BEYOND BORDERS

Our changing climate – its role in conflict and displacement

A report produced by the Environmental Justice Foundation

ENVIRONMENTAL JUSTICE FOUNDATION

Protecting People and Planet

ENVIRONMENTAL JUSTICE FOUNDATION

The Environmental Justice Foundation (EJF)
is a UK-based organisation working internationally to address threats to environmental security and their associated human rights abuses.
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Syrian Arab Republic, 2016

OUR MISSION

To Protect People and Planet

EJF believes environmental security is a human right.

EJF strives to:

- Protect the natural environment and the people and wildlife that depend upon it by linking environmental security, human rights and social need
- Create and implement solutions where they are needed most – training local people and communities who are directly affected to investigate, expose and combat environmental degradation and associated human rights abuses
- Provide training in the latest video technologies, research and advocacy skills to document both the problems and solutions, working through the media to create public and political platforms for constructive change
- Raise international awareness of the issues our partners are working locally to resolve.

Climate Campaign

Climate change is an environmental and a human rights issue. EJF views climate change as a primary threat to world peace and security, development and human rights in the 21st century.

EJF's Climate Campaign works to secure international awareness and protection for climate refugees: those who have done the least to contribute to climate change, but who are first and worst affected.
We believe in climate justice in a warming world.

Our vision is for zero emissions, and fair treatment and support for those affected by irreversible climate change.

As an organisation, EJF strives to be carbon neutral through innovative investments in natural woodland and renewable energy.

Contents

Abbreviations

CCEI Climate Change Exposure Index
FAO United Nations Food and Agriculture Organization
GHG Greenhouse gas – carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) and fluorinated gases
GISS NASA's Goddard Institute for Space Studies
IFAD UN International Fund for Agricultural Development
IFPRI International Food Policy Research Institute
IFRC International Federation of Red Cross and Red Crescent Societies
IPCC Intergovernmental Panel on Climate Change
MDG's Millennium Development Goals
NOAA National Oceanic and Atmospheric Administration
ppm parts per million
UNEP United Nations Environment Programme
UNHCR United Nations High Commissioner for Refugees
UNISDR United Nations Office for Disaster Risk Reduction
WFP United Nations World Food Programme
WMO World Meteorological Organization

Foreword

I see a clear and present danger. Our climate is changing and it will harm us all.

From the imagery of climate change, you might be mistaken for thinking it is all about polar bears. It is so much more: it is about all life on our planet and a threat to humanity as great or greater than geopolitical conflict or terrorism. Climate change has the potential to not only undo post-war advances promoting basic human rights and development: it is increasingly viewed as a threat to peace within and between vulnerable nations and regions.

> *... wait 20 years and see what happens when climate change drives people out of Africa, the Sahel especially, and we are talking now not just one or two million, but 10 or 20 [million], and they are not going to South Africa, they are going across the Mediterranean.*

Brigadier General Stephen A. Cheney,
United States Marine Corps (Ret.), 2017

As I write this, levels of carbon dioxide in our global atmosphere have just exceeded 410 parts per million (ppm) for the first time in human history, they haven't reached this level for millions of years. Scientists predicted that this would happen, and it has. The consequences are reflected in recent temperatures across our planet: June 2017 was the 390th consecutive month with temperatures above the 20th century average; and March 2017 experienced the second highest (March) temperature since global records began in 1880.

What this means for our global community is profound: climate change will exacerbate extreme poverty, food insecurity and inequitable access to natural resources including freshwater. It is compounding existing economic, social, political, and ecological stresses and building vulnerability amongst some of the poorest communities on our planet. Advances in combatting food and water insecurity, poverty, inequality and toward promoting environmental sustainability, healthcare, education and peace all stand to be undermined as our world heats up, extreme weather events proliferate and magnify, sea levels rise and our oceans acidify; as humanity finds itself inundated by too much water and damned by too little.

Rich nations, poor nations, all nations

Rising temperatures and changing rainfall patterns will intensify competition for resources, food and water. Rising sea levels and extreme weather events will displace ever greater numbers of people. Sea levels are set to further rise by 28-98 cm by 2100, something that will have devastating effects.

In Bangladesh tens of millions of people live at sea level and will be forced to move as their land is inundated with salt water. In Indonesia, around 300 million people live in close proximity to the coast and are vulnerable to sea level rise. Some island nations such as Tuvalu, the Maldives and Vanuatu are set to disappear altogether. Entire nations forced to flee.

Across the world this will be repeated in low-lying areas. While the poorest and most vulnerable will be among the worst impacted, in the world's wealthiest nations, communities will also be driven from their homes. In the USA, those in New Orleans, in parts of Florida, and in areas of the East Coast will all be hit as sea levels rise. In February 2017, former US National Security Advisor Richard Clarke said that climate change is the greatest single risk to California and to the entire United States.

The strength and frequency of hurricanes and storms will increase dramatically. This has already been seen with hurricanes Harvey and Irma, which hit the United States and a number of Caribbean islands with devastating impacts in August and September 2017. This gives us an unwanted glimpse into the future. This is not at some distant time in an unimaginable future, it will occur within the lifetime of our children.

Forced to move

As infrastructure and even the foundations for livelihoods diminish, the risk of conflict will surge, threatening far wider instability and embroiling nations in conflict, driving internal strife among their own and externally, as communities are forced to seek new resources to feed and nourish themselves.

This report looks at the impact of climate change on food production and security, and the ways in which people are driven from their homes and lands by slow-onset weather events.

Since 2008, weather-related hazards – which are magnifying and multiplying as a result of climate change – displaced an average of 21.7 million people each year, equivalent to 59,600 people every day or 41 people every minute. Millions more were forced to leave their homes due to prolonged droughts and their devastating impacts.

Climate justice & enlightened self-interest

95% of this human displacement has occurred in developing countries. Around 99% of all deaths from weather-related disasters have also occurred in these countries. The scale of these impacts all too often remains hidden and ignored. Consider what happened when on 2 May 2008 Cyclone Nargis struck Myanmar: at least 138,000 people lost their lives. Just one township, Labutta, reported around 80,000 dead. Imagine for a moment the reaction and horror in London, Washington, Berlin or Paris had this been a European or American catastrophe. And now we must consider that the world's least developed countries have produced only a fraction of the global greenhouse gas

emissions – those who are least to blame are those who will be affected worst. As the devastating impacts of climate change take hold, this will be the reality for millions more of our global poor, depriving them of their home, livelihood and community, and the identity that goes with them.

The developed world and the developing

However, they will not be alone. Climate change will also force migration in the world's developed nations, along with economic and social disruption, political discontent and increasing conflict. Remember the impact of just one extreme weather event – Hurricane Katrina – as it hit the world's wealthiest, most powerful nation, the United States: 800,000 people were made homeless; over 1,830 fatalities were recorded and federal disaster declarations covered 90,000 square miles (an area almost as large as the UK). What followed Katrina was perhaps the largest forced migration of people in American history. Texas took in 300,000 refugees; Houston 35,000, Chicago over 6,000. And initial cost estimates put damages at over US$81 billion.

This will be a problem affecting all communities, all countries and one that we are best able to solve working together, towards common goals and for collective benefit.

A climate of conflict

Mass displacement caused by climate change can bring disparate communities with different ethnicities, religious or other cultural beliefs and identities into contact, further driving the potential for conflict. Violence may follow, itself becoming a driver of migration. In Syria, some 1.3-1.5 million people were on the move from drought-stricken regions before a single gunshot was fired. This report looks at the prolonged drought that gave the context for the outbreak of Syria's bloody conflict that has now entered its seventh year. Whilst no-one would assert that climate change was the sole cause of conflict in Syria or elsewhere, it is increasingly viewed as a 'threat multiplier', increasing the likelihood of violent conflict arising from pre-existing and complex interactions between political, economic, religious and ethnic forces.

The challenge facing us is complex, and in a rapidly changing world, climate change and its potential to trigger both violent conflict and mass migration need to be considered as urgent priorities for policymakers and business leaders. Security analysts and military experts are already warning of increased conflicts if we continue on our current trajectory. This is not to militarize climate change, but to illustrate the gravity of the existential threat facing us all.

We need to protect vulnerable communities and climate refugees through new legal agreements and financial support. Alongside this, we must address the greenhouse gas emissions that are creating climate change so that, in line with the Paris Agreement, we are able to hold global temperature rise well below 2°C to pre-industrial levels, while building the ambition to keep it below 1.5°C.

This is a huge task, but it is not an impossible one: we must take responsibility for helping vulnerable communities adapt to the new reality and the changes that are taking place and that will deepen in the coming years. But crucially this report's concluding message is not about lost hope, it is about a renewal of our commitments to reduce greenhouse gas emissions in the future. Put simply, we must embrace the solutions to climate change - renewable energy and greater efficiencies - in the way our predecessors adapted to the Industrial Revolution and the economic and social developments that went alongside it. Enlightened self-interest can propel renewable energy forward, creating jobs and bringing massive economic benefits as society is weaned off our deadly 'carbon addiction'. We're already seeing this progress in the massive growth in clean energy across our planet. We can – and must - build resilience in societies and economies: our global security depends upon the effectiveness of such responses in the coming months and years.

Climate change will not wait and neither can we. There are no fences or walls that can defend individual nations against climate change. Climate change presents one of the most damning existential threats yet seen to our world, but, crucially, it is not too late to take action and neither is it yet impossible for such action to succeed.

It is in this context that we urgently need the development of a new legally binding, multilateral agreement to provide a framework for the necessary response to climate migration. We need this instrument to give definition and status to climate refugees; to define rights and obligations and to coordinate and combine our actions so that they are effective. **We cannot hope to deal with the wave of suffering and disruption as single nations; it will not work. We will all be better served, better prepared and better protected if we act together.**

Like others before me I am minded to quote the former UK Prime Minister and war-time leader Winston Churchill as the world entered another period of great threat and turmoil and use his words as our call to action today:

> *Owing to past neglect, in the face of the plainest of warnings, we have entered upon a period of danger... The era of procrastination, of half measures, of soothing and baffling expedience of delays, is coming to its close. In its place, we are entering a period of consequences... We cannot avoid this period; we are in it now.*

Winston Churchill, 12 November 1936

We must move from talk to action and we must do so today; for climate refugees, tomorrow will be too late.

Steve Trent
Executive Director, EJF

Executive summary

"A continually warming world will be a graveyard for entire ecosystems, entire peoples – and potentially even entire nations."
"There is a clear disconnect between the Paris Agreement's stated ambition to limit warming to less than two degrees and the commitments countries have made. That gap must be closed."
"The world cannot wait." [1]

Zeid Ra'ad Al Hussein
UN High Commissioner for Human Rights, 2016

- Each of the last three decades has been successively warmer than any preceding decade since 1850,[2] and in 2015 temperature rise exceeded 1.0°C, compared to pre-industrial times, for the first time.[3] These changes will have an escalating, negative impact on our environment, economies, livelihoods and security globally. These impacts will disproportionately affect the most vulnerable groups in society, and those who have contributed least to climate change will be first and worst affected by it.[4]
  If unchecked, some predict that climate change could draw up to 720 million people back into extreme poverty[5] and create millions or even billions of climate refugees.[6]
  A study published in 2013 suggested that the effects of climate change could precipitate as much as a 56% increase in the frequency of intergroup conflicts across the world.[7]

- Climate change can take the form of slow-onset environmental degradation, such as the melting of polar ice caps and rising sea levels, increased salinization of groundwater and soil, droughts and desertification from changed precipitation levels. It can also take the form of sudden-onset disasters including storms and floods, heatwaves and wildfires. The number of weather-related natural disasters has risen on all continents since 1980.[8] From 1970 to 2012 there were 8,835 disasters related to climate,[9] of which 3,496 took place between 2001 and 2010.[10] More than half of these were related to rainfall patterns; both floods and droughts are increasingly evident in many parts of the world.[11]

- Climate change is resulting in the destruction of livelihoods, infrastructure and communities and – without further action – is likely to force people to leave their homes and drive forced migration.[12] In 2016 extreme weather-related disasters displaced around 23.5 million people.[13] Since 2008, an average of 21.7 million people were displaced each year by such hazards.[14] This does not include the people forced to flee their homes as a consequence of slow-onset environmental degradation, such as droughts.

- EJF defines all these people as climate refugees: "persons or groups of persons who, for reasons of sudden or progressive climate-related change in the environment that adversely affects their lives or living conditions, are obliged to leave their habitual homes either temporarily or permanently, and who move either within their country or abroad."

- Rising temperatures and changing rainfall patterns will have widespread, large-scale negative impacts on food production and food security. Between 1985 and 2007, droughts drove a 13.7% loss in cereal production, compared to just 6.7% in losses between 1964 and 1984.[15] Drought is one of the key factors for agricultural failure and it is expected that the increase in intensity, frequency and duration of such droughts - all consequences of climate change - will bring about significant declines to crop yields.[16]

- Environmental change can be seen to drive conflicts over land or resources, which in turn can lead to the displacement of people.[17] Forced migration can be triggered by environmental conflicts, but forced migration due to the scarcity of food or extreme weather events can also in itself trigger conflicts.[18] The interaction between different social, economic and political variables – as well as environmental factors – are strong influencers of wars and armed conflicts in vulnerable countries.[19/20/21]

- This report includes a focus on impacts of changing weather patterns on food security, and how this helped fuel the Syrian war. The Syrian war, now in its seventh year, has resulted in more than 470,000 deaths[22] and 13.5 million people require humanitarian assistance.[23] 6.6 million people have been internally displaced[24] and nearly five million people are residing in camps in Turkey, Jordan and Lebanon[25] as well as an estimated 1.2 million seeking refuge in Europe.[26] Whilst the war was not solely a result of climate change, the intertwining effects of drought, rural to urban migration, and the increasing unrest due to a lack of government measures to avoid water scarcity, unemployment and growing inequality, corruption and political oppression are clear.

- EJF urges the international community to acknowledge the reality of climate change and take urgent action to limit the crippling effects on our global community. We note the imperative for greater consensus and support for vulnerable nations to increase their resilience to climate risks and adapt to their impact. We call for an international agreement that will clarify the rights and ensure the protection of climate refugees, with the immediate appointment of a United Nations Special Rapporteur to convene, initiate and guide preparatory discussions towards this end. Most important of all, is the need to end our 'carbon addiction' and meet our shared international commitment under the Paris Agreement, to cut greenhouse gas emissions and ensure that temperature rise is kept below 1.5°C on pre-industrial levels.

The confluence of risks around water scarcity, climate change, extreme weather events and involuntary migration remains a potent cocktail and a 'risk multiplier', especially in the world economy's more fragile environmental and political contexts.[27]

World Economic Forum, *Global Risks Report 2017*

Displaced Darfuris Farm in Rainy Season, Tawila, Sudan. UN Photo/Albert Gonzalez Farran

Climate change – evidence and impact

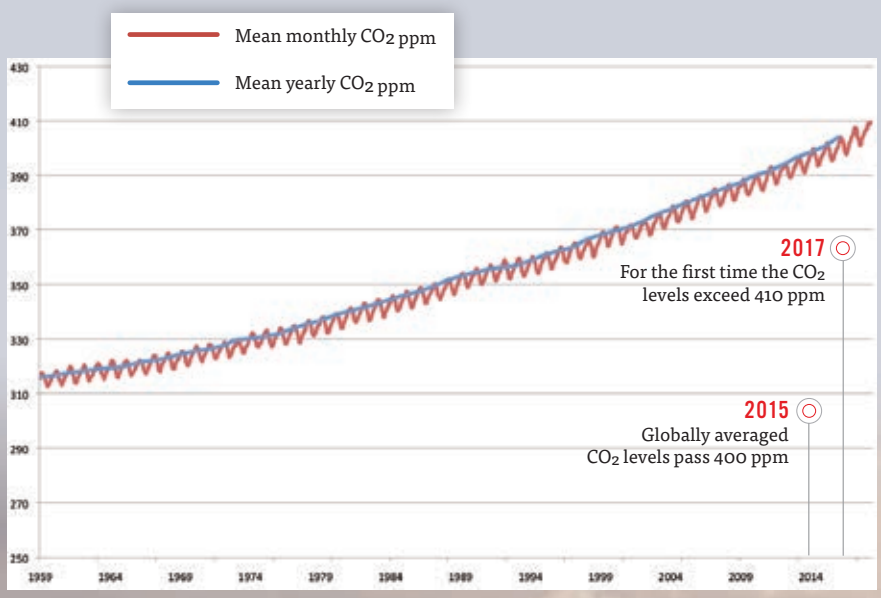
Global warming and the resulting climate change are scientific fact. There are no 'alternative' truths. The evidence is clear, specific and overwhelming, as is the global scientific consensus that represents this view.

In 2015, the US Government's National Oceanic and Atmospheric Association's (NOAA) Mauna Loa Observatory reported that annual CO_2 concentrations had increased by a record 3.1 parts per million (ppm), exceeding 400 ppm for the first time on record; by 2016, this had risen to 405.1 ppm.[28] This six ppm surge in CO_2 concentration between 2015 and 2017 was unprecedented in the observatory's history. By late April 2017, the observatory recorded its first-ever CO_2 reading in excess of 410 ppm.[29]

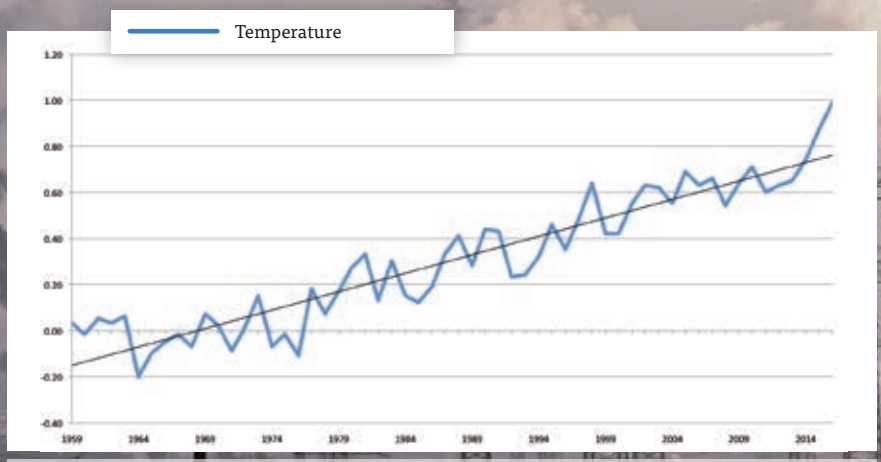
"Earth is warming at a pace unprecedented in 1,000 years."[30]
NASA, 2016

"The world just passed another round-numbered climate milestone. Scientists predicted it would happen this year and lo and behold, it has. On Tuesday (18 April), the Mauna Loa Observatory recorded its first-ever carbon dioxide reading in excess of 410 parts per million. Carbon dioxide hasn't reached that height in millions of years. It's a new atmosphere that humanity will have to contend with, one that's trapping more heat and causing the climate to change at a quickening rate."[31]
Scientific American, 2017

The correlation between increased CO_2 emissions and mean temperature 1959-2016



Data source: Mauna Loa Global Monitoring Division of NOAA's Earth System Research Laboratory



Data source: NASA's Goddard Institute for Space Studies (GISS)

The rate of CO_2 growth over the last decade is 100 to 200 times faster than what the Earth experienced during the transition from the last Ice Age. This is a real shock to the atmosphere.[32]

Pieter Tans, Lead Scientist, NOAA's Global Greenhouse Gas Reference Network, 2017

The Emissions Gap Report 2016 from the United Nations Environment Programme (UNEP) shows that even if countries deliver on the commitments – known as Nationally Determined Contributions (NDCs) – that they made in Paris, the world will still warm by 2.9°C to 3.4°C.[34]

The International Panel on Climate Change (IPCC) states that in order to keep global warming to within 2°C and limit the risk of dangerous climate change, the world will need to reduce emissions by between 40% and 70% by 2050, compared to 2010, and eliminate them altogether by 2100.[35]

What this means for our planet

As a direct result of these increased levels of GHG emissions, the Earth's average surface temperature is rising: 'global warming'. In each of the last three decades, the average surface temperature has been successively warmer than any preceding decade since 1850.[36] 2011-2015 was the hottest five-year period on record according to the World Meteorological Organization (WMO)[37], and global temperatures in 2016 were the warmest since official records began in 1880.[38]

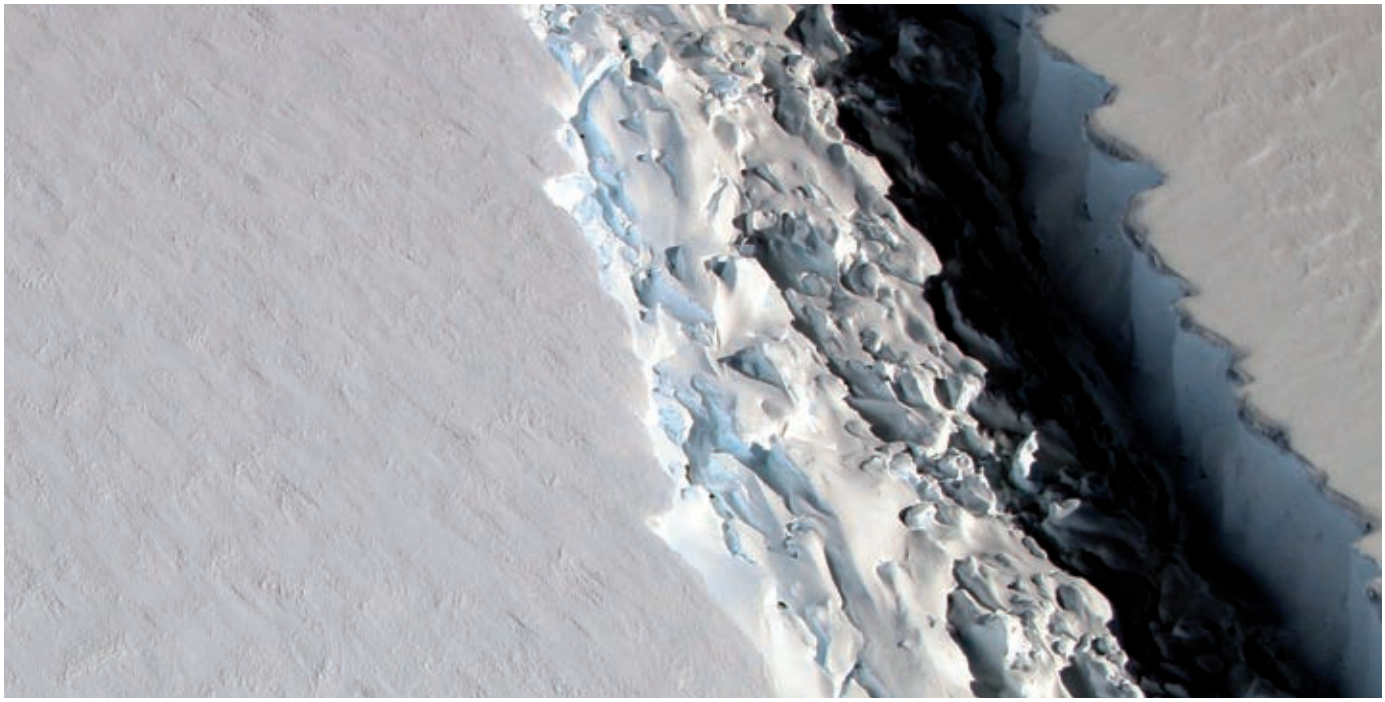
Earlier this year, June 2017 was the 390th consecutive month with temperatures above the 20th century average;[39] March 2017 experienced the second highest monthly temperature since global records began, behind the 2016 record by 0.18°C (0.32°F) and ahead of 2015 by 0.15°C (0.27°F).[40]

Changes in climate are interlinked globally.[41] Climate change is having a demonstrable and substantial impact on natural systems on all continents, and these impacts are escalating.

The most recent era in which the Earth was believed to have experienced temperatures of 3°C above pre-industrial levels was the Pliocene Epoch – around three million years ago.

"At that time, there was almost no ice anywhere. The sea level was 20 meters (65 feet) or so higher, and forests went to the edge of the Arctic Ocean where there is now tundra,"
"It takes a long time for those changes to manifest, but if we see 3°C... it pushes us in that direction," [33]

Gavin Schmidt, Director of NASA's Goddard Institute for Space Studies (GISS), 2015



Snapshot of the rift in the Larsen C on Nov. 10, 2016. An iceberg roughly the size of the state of Delaware split off from Antarctica's Larsen C ice shelf in July 2017.
© NASA/John Sonntag

Too much water, too little water

Global warming is affecting precipitation patterns and altering hydrological systems, resulting in both more rain and more drought.[42] At less than 1°C of temperature rise, the world is already seeing an increased frequency and intensity of extreme weather events, including heavy rainfall, storms, cyclones and floods, as well as heatwaves, extreme droughts, sand and dust storms, desertification and the loss of productive farmland. Snow and ice melt is accelerating, glaciers are retreating, permafrost is melting, sea levels are rising and wildfires are becoming more regular and more extreme. Natural resilience against these multiple impacts is expected to decline substantially as climate change worsens.

The IPCC has created scenarios for the magnitude of climate change based on different levels of atmospheric greenhouse gases. These scenarios vary greatly, estimating an increase in global mean temperature from 0.3°C to 4.8°C by 2100.[43] Without efforts to mitigate climate change, it is estimated that global mean temperature rise could be between 2.5°C and 7.8°C.[44] These scenarios incorporate a wide range of different factors, including feedback processes triggered by warming. Overall, this trend will continue and climate extremes and disasters will become more frequent and more forceful.

Future scenarios predict that there will be a substantial rise in temperature extremes, the maximum wind speed of tropical cyclones will increase, there will be more heavy precipitation, events of extreme coastal high-water levels will increase and droughts will intensify and last longer.[45]

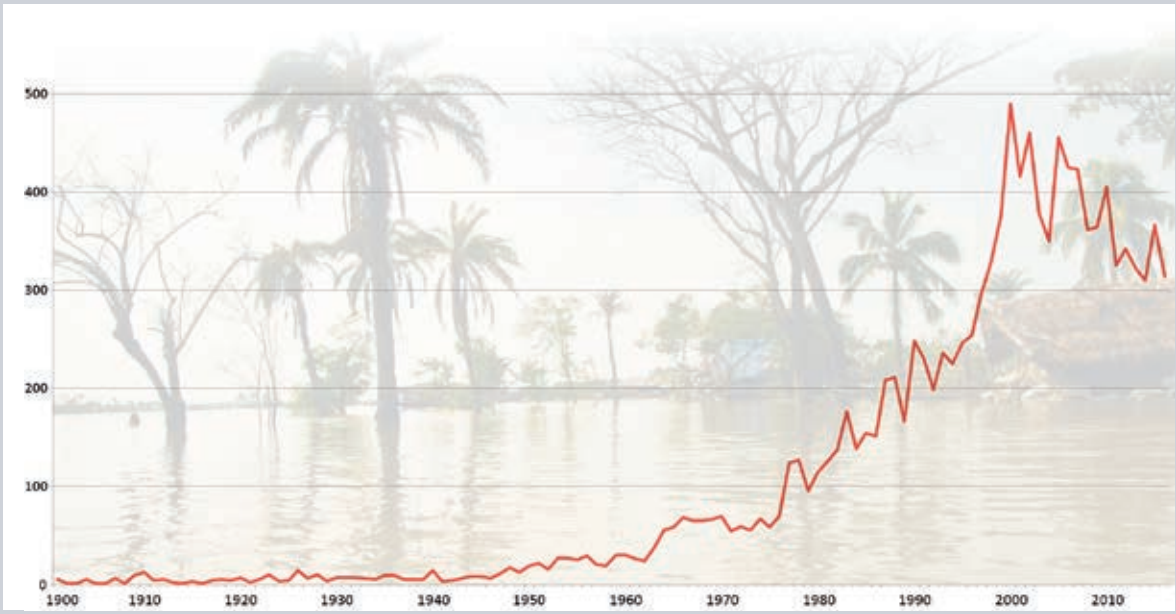
From 1970 to 2012 there were 8,835 disasters related to climate, of which 3,496 took place between 2001 and 2010.[47]

The increase in the number and magnitude of climate extremes is already occurring: the number of weather-related natural catastrophes has risen on all continents since 1980.[46] From 1970 to 2012 there were 8,835 disasters related to climate, of which 3,496 took place between 2001 and 2010.[47] More than half of these were related to rainfall patterns; both floods and droughts are increasingly evident in many parts of the world.[48]

Crucially, as already some 40% of the world's population live within 100km of the coast, projected sea-level rises of 28-98 cm by 2100[49] that will inundate farmland and urban areas alike, will cause immense damage and disruption to the social fabric of entire communities.

Sea level rises will contaminate drinking water, disrupt agriculture and food production, alter the composition of plant life, threaten wildlife and impact biodiversity.[50] It will devastate local economies and traumatize national and global economic stability and wealth.[51]

Increase in extreme weather events 1900-2016



Data source: EM-DAT: The Emergency Events Database - Université catholique de Louvain (UCL) - CRED, D. Guha-Sapir - www.emdat.be, Brussels, Belgium

Hurricane Harvey and Irma

Hurricane Harvey, which lashed the USA's southern states in August 2017 was the strongest storm in over a decade.[52] It pounded Texas and Louisiana with 27 trillion gallons of rain in only six days.[53] It broke rainfall records,[54] left an estimated 70 people dead[55] and affected as many as 13 million people.[56] The estimated economic loss due to Harvey stands at US$75 billion.[57]

Hurricane Irma hit the Caribbean just one week later. With winds of up to 185mph continuing for 37 hours, Irma became the longest-lasting cyclone of such intensity ever.[58] Irma affected an estimated 1.2 million people in the Caribbean before re-intensifying and moving north to the US mainland.[59] Barbuda in the Caribbean, one of the islands hit the hardest by Irma, saw 95% of its structures damaged and 60% of its population made homeless.[60]

This marks the first time that two category 4 storms have made landfall in the United States in one year.[61] Hurricanes Harvey and Irma are what climate change looks like. With every degree Celsius that the temperature rises, the air can hold 7% more water.[62] The global average temperature over land and sea surfaces in July 2017 was the second highest for the month of July in the NOAA global temperature record.[63] Consequently, there is now at least 4% more water vapour in the air than a century ago, creating larger storms than ever before and leading to higher rainfall rates in hurricanes.[64] Hurricanes form over sea, and with higher sea-surface temperatures the intensity of hurricanes increases.[65] The global average sea-surface temperature for July 2017 was the third highest global ocean temperature for July on record, behind 2016 and 2015.[66]

With sea levels expected to rise further over the coming century, storm intensity is expected to increase with rising global temperatures, and increased urbanisation concentrating larger populations in disaster-prone areas, tragedies like this will only get worse.

Unfortunately, the physicality is very clear: hurricanes get their destructive energy from the warmth of the ocean, and the region's water temperatures are super elevated.[67]

Anders Levermann, Climate Scientist at the Potsdam Institute for Climate Impact Research, 2017

Hurricane Irma, the strongest storm to ever form in the Atlantic, approaching the Caribbean. Photo: NOAA/CIRA

CANADA, UNITED STATES

2017. Canadian province of British Columbia suffered the loss of almost 900,000 hectares - its worst-ever wildfire season. The unprecedented year has seen 1,029 fires across the province, costing C$315.7 million to date.[68]

2017. USA Midwest, Pacific Northwest, Alaska and California hit by a series of devastating wildfires over the summer. The most recent fires in October affected California - 22 wildfires covered 69,000 hectares - a collective area larger than the city of Chicago. By 11 October, 23 people were dead, hundreds missing and 4,500 homes and businesses destroyed in the State, with fires still spreading.[69]

ARCTIC

2017. In July sea ice was 16.1% below the 1981-2010 average – the fifth lowest July sea ice extent since satellite records began in 1979.[70]

UNITED KINGDOM

2016. The UK received 152% of its average rainfall during January: the 4th wettest January since records began in 1910.[77]

UNITED STATES, THE CARIBBEAN

2017. In September Hurricane Harvey caused catastrophic flooding in south-eastern Texas and southeastern Louisiana.[71] Hurricane Irma, which followed straight after, was one of the strongest storms in history and had a devastating impact on many **Caribbean islands**, before turning to Florida. The two hurricanes left dozens of casualties, displacing thousands and causing huge economic disruption.[72]

EUROPE

2017. Parts of Southern Europe suffered severe drought, with the situation in Corsica reaching near-record precipitation deficits. The rainfall deficit contributed to serious wildfires across the region at the end of July.[78]

2016. In June **France**, **Belgium** and **Germany** experienced heavy rains that caused floods, resulting in significant damage and at least 18 deaths.[79]

HAITI

2016. In September Hurricane Matthew caused at least 546 deaths and 438 persons were injured in Haiti.[74] After crossing Haiti, Matthew tracked north and went on to cause damage in Cuba and the Bahamas, before tracking along the east coast of the United States and making landfall in South Carolina, causing major flooding.[75]

MEXICO

2016. Mexico had its warmest year on record.[73]

SIERRA LEONE, MALI

2017. **Sierra Leone** witnessed disastrous landslides near the capital Freetown. The increasing rainfall in August was over 300% of normal.[80]

2016. **Mali**. In July high rainfall in the Sahel led to significant flooding in the Niger River basin, with the river reaching its highest levels in about 50 years in Mali.[81] This led to 12 people dying and almost 10,000 left temporarily homeless.[82]

BOLIVIA

2016. Bolivia experienced its worst drought in the past 25 years.[76]

SOUTHERN AFRICA

2016. The year started with an extreme heat wave in southern Africa, exacerbating the ongoing drought. The drought caused a 9.3 million tonne shortfall in regional maize production.[83] All-time heat records were reached in January: in Pretoria, 42.7°C, and Johannesburg, 38.9°C.[84]

With acknowledgements to NOAA
http://www.noaanews.noaa.gov/stories2015/images/Fig%201%20map%20with%20icons-300%20dpi_2000.jpg

CLIMATE EXTREMES

2016-2017

RUSSIA

2017. A cyclonic depression caused extreme precipitation, with 185% of monthly average rainfall falling in the last two days of June, causing casualties and economic disruption.[91]

CHINA

2017. Tropical Cyclone Hato brought high winds and rain to Hong Kong and Macau on 23 August, causing devastation in Macau in particular.[87]

2016. The Yangtze basin in China had its most significant summer floods since 1999,[88] with the rainfall over the middle and lower Yangtze region being 140% of average in April to July.[89] The floods killed 310 people and caused an estimated US$14 billion in damage.[90]

NORTH KOREA

2016. In August Typhoon Lionrock caused destructive flooding in North Korea.[96] It is estimated that more than 130 people died and at least 100,000 were displaced.[97]

JAPAN

2017. The Tropical Storm Nanmadol was associated with torrential rainfall in southern Japan. The city of Hamada in Shimane, saw hourly precipitation of over 80 mm on 6 July; leading to an advisory evacuation of nearly 60,000 residents in affected areas.[98]

BANGLADESH, INDIA

2017. **Bangladesh**. In May Tropical Cyclone Mora caused considerable damage and some casualties. This was followed throughout June by heavy monsoon rainfall, which caused severe flooding and contributed to deadly mudslides. Nearly 900,000 people were affected by floods as of 5 July.[92]

2017. **India**. As of 24 August, 32.1 million people have been affected by flooding across Assam, Bihar, Uttar Pradesh, and West Bengal. More than 600 people are known to have died.[93]

FIJI

2016. Cyclone Winston was the most severe tropical cyclone on record to affect the country.[99] 44 people lost their lives[100] and more than 56,000 people – an equivalent of 40% of Fiji's population – lost their homes and were forced to live in rudimentary, temporary shelters,[101] 350,000 were affected.[102]

KINGDOM OF BAHRAIN, GREATER HORN OF AFRICA

2016/2017. Extreme droughts continued to devastate **the Greater Horn of Africa**, with up to 24 million people facing critical food insecurity.[85]

2017. The Kingdom of Bahrain had its highest July mean and maximum temperature on record. The nation's July minimum temperature was the third highest on record.[86]

SRI LANKA

2016. In May, flooding and landslides in Sri Lanka, caused by Tropical Storm Roanu[94], left more than 200 people dead or missing, and displaced several hundred thousand.[95]

AUSTRALIA

2017. Australia had the second driest June on record, with rainfall 62% below average for the country as a whole.[103]

GREAT BARRIER REEF

2016. Abnormal temperatures contributed to a coral mortality of up to 50% in parts of the Great Barrier Reef.[104]

Forced migration

In 2014 the IPCC report concluded that [with medium evidence, high agreement], 'Climate change over the 21st century is projected to increase the displacement of people'.[105]

While the close of the Millennium Development Goals (MDGs) at the end of 2015 noted progress in poverty reduction, the final report recorded 836 million people still living in extreme poverty. The same report also referred to a 50% global increase in carbon dioxide emissions since 1990.[106]

Climate change will produce negative outcomes for livelihoods, and economic and social security globally, especially for the most vulnerable groups and the poorest communities.[107] If left unchecked, climate change is predicted to draw up to 720 million people back into extreme poverty between 2010 and 2050.[108]

Extreme weather events are already devastating communities. In 2016, 'weather-related sudden-onset hazards', such as cyclones and floods, displaced around 23.5 million people.[109]

Since 2008, an average of 21.7 million people have been displaced each year by weather-related hazards: the equivalent of 59,600 people every day, or 41 people every minute.[110]

The UN Office for Disaster Risk Reduction reported that, between 1995 and 2015, 606,000 lives were lost and 4.1 million people were injured, left homeless or in need of emergency assistance, as a result of extreme floods, storms, heatwaves and other weather-related events.[111]

There is no clear global dataset on displacement by slow-onset climate extremes such as sea level rise and desertification; often this migration is classed as economic or other planned migration, failing to acknowledge fully the 'push' resulting from climate change impacts. This leaves the full human impact of climate change unknown and depends not only on the magnitude of the event, but also on the vulnerability of the area and the society it impacts. Communities from Alaska to Fiji and Kiribati have already been relocated, or are making plans to do so because rising sea levels threaten their lands. Developing countries - that have contributed least to climate change - are experiencing the strongest negative impacts, with increasing frequency and magnitude of extreme weather events that pose potentially disastrous consequences for agriculture and food security.[112]

According to a recent study, 1.4 billion people could be forced to leave their homes by 2060 and this number could rise to two billion by 2100.[113] This estimate is based on combined projections of population growth, submerging coastal zones, exhausted natural resources, declining net primary production, desertification and urban sprawl.

Climate change is also contributing to the heart-rending refugee crisis. The world's poor, though least responsible for climate change, are most vulnerable and already suffering its impact.[114]

Pope Francis, 2016

Dadaab, Kenya, 2014. UN Photo/Evan Schneider

2015

Disasters brought on by floods forced 8.3 million people to flee their homes, storms displaced 6.3 million and around 87,000 people were displaced by wildfires.[115]

1.4 billion people could be forced to leave their homes by 2060.UN Photo/Tobin Jones

Climate change certainly has national security implications. [...] it is a source of instability, it creates the conditions under which wars are fought or tensions increase.

Brigadier General Gerald Galloway
United States Army (Ret.), 2017

A 4°C rise in temperatures could lead to as much as 56% increase in the frequency of intergroup conflicts across the world. UN Photo/Albert Gonzalez Farran

A clear and present danger

Climate change poses perhaps the world's greatest challenge to global peace, security, development and human rights in the 21st century. It has the ability to undermine the progress made on each of these in the post-war period. The rapid changes to our planet's climate are exacerbating natural disasters and water, food, energy and health insecurities; contributing to conditions that can lead to conflict, state instability and failure, strain military readiness, operations and strategy, and make existing security threats worse.[116]

In 2013, the World Bank warned that 4°C of warming by the end of the 21st century is a real and urgent risk.[117] An influential study also published that year suggested such a rise in global temperature could lead to as much as a 56% increase in the frequency of intergroup conflicts across the world.[118]

Whilst climate change will not be the sole cause of any conflict, increasingly, it can be one of the most important and decisive factors. It will play a prominent role as a 'threat multiplier' in situations where multiple stressors already exist. Climate change impacts have the potential to breach critical thresholds that lead to the outbreak of conflict.

Climate change will affect resource scarcity placing strain on the essential resources that underpin human, national and international security – including food and water. These are likely to heighten the scale of political turmoil, state instability and mass migration in the future, particularly in regions or nations with poor governance and existing state fragility.

Climate change will affect resource scarcity placing strain on the essential resources that underpin human, national and international security
UN Photo/ Albert Gonzalez Farran

I believe it [climate change] is the biggest diplomatic challenge of all time. In other words, I think that what we are talking about here is an existential threat to our civilization [...] and it requires a human response on a scale that has never been achieved before.

Sir David King
Former UK Special Representative for Climate Change, 2014

A 2017 report, *A New Climate for Peace*, commissioned by the G7, identifies what are termed 'seven compound climate-fragility risks':

- **Local resource competition**
  As the pressure on natural resources increases, competition can lead to instability and even violent conflict in the absence of effective dispute resolution.
- **Livelihood insecurity and migration**
  Climate change will increase the insecurity of people who depend on natural resources for their livelihoods, which could push them to migrate or turn to illegal sources of income.
- **Extreme weather events and disasters**
  Extreme weather events and disasters will exacerbate fragility challenges and can increase people's vulnerability and grievances, especially in conflict-affected situations.
- **Volatile food prices and provision**
  Climate change is likely to disrupt food production in many regions, increasing prices and market volatility, and heightening the risk of protests, rioting and civil conflict.
- **Transboundary water management**
  Transboundary waters are frequently a source of tension; as demand grows and climate impacts affect availability and quality, competition over water use will likely increase the pressure on existing governance structures.
- **Sea-level rise and coastal degradation**
  Rising sea levels will threaten the viability of low-lying areas even before they are submerged, leading to social disruption, displacement and migration, whilst disagreements over maritime boundaries and ocean resources may increase.
- **Unintended effects of climate policies**
  As climate adaptation and mitigation policies are more broadly implemented, the risks of unintended negative effects – particularly in fragile contexts – will also increase.[119]

Food security in a warming world

Food security – sustaining supply and ensuring equitable access to food - is a major consideration in terms of climate change's impact on the most basic human rights, and is a driving factor behind mass migration. Rising temperatures and changing rainfall patterns will have widespread, large-scale negative impacts on food production and food security. With an increasing human population and growing global demand for food, ensuring that the right food – especially staples such as wheat, maize and rice – can be produced or supplied in the right places, at the right time and at the right price, is a fundamental challenge.

Whilst the nexus between climate change and food security is complex – the UN Food and Agriculture Organization (FAO) identifies multiple linkages[120] – the 'new normal' of more frequent weather and climate extremes is increasingly recognised as a considerable risk to food security and equitable access.

Whilst to a limited extent, warmer temperatures and increased levels of atmospheric CO2 benefits crops such as wheat in some locations, overall the benefits are expected to be far outweighed by the negative impacts of climate change. Floods and droughts will reduce food availability as well as income derived from the sale of crops.[121] This, in turn, affects the price of food, limits access to some basic foods, and has the potential to threaten overall food security. In recent years, nearly 25% of the total damage and loss from climate-related disasters in developing countries has been in the agricultural sectors,[122] which have the least resilience to withstand such shocks. Climate change is affecting agriculture in a variety of ways, including increased temperatures and changes to the growing season, reduced soil fertility, adverse changes to the availability of water, and increasing pest infestations.

In recent years, nearly 25% of the total damage and loss from climate-related disasters in developing countries has been in the agricultural sectors.

Between 1985 and 2007, droughts led to a 13.7% loss in cereal production, an increase from the 6.7% loss between 1964 and 1984.[123]

The IPCC summarises the issues:

For the major crops – wheat, rice and maize – in tropical and temperate regions, without adaptation, climate change is projected to negatively impact yields for local temperature increases of 2°C or more above late 20th century levels, although individual locations may benefit (medium confidence)

Global temperature increases of 4°C or more above late 20th century levels, combined with increasing food demand, would pose large risks to food security globally (high confidence)

All aspects of food security are potentially affected by climate change including food access, utilization and price stability (high confidence)

Rural areas are expected to experience major impacts on water availability and supply, food security, infrastructure and agricultural incomes, including shifts in production areas of food and non-food crops across the world (high confidence).

IPCC, 2014[124]

Climate-related threats to global food production[125]

- **Reduced yields**. The productivity of crops and livestock, including milk yields, may decline because of high temperatures and drought-related stress.
- **Increased irrigation**. Regions of the world that now depend on rain-fed agriculture may require irrigation, bringing higher costs and potential conflict over access to water.
- **Planting and harvesting changes**. Shifting seasonal rainfall patterns and more severe precipitation events – and related flooding – may delay planting and harvesting.
- **Decreased arability**. Prime growing temperatures may shift to higher latitudes, where soil and nutrients may not be as suitable for producing crops, leaving lower-latitude areas less productive.
- **More pests**. Insect and plant pests may survive in greater numbers or even reproduce more often if cold winters no longer keep them in check. New pests may also invade as temperature and humidity conditions change.
- **Risks to fisheries**. Shifts in the abundance and types of fish and other seafood may hurt fisheries. Extreme ocean temperatures and ocean acidification place coral reefs – the foundations of many of the world's fisheries – at risk.
- **Sudden-onset extreme weather events** and their impacts – storms, floods and wildfires – lead to dramatic loss of crops and livestock.

Crops dependent upon irrigation, Jordan. © EJF

Crops and climate change

Droughts and heatwaves are estimated to have decreased the global harvest of cereal – including rice, wheat and maize – by up to 10% between 1964 and 2007.[126] Drought is one of the key factors for agricultural failure and the increase in intensity, frequency and duration of droughts caused by climate change, will bring about devastating losses to crop yields.[127]

Climate change has significantly reduced renewable surface water and groundwater – vital for agriculture – in most dry subtropical regions;[128] and water availability is likely to decrease in the low latitudes,[129] including key agricultural areas in China, India and Egypt.[130] Glacier and snow cover – which play an important role in providing river flows during the summer – are also decreasing.[131] Worldwide, the area of dry land has doubled since the 1970s, while mountain water storage has significantly contracted.[132]

Whilst global cereal production continues an upward trend year-on-year, these climate change impacts – and temperature increases in particular – are projected to result in production declines in certain areas. Many crops rely on specific temperature ranges to produce good yields and a large number of crops may undergo reduced yields if temperatures exceed 32°C during the flowering stage.[133]

Higher temperatures can decrease rice yields as they can make rice flowers sterile, meaning that no grain is produced, and higher respiration losses also make rice less productive.[134] Rice yields could decline by 90% if temperature increases from 27°C to 32°C, and yields would drop to zero if temperatures exceed 35°C.[135] The reduction in average rice yields in rain-fed, drought-prone areas has ranged from 17-40% in severe drought years;[136] the intensity and frequency of droughts are predicted to increase in rain-fed rice-growing areas and water scarcity already affects more than 23 million hectares of rain-fed rice production areas in South and Southeast Asia.[137] In Africa, recurring drought affects nearly 80% of the potential 20 million hectares of rain-fed lowland rice.[138] The International Food Policy Research Institute's (IFPRI) 2009 report, *Climate Change: Impact on Agriculture and Costs of Adaptation*, forecasts that rice yields could decline by 10-15% globally and rice prices increase between 32-37% by 2050.[139]

With world utilization projected at 734 million tonnes in 2017/18,[140] wheat is by far the most significant single crop in terms of human consumption and declining production could have far-reaching impacts in countries where it is both a staple underpinning food security, and where options to import are limited. The increase in temperature between 1980 and 2008 already resulted in an average reduction in global wheat yields by 5.5%.[141] A 2016 study involving scientists from the US, China and the EU, and based on a wide range of modelling techniques and statistical analyses, assessed the potential impact of temperature changes on wheat production. The results all suggested that a global temperature increase of 1°C would lead to a worldwide decline in wheat yield by between 4.1-6.4%.[142]

Temperature increase between 1980 and 2008 resulted in average reduction in wheat yields of 5.5%. 1°C increase globally would lead to a decline of up to 6.4% in wheat yield.

The study produced similar findings on a country level for the world's largest wheat producers, including in the U.S., China, India and France. China will see yield reductions of about 3% per 1°C increase in global temperature, while India is projected to experience much greater declines of around 8%. Whilst it is unclear what losses will be incurred by smaller producers, all the studies found that warmer regions will experience the greatest temperature-related losses.[143]

Droughts and heatwaves are estimated to have decreased the global harvest of cereal by up to 10% between 1964 and 2007. Photo: Anne Wangalachi/CIMMYT

Rice yields could decline by 90% if temperature increases from 27°C to 32°C, and yields would drop to zero if temperatures exceed 35°C.

Photo: WorldFish/Georgina Smith

Climate change will intensify the impact of pests, as they appear earlier in the season, spread to new geographic areas and survive longer into the winter. Pests are currently reducing global harvests by between 10% and 16% and cause losses of at least US$220 billion per year,[144] these numbers are predicted to further increase as the effects of climate change increase. In the USA, the potato leafhopper currently appears around ten days earlier than in the 1950s, resulting in losses totalling several million dollars.[145] Climate change is expected to have a dramatic effect on the spread of the desert locust in Africa;[146] floods, cyclones and warmer conditions will lead to a rise in the number of locust generations in a year, making the risk of devastating plagues more likely. A very small locust swarm can consume as much food as 35,000 people eat in a day.[147] During the locust infestation in 2004, 10 countries in Africa were affected. In Mauritania an estimated 80% of crops were destroyed.[148] In 2015, Argentina suffered from the worst locust infestation in over 60 years, with 700,000 hectares of land affected. Whilst there were numerous factors at play, the winter was the third warmest on record and the wettest since 1932.[149]

As one FAO expert reported:[150]

"Extreme weather events, including torrential downpours, have the potential to trigger a massive surge in locust numbers."

Impacts on the poor and hungry

"For millions of people across Africa, Asia and Latin America, climate change means more frequent and intense floods, droughts and storms, accounting each year for up to 90% of all natural disasters. In the last decade, almost half of the World Food Programme's (WFP) emergency and recovery operations have been in response to climate-related disasters, at a cost of US$23 billion. In the absence of improvements to people's ability to prepare, respond and recover, it has been estimated that the risk of hunger and malnutrition could increase by up to 20% by 2050."[151]

UN World Food Programme, 2017

Climate change scenarios (2030 - 2050) for the Philippines show a reduction in average per capita consumption of cereals by 24% and fruits and vegetables by 13% – increasing the number of people at risk of hunger by 1.4 million in 2030 and 2.5 million by 2050, if measures to curb rising global temperatures fail. The projected economic costs are estimated at an annual average of US$4.3 billion.[154]

Climate change poses a significant threat to countries most reliant on farming, with sub-Saharan Africa at the greatest risk. According to the International Fund for Agricultural Development (IFAD), more than 70% of the world's very poor live in rural areas and most are highly dependent on agriculture for their livelihoods.[152] An estimated 500 million smallholder farms are supporting almost two billion people and producing around 80% of the food consumed in Asia and sub-Saharan Africa.[153]

With low capacity for adaptation, these farms are extremely vulnerable to environmental shocks. According to the FAO, 25% of the total economic losses caused by climate-induced hazards in developing countries affected the agricultural sector[155] and resulted in US$80 billion in losses to crops and livestock between 2003 and 2013.[156]

An estimated 500 million smallholder farms are supporting almost two billion people in Asia and sub-Saharan Africa. Photo: T. Krupnik/CIMMYT

By 2050, climate change is forecast to increase the number of people at risk of hunger by 10-20%; of these, 65% would be in Africa.

High exposure to hazards and limited coping capacity are creating profound risks to millions of the world's poorest people. Photo: USAID Africa Bureau

Rain-reliant farmers and pastoralists in the rangelands that span a quarter of the earth's land surface are especially vulnerable to food shortages caused by drought.[157] Over the last century, extreme famines caused by droughts have declined around the world as subsistence farmers and herders have entered market economies and become less susceptible to the vagaries of climate.[158] Africa is a stark exception because of its large number of subsistence communities and rapidly growing populations still dependent on rain-fed food production.[159] High exposure to hazards and limited coping capacity are creating profound risks to millions of the world's poorest people in countries with low resilience and fragile economies.

Food insecurity also results from price increases, especially for staple foods such as grains. The price of many major crops is projected to increase 10-60% between 2010 and 2030.[160] This in turn could increase levels of poverty by 20-50% in parts of southern Asia and sub-Saharan Africa.[161] By 2050, the price of maize could increase by 87-106%; the price of rice by 31-78%; and the price of wheat by 44-59%, compared to 2010 price levels.[162] Such price increases disproportionately affect low income households forced to spend a larger part of the income on food. In Tanzania, three quarters of the total workforce depends on agriculture[163] and the average wage for agricultural labour amounts to just US$1.6 a day.[164]

Globally, many of the areas where crop yields are predicted to decrease are already experiencing food insecurity.[165] By 2050, climate change is forecast to increase the number of people at risk of hunger by 10-20%; of these 65% would be in Africa. The number of malnourished children could increase by more than 20% globally.[166]

Food insecurity and poverty

A World Bank study using data from 73 countries estimated that almost 160 million people, 90 million of them rural, were pushed into poverty by the impact of the global food crisis in 2008[167] and a further study estimated that 63 million people were thrown into hunger from the 2008 price shocks.[168] The poorest households spend a much higher proportion of their income on food: in countries such as Bangladesh, Malawi and Vietnam, the poor often spend 35% or more of their income on staple foods.[169] On average in many developing countries, total food purchases represent about 70% of the expenditures of the poorest 20% of families.[170] An increase in food prices of almost any magnitude will have a negative impact.[171]

The IPCC's Fifth Assessment Report concluded that changes in precipitation and temperature could cause global food prices to increase by up to 84% by 2050.[172]

Future food shocks

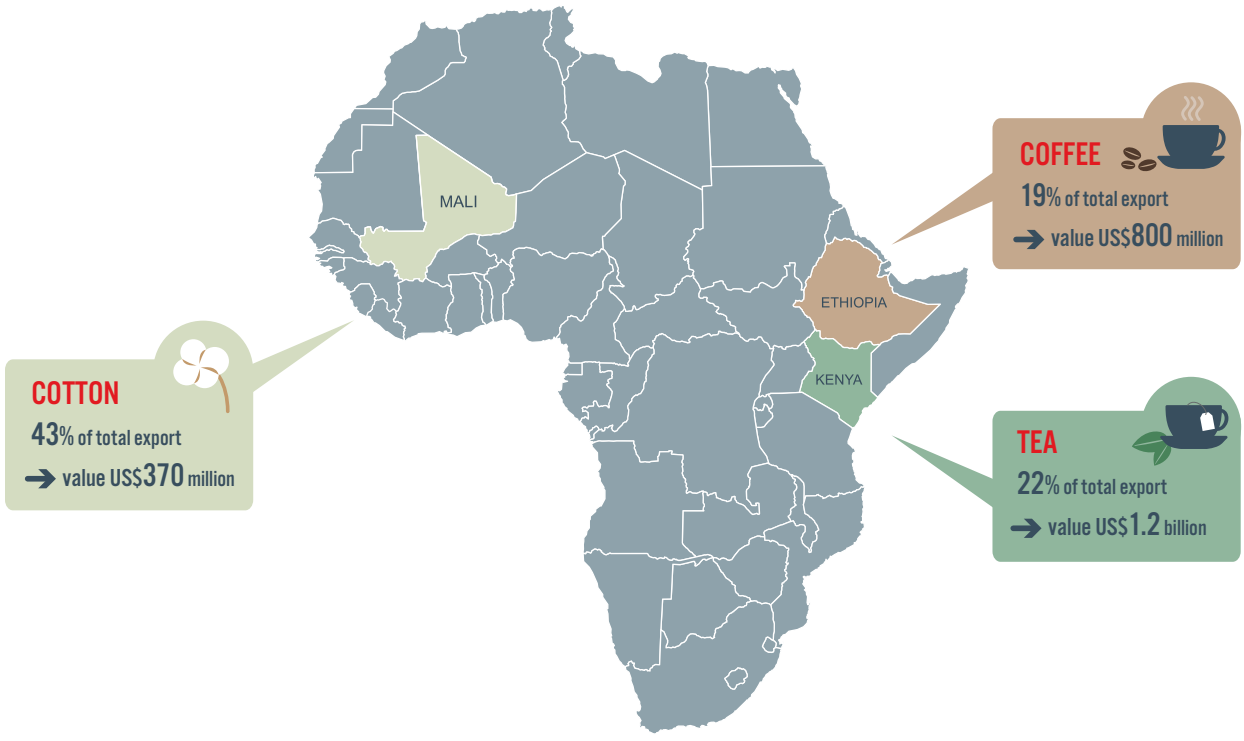
A 2016 Climate Change Exposure Index (CCEI) produced by the UK risk analytics firm Verisk Maplecroft shows that the physical risks posed by climate change are 'high' or 'extreme' in 85% of the world's most agriculturally-dependent countries. Sub-Saharan Africa faces the highest risk of changing weather patterns; the region is home to 17 of the 20 countries most economically reliant on agriculture and among the worst-placed countries to withstand repeated disruption to harvests.

Agriculture represents over 30% of national GDP in countries such as Sierra Leone, Liberia, Central African Republic, Guinea-Bissau, Burundi and Rwanda, all of which are rated 'extreme risk' in the CCEI.[173] All of these countries have low resilience to withstand climate change, and recent conflicts within each increases the risk to their populations. As well as reducing food security, reduced yields in key export crops such as tea, coffee, cashew nuts and cotton will severely impact national incomes as well as the smallholder farmers reliant on these crops.

Physical risks posed by climate change are high or extreme in 85% of the world's most agriculturally-dependent countries.

The vulnerability to food shocks is heightened by poor governance and closely linked to recent violent conflict and unrest. Of the worst performing countries in the 2017 CCEI – Central African Republic, DR Congo, Haiti, Liberia, South Sudan[175] – all but Haiti have suffered or are continuing to suffer from civil war in the past decade; Haiti's food riots and violent protests in 2008 contributed to the overthrow of the government that year. Civil war and protests can themselves lead to declines in food production and a downward spiral in food security, access and availability to vulnerable people.

Key export crops and their value in 2016[174]



We know that if we don't confront climate change, there will be no hope of ending poverty or boosting shared prosperity. Furthermore, the longer we delay, the higher the cost will be to do the right thing for our planet and our children.[176]

Jim Yong Kim
World Bank Group President, 2014

A severe drought in East Africa is causing malnutrition rates to soar and threatening the lives of children throughout the region. Photo: Colin Crowley/Save the Children

Droughts in East Africa – more frequent, more devastating

Released in March 2017, the FAO's *Crop Prospects and Food Situation* report includes estimates that 37 countries currently require external assistance for food: 28 are in Africa with the need for assistance driven by El Niño-triggered droughts. At the time of writing, the food security situation is 'of grave concern' in northern Nigeria, Somalia, South Sudan and Yemen, where over 20 million people are facing severe food insecurity due to long-standing conflicts, compounded by drought.

Six years ago, the UN's International Fund for Agricultural Development wrote: "Drought in this part of the continent is not unknown and has been an increasingly frequent occurrence. Datelines change but the stories of unimaginable hardship, death and deprivation, while differing in magnitude from one drought to the next, remain much the same. Drought never only has localized consequences. Its effects cascade through countries in the form of higher food and fodder prices, civil unrest and diminished social services as governments redeploy budgets to meet the most pressing needs of their citizens."[177]

Over the past decade or so, East Africa has experienced a number of particularly severe droughts – in 2005, 2006, 2008, 2011, 2015, 2016 and 2017.[178] Researchers examining the East African drought in 2011 concluded that there was evidence to show that anthropogenic climate change increased the probability of failure in the rains in the region.[179]

Along with increased frequency, the severity of the droughts and the impact on human populations have also intensified. The drought that lasted from July 2011 to mid-2012 was the region's worst for 60 years.[180] But while that crisis affected over 12 million people, the most recent drought that began in 2016 has greatly increased the number of people suffering from food insecurity and malnutrition.[181] In August 2016, 24 million people – twice as many as in 2015[182] – were facing critical food insecurity. According to UNICEF, by early 2017, more than 880,000 children were severely malnourished and 5.5 million children in danger.[183] The drought has contributed to outbreaks of yellow fever, malaria, cholera and measles.[184]

Ethiopia, Kenya and Somalia have been hit hardest by extensive crop failures and livestock deaths,[185] but other countries, including Burundi, Uganda, Djibouti, Rwanda, Sudan, South Sudan and the Democratic Republic of Congo have also been badly affected.[186] In South Sudan, the drought - coupled with ongoing armed conflict - has pushed the country into a disastrous situation.[187] In February 2017, the UN declared famine in parts of South Sudan,[188] where 100,000 people face starvation and around one million people are classified as being on the brink of famine;[189] one in seven people have been forced to flee their homes[190] through the combined impacts of conflict and drought.

When coupled with a brutal, ongoing conflict, the drought, food scarcity and spiralling food prices have led to massive migration across borders, as well as internal displacement.

According to the UN, there were 4.4 million refugees and asylum seekers and an additional 3 million internally displaced across the East Africa region in July 2017.[191]

The predictions are bleak for the region. The UN Regional Outlook for the Horn of Africa and Great Lakes Region predicts that the drought will intensify, that food prices will continue rising, that there is a risk of further escalation of violence in South Sudan and that the humanitarian situation in many of the countries will deteriorate.[192] More specifically, northern and eastern Tanzania, much of Kenya, southern and north-western Somalia, much of Djibouti, south-eastern Eritrea, north-eastern, eastern and southern Ethiopia, south-eastern parts of South Sudan, north-eastern Uganda and southern parts of Sudan are facing an increased likelihood of below-normal to near-normal rainfall. These regions are likely to face poor harvests and water shortages.[193]

This is a region where the global forces of climate change, forced migration, and volatile food supply converge, resulting in severe hunger and, at worst, famine. However, while drought is not new, it has become increasingly frequent.[194]

African Arguments, 2017

More than one million children are currently estimated to be acutely malnourished across South Sudan; over a quarter of a million children are already severely malnourished.[195]

Jeremy Hopkins
UNICEF Representative, South Sudan, 2017

There were four million refugees and asylum seekers across the East Africa region in January 2017. Photo: Andy Hall/Oxfam

El Niño's deadly effect

The ongoing drought in East Africa is linked to the occurrence of a 'super' El Niño in 2015: 2016 became the hottest year since record-keeping began. El Niño results from a strong and extensive interaction between oceans and the atmosphere: changes in the sea-surface temperature of the tropical Pacific Ocean disrupts normal weather patterns, bringing heavy rains and drought to different parts of the world. El Niño is followed by La Niña; together the cycling is the El Niño Southern Oscillation (ENSO).[196]

The lack of long-term observational data makes it extremely difficult to determine how climate change contributes to El Niño's altered rain patterns and how this will alter in the future; climate models give varied and, at times, contradictory results. However, a 2014 study published in Nature suggests that 'super' El Niño extreme weather events could double in the future: occurring roughly every 10 years instead of every 20.[197] Given the devastating impacts on food production, ecosystems, health, energy demand, air quality and increases in the risks of wildfires around the globe, it is imperative that the complex interactions between climate change and El Niño are given the attention that they deserve.

So this naturally occurring El Niño event and human-induced climate change may interact and modify each other in ways which we have never before experienced.

Even before the onset of El Niño, global average surface temperatures had reached new records. El Niño is turning up the heat even further.[198]

Michael Jarraud
Former Secretary-General of the World Meteorological Organization, 2015

Climate change as a threat to peace

"Climate change can indirectly increase risks of violent conflicts in the form of civil war and inter-group violence by amplifying well-documented drivers of these conflicts such as poverty and economic shocks."[199]

IPCC, 2014

A 2016 study found a coincidence rate of 9% between armed conflict and disasters, such as heatwaves and droughts.

Climate change is increasingly recognised as a 'threat multiplier' compounding and exacerbating underlying social, economic, demographic, political and environmental issues, [200/201/202] such as population growth, resource scarcity, poverty and poor governance.[203] Whilst the links are undoubtedly complex, climate change and its impacts on food security, as well as water, resources, energy and infrastructure, are expected to create tipping points, pushing some populations and states over critical thresholds leading to instability and the potential for conflict. Those states least able to respond are likely to be those that are already fragile, with poor governance and possibly already embroiled in recent conflict. Once violent conflict begins, disruption to food production and markets, declining purchasing power and unequal access to food supplies combine to create a rapid downward spiral that in itself can exacerbate competition, hostility and conflict. A 2013 report by the Overseas Development Institute (ODI), suggests that disaster and government failures to respond can deepen existing societal tensions, while disruption presents economic opportunities for criminal activities. Overall the report warns that natural disasters exacerbate pre-existing conflicts.[204]

UN Peacekeeper, Darfur. @ UN Photo/Albert Gonzalez Farran

Responses to climate change will vary greatly depending upon the context, including governance regimes and the fragility of the nation-state. A 2016 research paper found a coincidence rate of 9% between armed conflict and disasters - such as heatwaves and drought - between 1980 and 2010; this figure was far higher - 23% - in ethnically fractionalized countries.[205] While climate-related disasters do not act as direct triggers of armed conflicts, their disruptive nature seems to "play out in ethnically fractionalized societies in a particularly tragic way... disasters might act as a threat multiplier in several of the world's most conflict-prone regions." Nearly two-thirds of all civil wars fought since 1946 have been fought along ethnic lines.[206]

This observation has important implications for future security policies. Several of the world's most conflict-prone regions, including North and Central Africa and Asia are not only highly vulnerable to climate change impacts[207/ 208] but are also characterized by deep ethnic, religious and other social divisions. In these areas, climate-induced disasters might well act as a threat multiplier that leads to conflict within or between nations.

Research into the potential impacts of global climate change on armed conflict in sub-Saharan Africa found strong historical linkages between civil war and temperature, with warmer years leading to significant increases in the likelihood of war. The research warns of a roughly 54% increase in armed conflict incidences by 2030, or an additional 393,000 battle deaths if future wars are as deadly as recent wars.[209] Another study of the situation in East Africa showed that extreme rainfall variation in either direction – both too much or too little – increases small-scale conflict risks; the findings pointed to fluctuations in livestock prices and changes in "both a 'zero-sum' narrative, where conflicting groups use force and violence to compete for ever-scarcer resources, and an 'abundance' narrative, where resources spur rent-seeking/wealth-seeking and recruitment of people to participate in violence". It also warns that "preferentially higher rates of rebel conflict will be exhibited in anomalously dry conditions, while higher rates of communal conflict are expected in increasingly anomalous wet conditions".[210] Local seasonal migrations, which are influenced by rainfall, are also associated with the risks of violence. Anomalies in temperature have been found to affect the level of conflict, through the intensified competition for resources, particularly water.[211]

YEMEN: Water stress and war

Yemen is among the most water-stressed countries in the world: water scarcity has proven a critical factor underlying the country's instability and helped to spark the conflict that began in 2015. By January 2017, the UNHCR reported that more than 11% of Yemen's population, some three million people, had been forced to flee their homes.[212]
17 million people or two-thirds of the population are estimated to be food insecure.[213]

A 2014 World Bank report suggests that,
"Yemen today is a glimpse of what's in store for other parts of the Middle East and North Africa (MENA) as climate change and rapid population growth combine to put more and more pressure on the resources essential to human life, like water. Already, Yemenis have as little as 86 cubic meters of renewable water sources left per person per year – not the lowest figure in the region, but as one of the region's poorest countries, Yemen is among the least able to adapt."

"[...] areas north of the 25°N line of latitude will get drier; this includes most of Morocco, Algeria, Tunisia, Libya, and Egypt, and all of Lebanon, the West Bank and Gaza, Syria, Iraq and Iran... Food security is likely to drop, increasing the region's need for imported grains. Tunisia's wheat growing season may shrink by about two weeks if temperatures rise by 2°C and about a month if they rise by 4°C. By the end of this century, farming will have to shift 75km north in much of the Maghreb and Mashreq." [214]

With existing state fragility in much of the MENA region and a regional population of about 355 million predicted to double by 2050, food and water insecurity are likely to pose a significant threat multiplier to the outbreak of violent conflict.[215]

Bread, protests and the Arab Spring

"A once-in-a-century winter drought in China contributed to global wheat shortages and skyrocketing bread prices in Egypt, the world's largest wheat importer." [216]

Dr. Troy Sternberg, Oxford University

Food riots and bread protests have helped to spark revolutions and regime change over the centuries; the tinder to underlying public unrest and dissatisfaction. In 2008, food price spikes led to protests and riots in 48 countries,[217] amongst these, riots led to regime change in Haiti, and violent protests in Cameroon, and in Mozambique, where people protested a 30% increase in the price of bread.[218] More recently, Venezuela has succumbed to a year of violent protests by a hungry population hit by spiralling food prices as oil prices fell, and the government's failure to respond.[219] Protests have been most prevalent in Africa and Asia, which together are home to 92% of the world's poor and chronically food insecure.[220] Whilst these instances resulted from an array of both national and international factors at play, they reflect the desperate need of people to have regular, sufficient and affordable food supplies.

Climate change did not cause the Syrian civil war; climate change did not cause the Arab Spring; climate change did not cause the Egyptian uprising.

The cause of the political turmoil was multi-faceted, with a democratic deficit playing the leading role. But climate change amplified the risks. It exacerbates droughts and other disruptive natural phenomena.[221]

Stéphane Maurice Dion
Former Minister of Foreign Affairs, Canada, 2016

In 2008, food price spikes led to protests and riots in 48 countries.

The wall around Zaatari refugee camp in Jordan where 80,000 Syrian refugees live. 2017 © EJF

In 2010, changing weather patterns led to global shortages in wheat supply. Drought and bushfires in Russia, Ukraine and Kazakhstan; record rainfall in Canada and 2011's torrential rain in Australia; drought and dust storms in western China; followed by storms in the US (early 2011), reduced global wheat supply and led to major price increases – from US$157 per tonne in June 2010 to US$326 per tonne in February 2011.[222]

This had major implications across the globe and most particularly in the Middle East and North Africa (MENA) region, which is particularly vulnerable to fluctuations in food supply and prices. There is an 80% probability that the July 2010 heatwave in Russia - the worst in over 40 years, which claimed thousands of lives, and led to wildfires that destroyed some 9 million hectares of crops and caused a 30% fall in the grain harvest - would not have happened in the absence of anthropogenic global warming.[223/224]

By tonnage, the MENA region is the world's largest cereal importing area and a major importer of Russian grain.[225] Of the world's major wheat-importing countries per capita, "the top nine importers are all in the Middle East; seven had political protests resulting in civilian deaths in 2011".[226] The two countries exempt from this pattern, the UAE and Israel – despite having relatively high levels of wheat imports – have high per capita income and crucially, a low percentage of income spent on food (8.7% and 17.6% respectively). The remaining seven countries each show more than 35% of average per capita income spent on food, affecting food security and influencing dissatisfaction with governments. Food price hikes – caused by weather events alongside other factors such as financial speculation and growing international demand, including for biofuel – were certainly not the sole cause for the political turmoil in North Africa that began in 2011, but, according to the former World Bank President Robert Zoellick, they were an "aggravating factor in the unrest that began in Tunisia and spread to Egypt and other countries".[227]

Reduced global wheat supply led to major price increases – from US$157 per tonne in June 2010 to US$326 per tonne in February 2011.

Of the world's major wheat-importing countries per capita, the top nine importers are all in the Middle East. © EJF

The top nine wheat-importing countries (2010)

Rank	Country	Tonnes imported (in 000s)	Percent of income spent on food
1.	UAE	370.659	8.7
2.	Libya	242.803	37.2
3.	Israel	238.968	17.6
4.	Jordan	173.611	40.7
5.	Algeria	101.439	43.7
6.	Tunisia	89.330	35.6
7.	Yemen	86.843	45
8.	Egypt	81.284	38.8
9.	Iraq	76.701	35

Source: Troy Sternberg, *"Chinese Drought, bread and the Arab Spring"* Applied Geography 34 (2012); 519-524.

Drought and despair – climate change and the conflict in Syria

"Syria is not the first 'climate war' and climate change is not causing the Syrian refugee crisis. A major conflict is responsible for that. If we take such simplistic claims seriously, we run the risk of absolving governments, like the al-Assad regime, of their responsibility to protect and provide for their populations. On the other hand, underestimating the risks associated with climate change could also mean missing important contributing factors to state stability and migration. In this case, evidence suggests that climate change has been a factor in creating the conditions underpinning Syria's fragility – and that this fragility is partly responsible for the situation the country finds itself in today." [228]

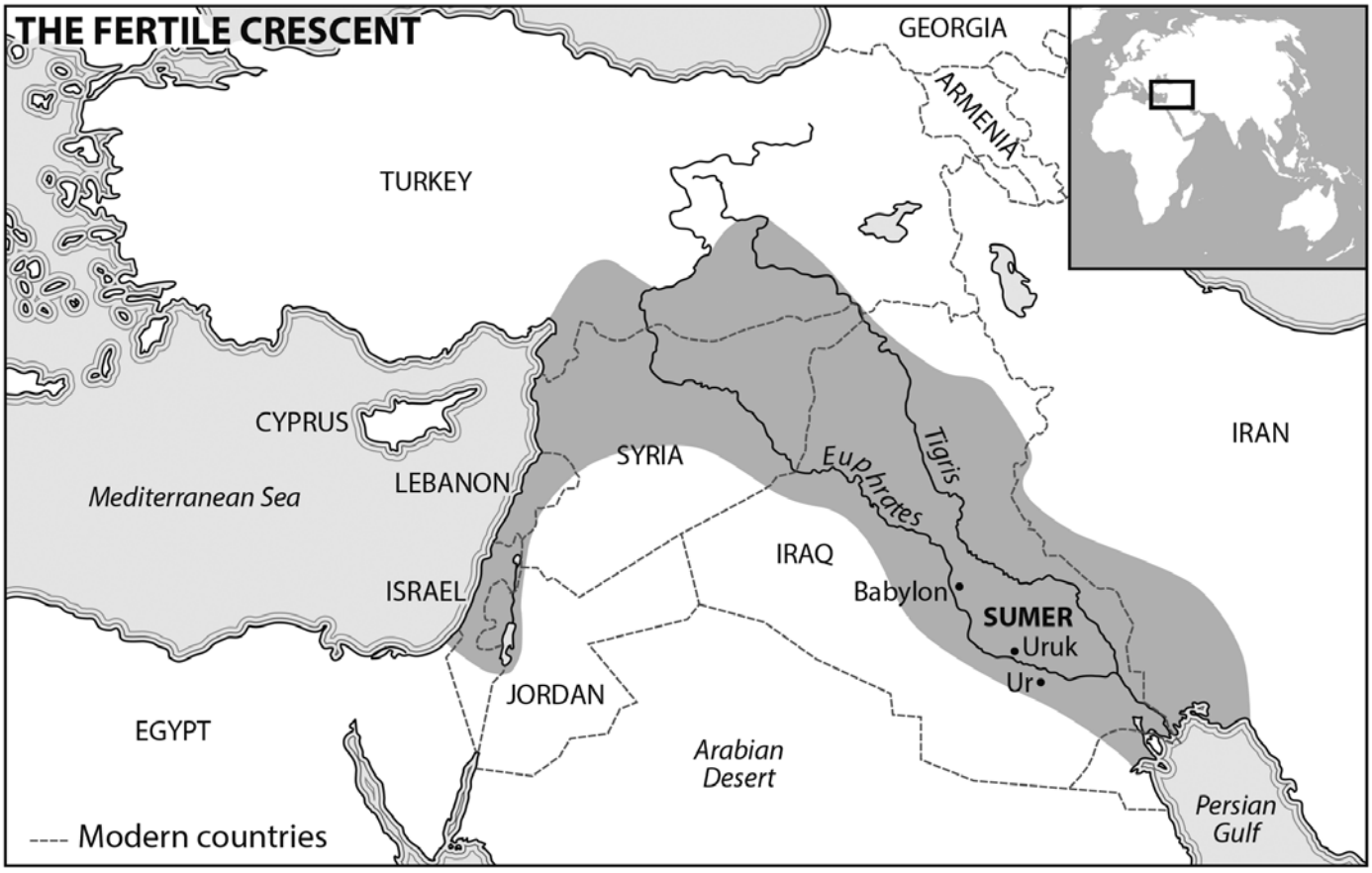
Caitlin Werrell and Francesco Femia, The Center for Climate and Security, 2015

The world is well aware of the humanitarian crisis in Syria. As the country entered its seventh year of civil war in early 2017, almost five million people have fled the country seeking refuge in Turkey, Egypt, Iraq, Jordan and Lebanon, with 2.9 million Syrians registered by the Government of Turkey, one million in Lebanon,[229] 661,000 in Jordan[230] and an estimated 1.2 million seeking refuge in Europe.[231] A further 6.6 million have been displaced internally. Hundreds of thousands have been killed and 13.5 million require humanitarian assistance.[232]

There are multiple factors that led to 2011's outbreak of war: for half a century Syria has been governed by a brutal and corrupt regime. Prolonged and intertwining effects of drought, rural to urban migration, and increasing unrest due to water scarcity, unemployment and growing inequality failed to be addressed by the Syrian Government. A focus on dam construction and irrigation projects in the northeast ignored the problems of smallholder farmers; the ongoing droughts and an emerging humanitarian crisis and food price hikes prior to 2011 fuelled anger and resentment aimed at the Al-Assad Government. Food and water insecurity forced rural people to the outskirts of Syria's already overcrowded cities, at a time when the country was struggling to cope with refugees from the Iraq war.

Background

Syria is part of the 'Fertile Crescent', an area straddling the Middle East and including lands in Egypt, Cyprus, Israel, Palestine, Lebanon, Jordan, Iraq, Turkey, and Iran. The birthplace of agriculture, the rich and fertile soils are bathed by the Tigris, Euphrates, Nile and Jordan, and inspired the cultivation of important crops including barley and wheat; and animal herding began here around 12,000 years ago.[233] Over the past 2,000 years, the Fertile Crescent has become the 'breadbasket' of the eastern Mediterranean and today feeds millions of people.[234] All this is set to change if current projections of drought and rising temperatures continue to impact these once-fertile lands.[235]



From *A Short History of the World* by Christopher Lascelles © ML Design

In 2015, the United Nations Environment Programme (UNEP) published a report on climate change impacts in the Arab region and found that: "While drought episodes can be seen as a natural phenomenon dating back millennia, their frequency and intensity are seen to be increasing, making this aspect of climate change an immense and immediate threat to the region. Land degradation and desertification come at the forefront of risks the region faces".[236]

In very simple terms, in the years preceding 2011, which was the year of the Arab Uprisings, there had been terrible drought conditions in North Africa and the Levant and this had particularly hit the Syrians very badly. As a precursor, as one of the factors that led to the conditions that made Syria explode, I think there is no doubt that the drought played a major role.

Dr. Geoffrey Kemp, Senior Director of Regional Security Programs, Center for the National Interest USA, 2017

Increases in average temperatures combined with extreme heatwaves, prolonged droughts and altered rainfall patterns are exacerbating pressure on already over-exploited aquifers and leading to soil loss, which are already having a devastating impact.[237/238] Predictions for the Fertile Crescent show declining precipitation levels, with Jordan and Syria the worst affected.[239]

Globally, Syria is one of the countries most vulnerable to water scarcity[240] and most economically affected by drought.[241] The country suffered a number of droughts in the 20th century[242], with evidence showing an increasing tendency in annual and seasonal droughts over time.[243] Climate change has contributed to altered precipitation patterns[244], increased temperatures[245], and an increased number of sandstorms.[246] Some 185,180 km² of Syrian land is thought vulnerable to droughts: 63.65% has high or medium vulnerability to drought.[247] These findings are also reflected in the World Bank's 2014 report, *Turn Down the Heat*, which forecasts that countries north of the 25° latitude line – which includes Syria – will become drier.

Drought has become a part of climate change. In the past, the cycle of drought affected Syria every 55 years. It then shrunk to every 27 years and then decreased to every 13 years. Now, it is occurring every seven or eight years.[248]

Samir al-Safadi, Chairman, Syrian Environment Association, 2010

Farmers in the northeast lost 80% of their livestock. Photo: Joel Bombardier

Syrian agriculture

Before the outbreak of war, Syria had more than six million hectares of productive arable land[249] and agriculture accounted for between 17% and 30%[250] of GDP, employing roughly one-third of the workforce.[251] Important crops included wheat, cotton, sugar beet, tobacco, barley, maize and olives.[252] With around 40% of the population classed as rural and largely dependent on agriculture for food and livelihoods,[253] the sector was vital in sustaining rural communities and reducing poverty.

Decade of drought

Between 1999 and 2011, around 60% of Syria suffered from two severe and prolonged droughts, resulting in the heaviest crop failure for many years.[254/255/256/257]

1999: Syria suffered one of its most devastating droughts in recorded history.[258/259] A 1999 UN FAO/World Food Programme (WFP) Mission to Syria reported that the situation was particularly grave for nomadic pastoralist families, with a large proportion of herders facing 'financial ruin', and 4,700 households (over 30,000 people) seriously vulnerable to food shortages and needing food aid.[260]

Rainfall in key areas was 25-70% below normal.[261] The country's barley crop – almost entirely rain-dependent – produced just 380,000 tonnes, less than half of the previous year and down 72% from the previous five-year average.[262] Irrigation meant that reductions in wheat production were less severe, but nevertheless the harvest was around one-third lower than in the previous year. The drought created a dire situation for nomadic herders living in the Syrian steppe, or Badia, where only 33 mm of rain fell in 12 months, compared with the usual 200 mm.[263] High mortality rates amongst sheep flocks led to a significant drop in farm income: herders' debts rose to roughly three times their annual incomes.[264] Agricultural employment declined[265] and many herders had no option but to migrate to urban areas.

2006–2011

- **2006**'s intense drought reduced wheat, cotton and barley harvests by 50% in parts of the country and herders in the northeast lost around 85% of their cattle, affecting 1.3 million people[266/267/268/269]
- **2007-2008** nearly 75% of the households in the northeast suffered total crop failure[270]
- **2007** one million Syrians left food insecure by droughts[271]
- **2009** UN and IFRC: 800,000 Syrians lost their entire livelihood as a result of the droughts[272]
- **2010** UN: 2-3 million driven into extreme poverty[273]
- By **2011**, 1.3-1.5 million Syrians had been forced to migrate from their homes by drought and its impacts.[274]

In 2009, two years before the war started, the International Federation of Red Cross and Red Crescent Societies reported that some 1.3 million inhabitants of Eastern Syria had been affected by the drought, of which 803,000 lost almost all of their livelihoods and faced extreme hardship, resulting in an unprecedented migration from affected areas.[275/276] A 2009 study found 160 villages in the northeast of the country had been completely abandoned in the preceding two years.[277]

Under normal conditions, crops are fed by winter precipitation and water flowing from Turkey's mountains but between October and December 2007, little or no rain fell[278] and the drought was exacerbated by abnormally hot Spring temperatures in 2008.[279] The lack of rainfall in 2007 and 2008 devastated Al Hasakah, Deir ez-Zor and Al Raqqa[280], the northeast's main grain-growing regions, which had weak infrastructure and the least capacity to deal with the drought.[281]

In 2008, the continued drought meant that for the first time in 15 years, the Syrian Government had to import wheat.[282] Feeding Syria's people was left to the vagaries of world wheat prices, which globally increased by 50% between 2009-2010.[283] Limited government intervention failed to meet Syria's needs, and wheat and barley shortages drove food prices higher. From January 2008 to 2010 the price of bread and cereals – essential to the Syrian diet – increased by around 27%,[284] with devastating impact: by 2010, up to 3.7 million people were food insecure.[285] The worst-affected families were forced to survive on a diet of bread and sugared tea;[286] milk and meat were no longer available. Cases of malnutrition and nutrition-related diseases increased.[287]

A World Bank study from 2014 found that in 2011, the households taking part in the study in the Syrian Arab Republic lost 19.5% of their income due to environmental change, most of this was due to a loss in crops as a consequence of the drought.[288]

It is ironic: this region is the origin of wheat and barley, and now it is among the biggest importers of these products.[289]

Rami Zurayk, Professor of Agricultural and Food Science, American University in Beirut, 2010

The regime's failure to respond to the crisis[290/291/292/293] resulted in massive changes to migration patterns. Traditionally, men migrated to the cities in search of temporary work, but, since 2006, migration became permanent and involved entire families forced to move from rural to urban areas.[294] By June 2009, the Syrian Government calculated that between 200,000 and 300,000 people migrated from rural Al-Hasakeh Governorate alone.[295] More recent estimates are of 1.5 million rural migrants[296] with cities such as Al-Raqqa, Al-Hasakeh and Aleppo absorbing much of the influx.[297]

Before the drought, the internal migration rate was just 1%, lower than any other country in the region;[298] by 2011, the World Bank reported that 85.25% of people surveyed used migration as an 'adaptation strategy' to the drought's impact.[299] Since the beginning of the 2000s, the emigration rate also increased, especially in those areas most affected by drought;[300] compounding this was a rapid rate of population growth – one of the highest in the world.[301] When agriculture could no longer absorb the growing labour force, unemployment – especially amongst the young – skyrocketed[302] expanding the number of poor, marginalised and disenfranchised Syrians. Unlike the 'Arab Spring' in Egypt and Tunisia, the Syrian uprising took place among the most impoverished and in marginalised neighbourhoods with high concentrations of rural migrants.[303]

A woman and three children stand near their conical tent shelter in the Bab Al Salame camp for internally displaced persons, near the border with Turkey in Aleppo Governorate. © UNICEF/UNI156528/Diffidenti

I had 400 acres of wheat, and now it´s all desert [...] We were forced to flee. Now we are less than zero – no money, no job, no hope.[304]

Ahmed Abdullah, Syrian farmer, 2010

The lead-up to war was the culmination of multiple factors: poor resource management, unemployment, inflation, food insecurity and demographic pressure from refugees and the displacement of up to 2 million farmers and herders[305] and the regime's failure to respond to their needs. Migration and unemployment exacerbated deep pockets of poverty and inequality in cities that were already overstretched by failing public services and falling Government subsidies; together these were compounded by a brutally repressive and corrupt regime. Discontent and public anger grew across Syria, helping to fuel and catalyse the resistance movement and creating the tinderbox, which once sparked by the first protests in Daraa in March 2011, ignited into the widespread protests across the country and the complex war and desperate humanitarian crisis being witnessed today.[306]

Since 2011, half the country's pre-war population – more than 11 million people – have been killed or forced to flee their homes.[307] More than six million of the remaining population is internally displaced.[308]

"Around 75% of farmers suffered total crop failure, so they moved into the cities. Farmers in the northeast lost 80% of their livestock, so they had to leave and find livelihoods elsewhere. They all moved into urban areas – urban areas that were already experiencing economic insecurity due to an influx of Iraqi and Palestinian refugees. But this massive displacement mostly wasn't reported. So, it wasn't factoring into various security analyses. People assumed Syria was relatively stable compared to Egypt." [309]

Washington Post, 2013

Climate change is what the Department of Defense has called a 'threat multiplier', which means that even if climate change isn't the spark that directly ignites conflict, it increases the size of the powderkeg... In the years prior to civil war breaking out in Syria, that country, too, experienced its worst drought on record.[310]

Susan Rice, former US National Security Advisor, 2015

In 2015, scientists demonstrated that the emerging 'climate change signal' in the Fertile Crescent made that severe drought (2006-2010) two to three times more likely.[311] A 2016 study led by Ben Cook, a climate scientist at NASA's GISS and the Lamont Doherty Earth Observatory at Columbia University concluded with 'high confidence' (98%) that the extended drought in the Levant region between 1998 and 2012 was drier than any other comparable period over the last 500 years.[312]

May 2014, Old City area of Homs, Syrian Arab Republic.
© UNICEF/UNI162757/Ali

In the context of Syria's worst recorded drought and the mass migration that followed, it seems unreasonable to take the view that, "the possible role of climate change in this chain of events is not only irrelevant, it is also an unhelpful distraction and a damaging alibi for the Assad regime's failings"[313] or that such a conflict "could have happened at any time in Syria, irrespective of the drought".[314] More recently analysts have detailed the gravity of the drought and groundwater depletion and the effects on rural livelihoods, strongly suggesting that these elements contributed to the 2011 unrest. Indeed, many experts now support the notion that the war in Syria is a representative case of how a climate variable can exacerbate existing social and political unrest, particularly in fragile states or with poor governance.[315/316/317/318]

The problem of commentators dismissing climate change as a driver of conflict is that it oversimplifies the complex nature of the climate-security nexus. Indeed, by dismissing climate as a factor, such approaches risk reducing the emphasis on climate mitigation that is so urgently required if food and water insecurity, mass migration and future resource conflicts are to be avoided.

A 2015 paper by the Center for Climate and Security succinctly makes 3 key points:[319]

- **There has been an oversimplification and underestimation of climate-security risks.** In Syria's case, strong evidence suggests that climate change has been a factor in creating the conditions underpinning Syria's fragility, which is partly responsible for the situation the country finds itself in today.
- **New stresses demand new risk assessments** which, in a rapidly changing world, need to include a wider range of climate-related factors and the water and food insecurity that result from extreme weather hazards. In the case of Syria, security analysts failed to take these – and the mass human displacement which followed – into account.
- **The future may not be wholly predictable**, but evidence that climate change is connected to state fragility and migration is growing.

"While scholars must continue to seek greater certainty in those connections, policymakers do not have the luxury to wait for that certainty... where such delays may be implicated in state failure and humanitarian crisis... We should not demand that governments wait for near-perfect certainty before acting."[320]

Caitlin Werrell and Francesco Femia, The Center for Climate and Security, 2015

Protecting climate refugees

With the recent humanitarian crises in the Mediterranean and unfolding tragedy in East Africa, and alongside mass displacement as a result of slow-onset or extreme weather events, international policymakers are more aware of climate change as a trigger of forced migration. There has been some movement towards the political recognition of climate refugees and a growing global awareness of the threat climate change poses to the most fundamental human rights.

Climate-induced, forced migration can be discussed from different perspectives: environmental, developmental, disaster and risk reduction, humanitarian responses to migration, and from human rights and security perspectives. The concept is evolving quickly and multilateral organisations are starting to develop a more holistic approach to the protection of climate refugees. However, they still lack recognition and protection under international law.[321]

Existing legal and policy frameworks lack specificity with regards to how particular populations are affected by different types of climate-induced displacement. Many of the frameworks that currently govern statelessness and refugees are largely inapplicable and inappropriate. For example, those that specify particular criteria tend to exclude a large proportion of the overall population of concern, while those which detail obligations upon states and identify mechanisms aimed at reducing the risk of displacement and assisting affected populations are undermined by a lack of systems for monitoring, enforcement and accountability.

Those which can confer varying degrees and types of legal protection are generally vulnerable to dispute or differences in interpretation. In many respects, these shortcomings reflect the broader failure to arrive at functional definitions and, in particular, develop a means of distinguishing forced from voluntary movements in the context of environmental change. EJF argues that a new legal framework must be capable of responding to a multiplicity of climate-induced displacement scenarios and incorporate mechanisms to provide for the adaptation and risk reduction needs of multiple populations of concern.

This struggle [Paris summit] is not only about securing dramatic cuts in carbon emissions but getting the world to focus on a broad range of side issues related to climate change that have yet to be debated. These include formulating new international laws to deal with the issue of climate refugees.[322]

Josaia Voreqe Bainimarama
Prime Minister of Fiji, 2015

Sweden – pioneering the protection of climate refugees

Since 2005 Sweden has provided the possibility for persons to be considered in need of protection also if they are unable to return to their country of origin because of an environmental disaster.[323] This is a first step in creating a system of protection for climate refugees and other States should follow this example.

Refugee camp in Jordan, 2017. © EJF

Climate change is even one of the root causes of a new migration phenomenon. Climate refugees will become a new challenge if we do not act swiftly.[324]

Jean-Claude Juncker
EU Commission President, 2015

Lebanon, 2014. A young Syrian girl seating on a broken chair by her tent in Faida 3 camp, an informal tented settlement for Syria refugees in Bekaa Valley, Lebanon. © UNICEF/UNI180454/Romenzi

Conclusions

Rising sea levels threaten every coastline. More powerful storms and floods threaten every continent. More frequent droughts and crop failures breed hunger and conflict in places where hunger and conflict already thrive. On shrinking islands, families are already being forced to flee their homes as climate refugees. The security and stability of each nation and all peoples – our prosperity, our health, and our safety – are in jeopardy.[325]

Barack Obama, 44th President of the United States, 2009

Anthropogenic climate change presents a near and present danger to environmental integrity and as a result to security, economic and social well-being and political stability across our planet.

The threat posed by climate change cannot be understated. In April 2017, measurements of the global concentration of carbon dioxide in the atmosphere exceeded 410 ppm. The last time such levels were present, during the Pliocene era three million years ago, sea levels were nine to 27 metres higher. We are currently only spared such effects by the time that it takes for the climate to respond and reach equilibrium with levels of atmospheric GHG.

Climate change is fast becoming one of the most pressing issues on the international security agenda. Its nature as a threat multiplier not only jeopardises the fundamental human rights of populations but also pushes some of the world's poorest and most vulnerable people deeper into poverty. It amplifies strains on infrastructure and services within society, and on national and international governance structures. Where exposure to the impacts of climate change is greatest, sensitivities are high, and there is limited resilience, states face a pressing security threat.

The World Economic Forum 2017 Global Risks Report states:

"Over the course of the past decade, a cluster of environment-related risks – notably extreme weather events and failure of climate change mitigation and adaptation as well as water crises – has emerged as a consistently central feature of the GRPS risk landscape, strongly interconnected with many other risks, such as conflict and migration."[326]

Depending on how affected populations react to this threat, the impacts of climate change may contribute to the outbreak of conflict or sustain existing conflicts.

This report highlights the particular role played by climate change – in combination with resource conflicts, human migration, and pre-existing fragility – in generating insecurity and conflict. Climate impacts will be felt most profoundly in regions and countries where exposure is greatest and where there is the lowest capacity to adapt. Many climate-vulnerable regions already exist in situations of state fragility, conflict or post-conflict recovery.

Even in the absence of anthropogenic climate change, a growing human population and expanding international demand are posing significant challenges to global development. The poorest countries are the most vulnerable to rising food prices and have the highest potential to spark civil unrest or wider conflict. Concerns have been expressed for Central America and the Caribbean[327], with food riots in Venezuela sparking mass protests and civil disobedience; Kyrgyzstan and Tajikistan in Central Asia, as well as Africa, where 14 countries suffered civil unrest and food riots in 2007-2008.[328]

The world's major military powers and security institutions are consistently and increasingly voicing their concerns regarding the impacts of climate change, or more specifically, of 'climate security'. The insecurity created is the defining threat to global human rights in the 21st century. At the 2017 Munich Security Conference – an annual conference focusing on high-level international security policy – a high-level panel identified climate change as a global megatrend that must be addressed in order to "build a culture of prevention for long-term peace and prosperity" and noted the security community's acceptance of climate change as a security issue "with its long-term view, [it] knows that what's happening now is just the start".[329]

Where existing international human rights frameworks have insufficient scope to protect those affected by the impacts of climate change, regulatory measures and precedents must be established and rigorously and equitably enforced.

The recognition of climate change as a threat not only to the stability of ecological systems which have sustained human life for thousands of years but also to the rights of those living today, is the alarm call for a new paradigm of environmental cooperation in which progressive and ambitious action on climate change should be central to conflict prevention and human rights protection strategies.

"Waiting for humanitarian crises to hit the front pages before acting has proven a great failure of the international community in the past few decades. How we respond to that failure will be the measure of our resilience".[330]

Caitlin Werrell and Francesco Femia, The Center for Climate and Security, 2015

Recommendations

Governments must ensure that the development of legal protections and actions are migrant-centred, human rights-based and gender-responsive within a system of global migration governance.

Mitigation against climate change

- **EJF calls on all countries to rapidly and fully implement the global climate agreement agreed in Paris** in December 2015 and support efforts to raise their emission reduction pledges over time in line with its goal to phase out man-made emissions and keep global temperature rise below 1.5°C on pre-industrial levels.

- In the next 5 years there must be greatly accelerated public and private investment in renewable energies and energy-saving initiatives within a package of measures to curb GHGs outlined under the Paris Agreement.

Supporting resilience, adaptation and climate justice

- Member States of the United Nations must rapidly progress the development of an international agreement that will clarify the rights and ensure the protection of climate refugees. Such action must take place entirely outside of the scope of the 1951 Convention Relating to the Status of Refugees.

EJF believes that refugee law is not a suitable avenue through which to pursue responses to climate-induced displacement. It is vital that existing instruments are not amended or opened up to renegotiation.

- Member States should provide their full backing to the UN Office of the High Commissioner for Human Rights, which is leading an initiative by the Global Migration Group to devise a set of Principles and Guidelines on the human rights protection of migrants in vulnerable situations.

- Definitions of climate-induced migration are urgently needed to ensure a rights-based approach and give clarity to the legal status of 'climate refugees'. There is a need to clarify the obligations of States to persons displaced by climate change within new legal definitions and these must be developed without delay.

- Governments must provide full backing to the Warsaw International Mechanism on Loss and Damages Task Force on Displacement as it develops its work and multi-stakeholder, inclusive approach and develops recommendations for the UNFCCC.

EJF asserts that international frameworks governing displacement are ill-equipped to respond to the different types of involuntary movement associated with climate change. Effective responses to those dimensions of the issue that are covered are plagued by operational inefficiencies.

- **Additionally, in consideration of the wide ranging nature of the issues and multiple existing initiatives, EJF calls for a UN Special Rapporteur on Human Rights and Climate Change** to both examine the issues surrounding climate change and forced displacement, and identify the most effective means to build cooperation and complementarity between initiatives, existing legal agreements and current commitments from the international community.

- The UN Secretary General should establish an expert meeting on climate change, human rights and forced migration.

- Multilateral cooperation must be intensified to reduce the threat of food insecurity by strengthening social protection systems and investing in productive, inclusive and resilient agriculture, fisheries and other mainstays of food security.

- States should work together and share innovation, technology transfer and expertise and localised capacity building to help with the preparedness for natural disasters and extreme weather events, including slow-onset events.

- States must develop cooperative measures to ensure that decision-making is transparent and empower affected persons through meaningful consultation and consent; planned relocation can only be undertaken on a voluntary basis in full respect of human rights obligations, with the informed consent of the community, and avoiding any forced evictions.

- States should take measures to respect, protect, and fulfil all human rights without discrimination and to provide access to protection and justice for those compelled to move as a result of climate change – in transit, at international borders and upon arrival.*

- In all deliberations and future negotiations, all stakeholders must be included, with special reference to local communities and the most vulnerable and disenfranchised on our planet. It is essential that marginalised communities are given a voice.

EJF argues that persons rendered stateless by extreme climate change impacts constitute one of the clearest examples of a legal and policy void across international frameworks.

* with acknowledgements to speech given by Kate Gilmore United Nations Deputy High Commissioner for Human Rights to UN Human Rights Council Panel Discussion on Human Rights, Climate Change, Migrants and Persons Displaced across International Borders, Geneva 6/10/2017.

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U.S. Marine Corps. Photo: Lance Cpl. Niles Lee

Climate change could lead to a humanitarian crisis of epic proportions. We're already seeing migration of large numbers of people around the world because of food scarcity, water insecurity and extreme weather, and this is set to become the new normal.

Brigadier General Stephen A. Cheney
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