily for governments, on how to avoid going down the path of the 2°C and 3°C warming scenarios, thereby minimizing the human and economic costs of migration and displacement:

1 Enable poor people and countries to prepare for and adapt to climate change

Climate resilience is essential to keep the Sustainable Development Goals achievable and to keep climate change from wiping out all progress. Giving financial and technical support to communities in developing countries, for planning and implementing solutions that are appropriate to climate change impacts in their ecological, economic, and social contexts can make an enormous difference. Either people are able to stay at home and keep their livelihoods and communities intact or large numbers of people will be forced to flee from their homes, creating the circumstances for conflict and further displacement.

A key contribution from richer countries is technical and, in particular, financial support for countries most affected by climate impacts. Support to set up early-warning systems, improve the use of climate information services, and building capacity among vulnerable groups are central to the solution, along with tackling the underlying causes of marginalization and inequality, including gender inequality. Gender-equitable, pro-poor community-based adaptation is key. Therefore, **governments must:**

1.1 *Put in place a roadmap for rich countries to ensure that from 2020, at least USD 50 billions of adaptation finance is provided each year, of which a minimum of USD 35 billion must be grants, not loans;*

1.2 *Channel the majority of climate finance into funding mechanisms that give developed countries a voice in decision-making, such as the Green Climate Fund, the Adaptation Fund, and the Least Developed Countries Fund, and provide larger shares to civil society organisations that work with the poorest and most vulnerable segments of the population in developing countries;*

1.3 *Integrate climate change into the development-funding portfolio and into international finance institutions such as the Green Climate Fund, the World Bank, etc. This integration should support the use of gender-responsive climate vulnerability and capacity analyses and promote (or prioritize) gender-transformative adaptation approaches;*

1.4 *Use quality standards and principles for good adaptation practice to guide investments to where they have the most benefit, such as community-based adaptation, and to avoid so-called maladaption that increases the vulnerability of the poorest and most vulnerable populations by choosing short-sighted, or otherwise wrong adaptation solutions;*

1.5 *Provide political, financial, and technical support to governments in implementing disaster risk reduction measures in line with the Sendai Framework on Disaster Risk Reduction while placing communities and gender equality at the centre;*

1.6 *Developing countries (with adequate financial and technical support) should apply gender-equitable participatory approaches to all relevant planning instruments, including Nationally Determined Contributions, National Adaptation Plans, and plans in highly climate-sensitive development sectors, such as agriculture. Such approaches should be implemented to ensure respect for the human rights of those most at risk and to avoid actions, which may cause dis*placement or undermine sustainable development.

2 Address climate-induced displacement in the context of loss and damage from climate changeimpacts

The UNFCCC Warsaw International Mechanism for Loss and Damage is set to become the key instrument in international cooperation to address loss and damage where adaptation efforts are insufficient. At the Paris climate summit, all governments agreed to set up a Task Force on Climate Change Displacement under the Warsaw Mechanism, which is tasked to determine recommendations in the next two years. **Governments, in particular from developed countries, must:**

2.1. Provide political and financial support to the work of the Warsaw International Mechanism for Loss and Damage in general, and the Task Force on Climate Change Displacement specifically, in addressing capacity, regulatory, financial, and coordination gaps related to different types of climate-induced displacement;

2.2 Promote and invest in local and national level capacity and mechanisms to understand, assess, and respond to loss and damage in a pro-poor manner, including potential approaches to com pensate affected communities and countries as part of comprehensive risk management strategies;

2.3 Acknowledge that loss and damage will require finance over and above the current commitment to the USD 100 billion in climate finance, and that funding sources must reflect the underlying responsibilities for causing the problem of climate change;

2.4 Proactively establish a working group on new sources of finance for loss and damage (and adaptation) that include options such as a global levy on the fossil fuel industry;

2.5 Strengthen linkages with other international migration and displacement mechanisms, such as the UNISDR etc., at the international and local level.

3 Keep global warming below 1.5°C

Serious action required to meet this limit must start now. All countries must increase and meet emission reduction targets and phase out fossil fuels, especially coal. Rich, developed countries must provide leadership at home and climate finance abroad so that poor countries can take mitigation action. The rapid transitions, that we need to initiate immediately in order for them to be effective, also have the potential to provide multiple development benefits from avoided climate change impacts, better health, and economic opportunities. **Governments, with a lead role from developed and other similarly capable, historically and currently responsible countries, must:**

3.1 Revisit their climate action contributions and immediately reduce emissions towards globally almost zero before 2050, to be in line with 1.5°C pathway, while avoiding or minimising any reliance on potentially harmful negative emission technologies;

3.2 Put in place a target, regulations, and investments to phase out fossil fuel use in electricity and transport by 2040 ,at the latest, by employing renewable energy and energy efficiency opportunities, including managing a just transition of the workforce from polluting industries;

3.3 Developing countries should take lead on rapid and just transition processes to low-emission economies with adequate financial and technical support from developed countries;

3.4 Insure investments are pro-poor, climate resilient and not maladaptive and that they adhere to the Paris Agreement preambular principles, in particular to human rights, food security, and gender equality.

4 Rethink and rebuild systems for refugees, migrants, and displaced people

When people are forced to leave their home and community, it is essential that they have rights and that those rights are protected. The current protection and migration system is dysfunctional and in need of revision. Those who are trapped because they lack the resources to leave are often in need of significant support. **Governments must:**

4.1 As a starting point, women must be recognized as agents of change, having their rights to organize supported, and be allowed participation in decision-making processes at all levels, in accordance with SDG goal 5;

4.2 Allocate timely and adequate needs-based assistance to internally displaced persons and those displaced to neighbouring countries, and support local communities in host countries, with specific attention to social cohesion, gender equality, and livelihoods;

4.3 Clarify the legal status of climate-related displacement, recognizing that current UN refugee conventions do not offer any protection to those displaced by climate change;

4.4 As part of the above, actively support and work towards implementing the Protection Agenda developed by the Nansen Initiative, at home and abroad;

4.5 Develop targeted approaches to "migration in dignity" for climate-displaced people, both in the context of the Warsaw Mechanism displacement task force and the UN negotiations on a global compact for safe, orderly, and regular migration, to be concluded in 2018.

GLOSSARY

Adaptation refers to adjustments in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts. It refers to changes in processes, practices, and structures to moderate potential damages or to benefit from opportunities associated with climate change (UNFCCC).

El Niño is a weather pattern of unusually warm water stretching across the surface of the Pacific Ocean. The relationship between winds and ocean currents changes and modifies weather conditions around the world. Key outcomes are reduced rainfall and drought. La Niña often follows El Niño and brings extreme weather to the same regions which have already been badly affected by El Niño. It is usually associated with above average rainfall. It can reduce water deficits, but can also result in flooding in some areas.

Human mobility
i) Displacement - understood as the primarily forced movement of persons;
ii) Migration - primarily voluntary movement of persons; and
iii) Planned relocation - planned process of settling persons or groups of persons to a new location (WIM ExCom 2016a).

Loss and damage: The adverse effects of climate variability and climate change that occur despite global mitigation and local adaptation efforts. It can be broken down into economic and non-economic losses. Non-economic losses include human life, meaningful places, cultural artefacts, biodiversity, ecosystem services, communal sites, production sites, intrinsic values, identity and agency (WIM ExCom 2016a).

METHODOLOGY

This report was drafted by an external consultant commissioned by CARE Danmark and edited by CARE Danmark staff. The consultant was asked to review and extract information from various studies, "grey literature" reports and scientific articles (see bibliography) that illustrate the effects of climate change on existing and projected migration and displacement patterns.

As it turned out, there was a very large number of relevant studies available. We cannot rule out that important studies have been overlooked by this analysis. It also became apparent that few, if any, studies have attempted to synthesize scattered findings into a coherent analysis of the linkages between migration and climate change. This study does not claim to make up for this lack. Instead, it seeks to structure information in three main warming scenarios, all within reference to a geographical focus on selected developing country regions.

Much of the debate about climate-displaced people tends to focus on the elusive number of people who will be displaced in, for instance, 2050. There are numerous methodological pitfalls and caveats related to using this number, some of which we discuss in the report. It became apparent that most sources cite the same model study dating back to 1993. Although it has since been updated (in 2002), there seems to be a need for fresh calculations to be made based on knowledge that is more recent.

Throughout the report, we cite topical and regionally focused studies. Studies and reports are based on different assumptions, methods, and timelines. These, and other differences, imply that the studies are not always comparable and complementary. Caution is therefore required when piecing these results together, as we have attempted in this report. In most cases, the numbers and effects presented cannot be accumulated across the studies.

Despite such methodological limitations, we hope that this compilation of information on the climate-migration nexus will be useful to readers and may inspire action that is based on the overwhelming evidence.

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