ECOLOGICAL THREAT REPORT 2021

UNDERSTANDING ECOLOGICAL THREATS, RESILIENCE AND PEACE

Institute for Economics & Peace

IEP

Quantifying Peace and its Benefits

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EXECUTIVE SUMMARY

This is the second edition of the Ecological Threat Report (ETR), which analyses 178 independent states and territories. Produced by the Institute for Economics and Peace (IEP), the report covers over 2,500 sub-national administrative units or 99.9 per cent of the world's population. It assesses threats relating to *food risk, water risk, rapid population growth, temperature anomalies and natural disasters*. These assessments are then combined with national measures of socio-economic resilience to determine which countries have the most severe threats and lowest coping capabilities. These are the countries most likely to suffer from increased levels of ecological-threat related conflict. The report also looks at the future, with projections out to 2050.

Many ecological threats exist independently of climate change. However, climate change will have an amplifying effect, causing further ecological degradation and pushing some countries through violent tipping points.

Countries with high population growth are amongst the most ecologically degraded. The combination of weak socio-economic resilience, extreme ecological risk and rapid population growth can result in societal collapse.

The report uses IEP's Positive Peace framework to identify countries without enough socio-economic resilience to adapt to or cope with these future shocks. Positive Peace has a strong statistically significant relationship to peace, and this framework has proven successful in forecasting substantial falls in peace and predicting superior economic growth.

The main finding from the 2021 ETR is that a cyclic relationship exists between ecological degradation and conflict. It is a vicious cycle whereby degradation of resources leads to conflict, and the ensuing conflict leads to further resource degradation. Breaking the cycle requires improving ecological resource management and socio-economic resilience. The resilience and adaptability of the socio-economic system, referred to as the societal system, will generally determine the outcome.

Based on current trends, future prospects are not encouraging. Both undernourishment and food insecurity have been steadily rising since 2015. This is the reversal of a long-established trend where undernourishment had been improving. The factors causing this are complex, however, high population growth, lack of potable water and increasing land degradation are clear contributors. Based on the current number of undernourished people and allowing for population growth, IEP projects the number of undernourished people to rise by 343 million people by 2050, to 1.1 billion. This is a 45 per cent increase.

The 2021 ETR identifies three clusters of ecological hotspots, which are particularly susceptible to collapse:

- The Sahel-Horn of Africa belt, from Mauritania to Somalia;
- The Southern African belt, from Angola to Madagascar;
- The Middle East and Central Asian belt, from Syria to Pakistan.

The impact of ecological degradation on conflict is highlighted by the strong overlap between the countries with the highest levels of conflict, as measured by the Global Peace Index (GPI), and those with the worst ecological degradation. Eleven of the fifteen countries facing the worst ecological threats are currently in conflict, and another four are at a high risk of substantial falls in peace. Examples include Afghanistan, Yemen, Somalia, Niger, Burkina Faso and Pakistan.

Given the significant link between ecological fragility and conflict, addressing water availability, food security and high population growth in countries mired by conflict will improve prospects for lasting peace.

Highly resilient countries have the best ability to manage their natural resources while still catering for their socio-economic needs. Positive Peace is a proxy for socio-economic resilience and the attributes of Positive Peace allow for higher levels of adaptability. This includes better water management, more efficient agricultural systems, and the capability to import food when local production is insufficient. No country with a high level of peace has an extremely poor ETR score, underscoring the relationship between ecological fragility and conflict.

On the other hand, eighty per cent of the countries with the worst ETR scores are also among the world's least resilient. This indicates that these nations may not be able to mitigate the impacts of their rapidly changing environment.

The 30 countries facing the highest level of ecological threat are home to 1.26 billion people. These nations combine low socio-economic resilience with medium to extremely high catastrophic ecological threats.

The number of people displaced by conflict has been steadily rising. At the end of 2020, 34 million people had been forcibly displaced from their home nations. Of this total, 23.1 million people or 68 per cent came from these 30 hotspot countries. Without a reversal of ecological degradation, these numbers are likely to increase.

More positively, the 2021 ETR identifies that 46 countries face low ecological threat levels, with 35 exposed to very low threats. Eighty-nine per cent of these countries have high Positive Peace scores. These countries also have low population growth. In 2021, their combined population is 1.96 billion people, and by 2050, this figure will slightly increase to 2.18 billion people. These countries are mainly located in Eastern and Western Europe, North America and South America.

Food insecurity remains a serious challenge and has also been on the rise. Underlying the urgency of the situation, the Food and Agricultural Organisation of the United Nations (FAO) estimates that in 2020, a total of 2.4 billion people, or 30.4 per cent of the global population, are food insecure. In 2020 the number of food-insecure people rose by 318 million people relative to the previous year. The vast majority of this increase occurred in three regions: South Asia, sub-Saharan Africa and South America, where the numbers of food-insecure people rose by 128 million, 86 million and 40 million, respectively.

Sub-Saharan Africa has the highest prevalence of food insecurity, with 66 per cent of the population deemed food insecure. Sub-Saharan Africa also has the lowest societal resilience of all regions. By 2050, sub-Saharan Africa's population is projected to be 2.1 billion, a 90 per cent increase from today's levels. Such rapid population growth is unsustainable and could translate to hundreds of millions of additional food-insecure people over the next few decades. Eleven countries in the region are expected to double their population between now and 2050. The three countries with the largest projected increases in population are Niger, Angola and Somalia, where the populations will increase by 161, 128 and 113 per cent, respectively.

The Sahel is especially vulnerable. The region faces many converging and complex challenges such as civil unrest, weak institutions, corruption, high population growth and lack of adequate food and water. These issues have formed a vicious cycle whereby ecological degradation and population growth have increased the likelihood of conflict and facilitated the rise of Islamist insurgencies.

There are gender differences in the way malnutrition affects human growth and development. The data indicates stunting and thinness markedly affects males more than females, especially in Africa, where stunting and thinness rates are twice as high for males than females.

The relationship between malnutrition and violence is not well researched, especially in areas suffering from prolonged conflicts. In particular, the links between poor nutrition, brain development and emotional control needs to be studied more deeply, and whether hunger may act as a motivator for young males joining militias. In 14 countries in sub-Saharan Africa, more than 10 per cent of young men suffer from very low body mass. These countries are also among the least peaceful in the GPI.

In 2020, nearly 170 countries closed their borders, either partially or completely due to the COVID-19 pandemic. This severely affected refugee movement and resettlement. In 2020, according to the United Nations High Commissioner for Refugees (UNHCR), the number of refugees resettled or naturalised was the lowest on record. Only 250,000 refugees returned home compared to the pre-COVID average of 670,000 returnees. In Europe, Turkey hosted the largest number of refugees at 3.9 million, followed by Germany at 1.5 million and France at 550,000.

This report analyses and proposes a number of policy recommendations to improve the efficiency of interventions and break the vicious cycles that exist in many parts of the world. Three of the key recommendations were:

- International agencies need new integrated structures that combine health, food, water, refugee relief, finance, agricultural, development and other functions. This would create area-specific integrated agencies that would be agile and built for specific contexts while also providing a simplified chain of command, better allocation of resources and faster decision making. This would align with the systemic nature of many of the problems. The focus should be on building societal resilience.

- Many of the solutions to the ecological problems can generate income. An example is the provision of water that can then be used to grow food. If businesses can garner a profitable return from ecologically positive investments, funds will naturally flow towards solutions. These businesses need to be small scale and run by local business people. Better leveraging of carbon offsets for the local communities can also provide income.

- Empowering local communities. Community-led approaches to development and human security result in more effective programme design, easier implementation and more accurate evaluation. Due to the strong bonds within communities, cooperatives can work well. This provides a mechanism for the pooling of resources and the dilution of costs.

In summary, ecological threats will continue to create humanitarian emergencies and will likely increase without a sustained effort to reverse the current trend. Ecological threats are becoming more pronounced and affecting more people than ever. Building resilience to these threats will increasingly become more important and will require substantial investment now and into the future.

KEY FINDINGS

SECTION 1: RESULTS

- Ecological threats are correlated with high levels of violence. This is due to systemic dynamics, whereby the depletion of resources and violent disputes reinforce one another, forming a vicious cycle.
- In 2021, 47 countries home to 3.3 billion people face high to extreme ecological threats, but many have adequate levels of resilience.
- IEP estimates that by 2050, 4.7 billion people will reside in countries with high and extreme ecological threats. Their populations will account for 48.7 per cent of the world's total population.
- No high or very high peace country as measured by the Global Peace Index scores extremely high threat on the ETR.
- There are 30 countries facing the highest levels of ecological threat, home to 1.26 billion people. They have both low socio-economic resilience and medium to extremely high catastrophic ecological threats.
- Overall, 16 of the 20 countries with the highest ETR score are among the world's least resilient countries, measured by the Positive Peace Index (PPI).
- The vulnerable countries with the least socio-economic resilience are clustered in three geographical regions: The Middle East and North Africa (MENA), sub-Saharan Africa and South Asia — these are also the three least peaceful regions as measured by the Global Peace Index (GPI).
- North America and Europe are the two regions with the lowest average level of ecological threat.
- South Asia, sub-Saharan Africa and MENA are the regions with the highest average level of ecological threat.
- Eleven of the 12 African countries in conflict in 2018 were experiencing food insecurity.
- Afghanistan has the highest overall score on the 2021 ETR. All 34 of Afghanistan's administrative units are facing extremely high levels of threat.
- From 1990 to 2020, a total of 10,320 natural disasters occurred globally. Flooding has been the most common natural disaster, accounting for 42 per cent of the total disaster count.
- In 2020, 177 countries and territories recorded a warmer average temperature compared to their historical average temperatures.
- Eleven countries are projected to double their population between 2021 and 2050. They are all in sub-Saharan Africa.
- The three countries with the largest projected increases in population are Niger, Angola and Somalia, where the populations will increase by 161, 128 and 113 per cent, respectively.

SECTION 2: FOOD SECURITY

- The number and percentage of food-insecure people globally has risen every year since 2014. In 2020, 2.4 billion people or 30.4 per cent of the population were food insecure. This is an increase of 44 per cent since 2014.
- The number of undernourished people had been decreasing globally until 2015. Since then, the trend has reversed, and undernourishment has been on the rise.
- 2020 recorded the largest increases in food insecurity and undernourishment since at least 2014, with an additional 300 million suffering from food insecurity and an additional 118 million from undernourishment.
- By 2050, the number of food-insecure people is expected to increase by 43 per cent to 3.4 billion people.
- The number of undernourished people is projected to rise by 343 million people by 2050, a 45 per cent increase from 2020. Currently, 768 million people are undernourished in 2020.
- The COVID-19 lockdowns will likely have a long-lasting negative impact on world hunger.
- By 2050, the global demand for food will increase by 50 per cent from current levels.
- Two-thirds of people in sub-Saharan Africa currently face food insecurity, the highest rate of any region, while 264 million suffer from undernourishment. It is followed by South Asia, where 44 per cent of the population suffer from food insecurity.
- Europe has the lowest prevalence of food insecurity, with less than six per cent of its population affected.
- Rates of male thinness in low-peace countries are on average almost twice that of females. Lesotho, Zimbabwe and Togo have the highest differentials. In those countries, young males are very thin at rates 3.4 to 5.7 times higher than young females.
- The five most undernourished countries are Somalia, the Central African Republic, Haiti, Yemen and Madagascar.
- Almost two-thirds of Afghanistan's population faced food insecurity in 2020. This situation may worsen following the Taliban's return to power in 2021.
- Global food prices have increased dramatically since 2019 as a result of the COVID-19 pandemic and the associated economic downturn. By the first half of 2021, the Food Price Index had recorded a 26.8 per cent rise relative to 2019 prices. These rising prices will exacerbate the problem of food insecurity in the coming years.

SECTION 4: FORCED DISPLACEMENT

- At the end of 2020, 82.4 million people were forcibly displaced globally — the highest number on record.
- In 2020, approximately 1 in 94 people globally were forcibly displaced compared to 1 in 161 in 2000.
- Low and very low peace countries account for 91 per cent of the people forcibly displaced from conflict and violence worldwide.
- At the end of 2020, 68 per cent, or 23.1 million of the total forcibly displaced people living outside their home country came from hotspot countries – countries with catastrophic ecological threats and low societal resilience.
- The total number of forcibly displaced people has increased each year for the last nine years.
- At the end of 2020, approximately two in three people forcibly displaced by violence and conflict were displaced within their country.
- The three countries with the highest number of people displaced by conflict are Syria, Afghanistan and the Democratic Republic of the Congo.
- In May and June 2020, nearly 170 countries out of 195 closed their borders either partially or completely because of COVID. This severely affected refugee movement and resettlement.
- In 2020, only 251,000 refugees returned home compared to the pre-COVID average of 670,000 returnees.
- In 2020, 68,000 people resettled and naturalised, down from the 20-year average of 170,000 people per year.
- People internally displaced from conflict are often displaced for longer periods, sometimes decades. For people displaced by natural disasters, the duration is usually less than a year.
- In 2020, South Sudan had the largest number of refugees return home at 122,000, followed by Burundi at 40,800 refugees.
- The majority of disaster displacement events were concentrated in Asia-Pacific and South Asia. China, the Philippines, India and Bangladesh each recorded more than 3.9 million new displacements from disasters in 2020.
- As Syria's conflict entered its tenth year, 6.6 million people were internally displaced and an additional 6.8 million externally displaced. Of the 6.8 million Syrians displaced abroad, 4.7 million are hosted in Europe, two million in MENA, and 100,000 in other regions.
- At the end of 2020, Europe was hosting the largest number of people displaced abroad. Turkey hosted the largest number of refugees within the region at 3.9 million, followed by Germany at 1.5 million and France at 550,000.

1 Results

KEY FINDINGS

- Ecological threats are correlated with high levels of violence. This is due to systemic dynamics, whereby the depletion of resources and violent disputes reinforce one another, forming a vicious cycle.
- In 2021, 47 countries home to 3.3 billion people face high to extreme ecological threats, but many have adequate levels of resilience.
- IEP estimates that in 2050, 4.7 billion people will reside in countries with high and extreme ecological threats. Their populations will account for 48.7 per cent of the world's total population.
- No high or very high peace country scores extremely high threat on the ETR.
- There are 30 countries facing the highest levels of ecological threat, home to 1.26 billion people. They have both low socio-economic resilience and medium, high or extremely high catastrophic ecological threats.
- Overall, 16 of the 20 countries with the highest ETR score are among the world's least resilient countries, measured by the Positive Peace Index (PPI).
- The vulnerable countries with the lowest socio-economic resilience are clustered in three geographical regions: The Middle East and North Africa (MENA), sub-Saharan Africa (SSA) and South Asia — these regions are also the three least peaceful as measured by the Global Peace Index (GPI).
- North America and Europe are the two regions with the lowest average ETR score.
- South Asia, sub-Saharan Africa and MENA are the regions with the highest average score.
- Eleven of the 12 African countries in conflict in 2018 were experiencing food insecurity.
- Afghanistan has the highest overall score on the 2021 ETR. All 34 of Afghanistan's administrative units are facing extremely high levels of threat.
- From 1990 to 2020, a total of 10,320 natural disasters occurred globally. Flooding has been the most common natural disaster, accounting for 42 per cent of the total disaster count.
- In 2020, 177 countries and territories recorded a warmer average temperature compared to their historical average temperatures.
- Eleven countries are projected to double their population between 2021 and 2050. They are all in sub-Saharan Africa.
- The three countries with the largest projected increases in population are Niger, Angola and Somalia, where the populations will increase by 161, 128 and 113 per cent, respectively.

Background

The Ecological Threat Report (ETR) is a comprehensive, data-driven analysis covering over 2,500 sub-national administrative units in 178 independent countries and territories. It covers 99.9 per cent of the world's population and assesses threats relating to food risk, water risk, population pressures, climate change and natural disasters.

This report uses two approaches to measure the level of ecological threat. The first approach is the ETR score which is an average of the five threats. It uses the relative severity of five indicators to build up the overall level of threat faced by a country. The ETR score can be divided into two domains; Natural Disasters and Temperature Rise, and Resource Scarcity.

However, averaging the five threats to calculate the score means that countries facing catastrophic events may not be prioritised correctly. Therefore, the second approach looks at the most severe threats a country faces to achieve the catastrophic threat score.

When combining the catastrophic threat score with a country's resilience, IEP can identify whether the country can respond to ecological threats. Many countries will have the resilience to cope with the threats. However, there are countries with catastrophic threats and low resilience — these are identified as ecological hotspots.

This report identifies the countries most at risk of catastrophic failure which may lead to conflict due to ecological collapse and low socio-economic resilience. These countries are currently facing hardship and instability, even without the effects of climate change. For instance, rapid population growth and food insecurity in regions such as sub-Saharan Africa and parts of MENA have been stressors of socio-political instability for at least the past fifty years. Since the 1960s, water scarcity strained international relations in the Middle East, as Turkey, Syria and Iraq competed for the resources of the Euphrates-Tigris Basin.[1] Similar tensions exist between Egypt, Sudan and Ethiopia in regards to the water of the river Nile.[2]

The balance between human activity and the planet's ecology is coming under increasing stress. Freshwater available for consumption is becoming more scarce. Globally, 2.6 billion people are living in countries exposed to high and extreme water stress. By 2040, this could increase to 5.4 billion.[3] Food insecurity has slowly become more prevalent and approximately one in three people globally do not currently have adequate nutrition.[4] With the global population expected to grow by around one-quarter over the next 30 years, food insecurity, water shortages and the severity of natural disasters is also likely to rise.

Looking forward, climate change will act as a threat multiplier, potentially exacerbating competition and tensions among countries with low resources and resilience.

The number of natural disasters, including floods and droughts affecting human settlements, has tripled over the last four decades and is likely to continue growing.[5] The latest Intergovernmental Panel on Climate Change (IPCC) report projects worse fires, longer droughts, and more severe floods.[6]

With the global population continuing to increase, consumption will grow, thereby increasing humanity's ecological footprint. As a result, the effects of ecological threats will become more pronounced. Within a decade, global warming could push temperatures to 1.5 degrees Celsius above pre-industrial levels.[7] All of these factors will interact, compounding the pressures on many countries. These challenges may negatively affect existing social and political structures. Recent examples of forced mass migration suggest that the impact of negative shocks often extend well beyond national and even continental boundaries. In 2020, 30.7 million people from 145 countries and territories were displaced by disasters, according to the Internal Displacement Monitoring Centre (IDMC).[8]

This highlights the urgency for a deeper understanding of how countries will be impacted and whether they have the socio-economic resilience to withstand extreme shocks.

To mitigate the humanitarian and economic impacts of these future ecological shocks, it is imperative to raise the levels of resilience in the most vulnerable countries. This will enable them to protect their populations and infrastructure from these shocks, and conduct robust social and economic recoveries in their aftermath. In this context, one of the key aims of the ETR is to identify the potential shocks facing countries. It also aims to provide an impartial, data-driven foundation for the debate about ecological threats facing countries and sub-national administrative units and to inform the design of resilience-building policies and contingency plans.

IEP has statistically shown how societies can create resilience through building Positive Peace. By combining this work with data on ecological threats, global risk hotspots have been identified. Box 1.1 gives an introduction to Positive Peace, resilience and systems thinking.

The overlap between two groups of countries is used to determine the hotspot countries. The first group are those that face medium to extremely high catastrophic threat. The second group are the 30 countries with the lowest societal resilience as measured by the Positive Peace framework. Only countries with low resilience and a high level of threat are included. Figure 1 shows this process. In total, 1.26 billion people are living in these 30 hotspot countries which have the most severe threats and lowest coping capabilities. These are the countries most likely to either fall into conflict or suffer from increased levels of conflict because of deteriorating ecological factors. It is a vicious cycle whereby degradation of resources leads to conflict, and the ensuing conflict leads to further resource degradation.

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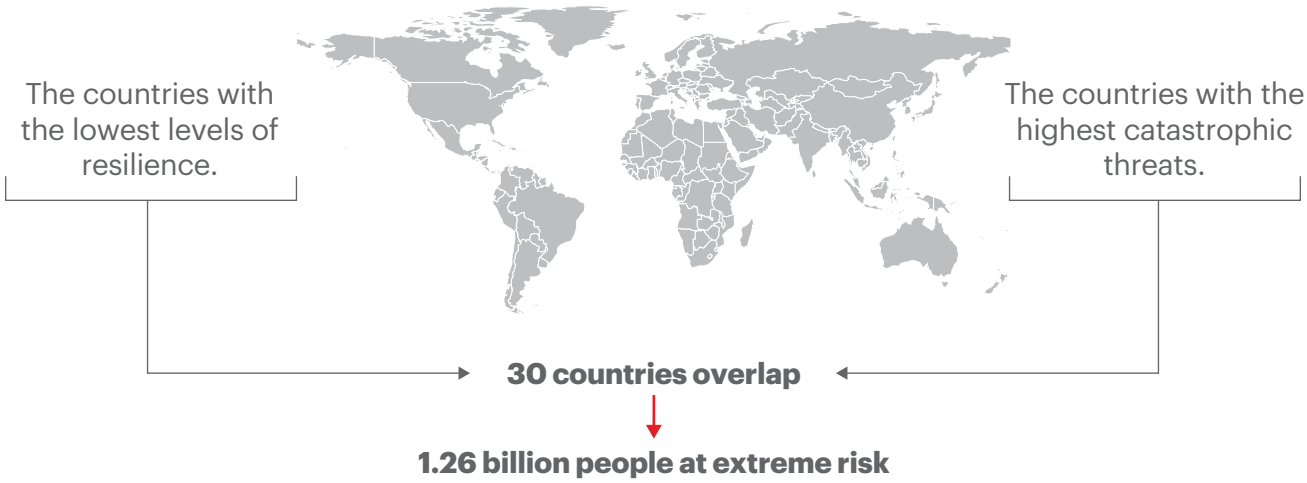
FIGURE 1

Calculating which countries are at risk to ecological threats

IEP estimates there are 1.26 billion people living in countries where societal resilience is unlikely to be sufficient to withstand the impact of their ecological threats.



Source: IEP

BOX 1.1

An introduction to positive peace, resilience and systems thinking

Positive Peace can be defined as the *attitudes, institutions and structures that create and sustain peaceful societies*. It was conceptualised by sociologist Johan Galtung in the 1960s and empirically derived by IEP in 2012 with the development of the Positive Peace Index (PPI).

The PPI assesses the social, economic and governance factors that allow individuals and groups to thrive and resolve grievances without resorting to violence. Positive Peace is also statistically connected to many other things considered important, including higher GDP growth, stronger measures of well-being and better performance on the ecology. Countries that perform well in the PPI tend to operate with higher levels of peace as measured by the Global Peace Index (GPI). They also tend to improve more rapidly than their peers along the GPI ranking. Research has shown that a country that enjoys high levels of Positive Peace is more capable of shielding its population from the immediate impacts of adverse shocks; and it recovers more quickly in their aftermath. Thus, the PPI is often seen as a gauge of socio-economic resilience.

Nations operate according to the principles of social systems. This means that social, economic and political developments mutually affect one another, and it is difficult or impossible to identify unique causes of events and trends. Another feature of social systems is that their internal structure may be changed depending on the severity of a shock. If a system is hit by a weak shock, it will respond without changing its internal configuration. For example, if a country is impacted by a mild economic recession, authorities will just need to respond with palliative measures that will not alter the structure of the economy or the fabric of society.

However, if a system is impacted by a high severity shock, or if the system has a low degree of resilience, the disruption may cause ruptures in the system's internal configuration. For example, there are many instances of nations that descended into a state of social disarray in 2020 and 2021 as a consequence of the COVID-19 pandemic and global recession. Combined with political and economic tensions, the pandemic has contributed to deep social turmoil in Belarus, Colombia, South Africa and other nations.

Some of the threats assessed in the ETR can generate rather severe shocks to nations worldwide. In addition, if these national systems display low socio-economic resilience, the shocks can trigger tumultuous break-downs in their internal structure. The results could encompass frayed international relations, growing risk of conflict, forced displacement of persons both internal and cross-border, and fertile recruitment grounds for radical militant organisations with global reach.

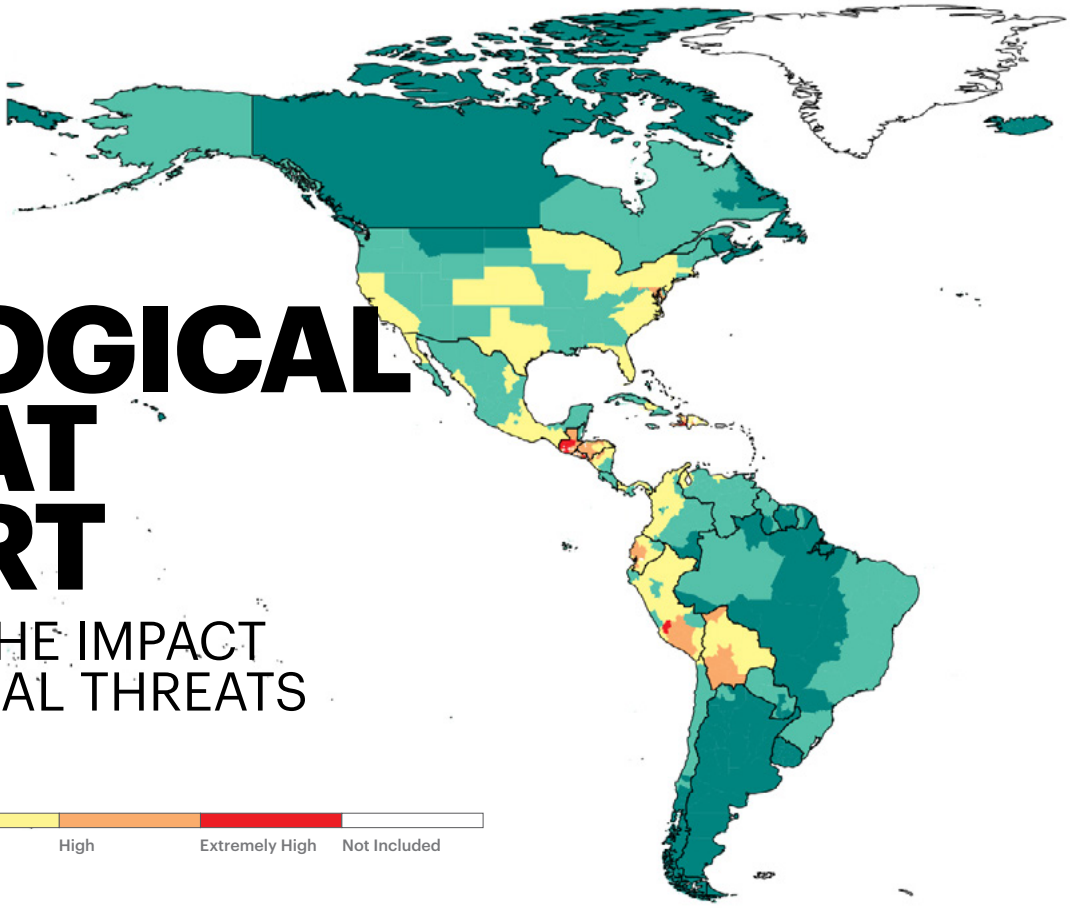
The concept of Positive Peace is discussed in more detail in the section 'Positive Peace and Hotspots' below. A more in-depth exposition can be found in the Positive Peace Report 2020 (https://www.visionofhumanity.org).

ETR Results

FIGURE 1.1

ETR sub-national score, 2021

The higher the ETR score, the higher the ecological threat.



Source: IEP

Ecological threats, similarly to conflict, have the capacity to disrupt and destroy lives globally. The Ecological Threat Report (ETR) attempts to gauge the severity of such threats in an objective and transparent way. The ETR assesses five threats:

- *rapid population growth;*
- *water risk;*
- *food risk;*
- *temperature anomalies;*
- *natural disasters*

A quarter of the countries in the ETR are identified to be facing high to extreme ecological threats. Figure 1.1 displays each sub-national administrative unit's ETR score. It shows that the most vulnerable countries are clustered in certain geographical regions. Most notably, the Middle East and North Africa (MENA), sub-Saharan Africa (SSA) and South Asia. These regions are also the least peaceful, as measured by the GPI.

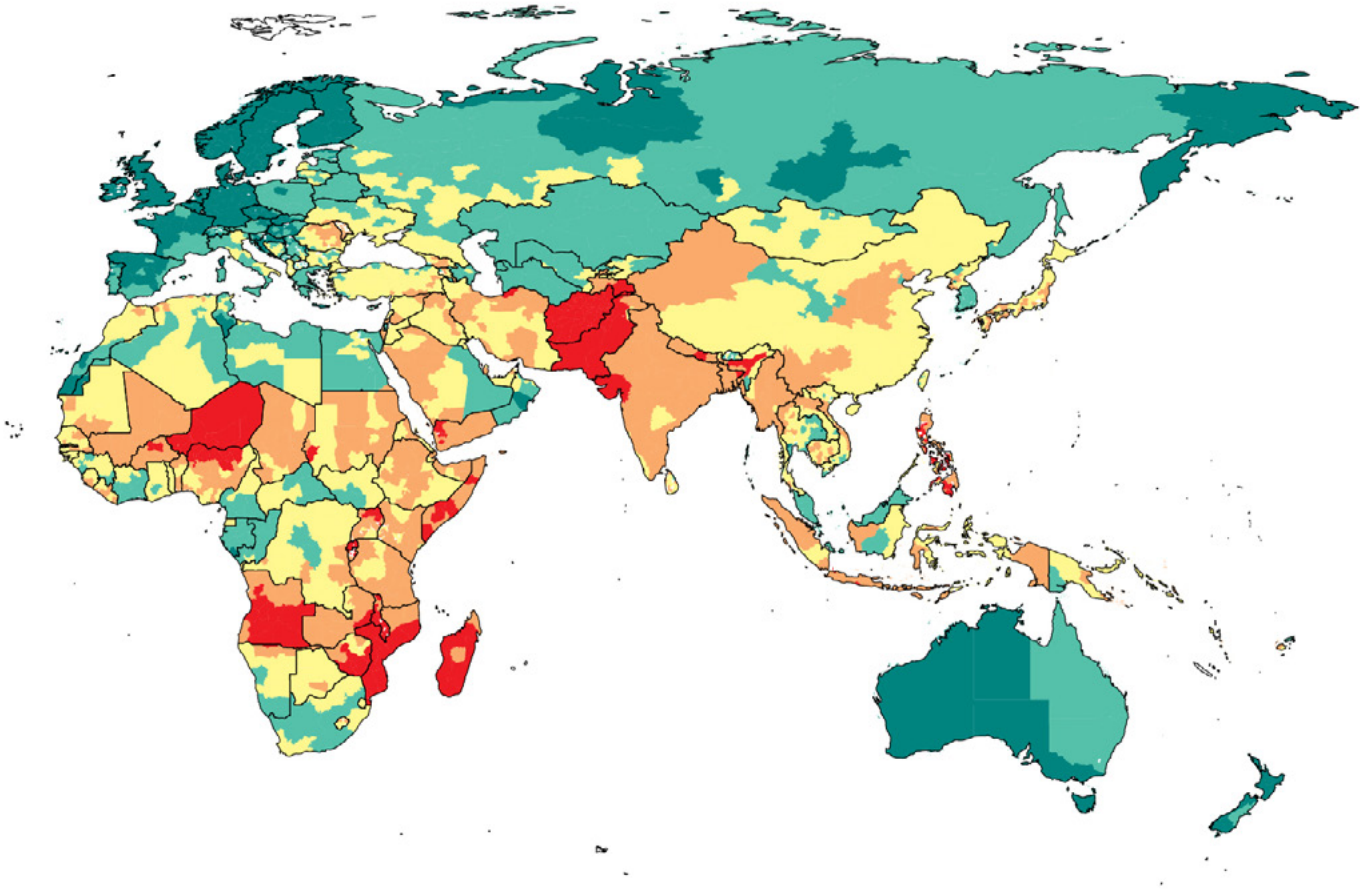
The ETR is calculated at the sub-national administrative level of a country according to their relative threats and includes over 2,500 administrative units. Sub-national scores are then aggregated to calculate a country level score. For more details, see the methodology section or the methodology at a glance in Box 1.2.

THREAT SEVERITY

Figure 1.2 displays the distribution of countries by the severity of ecological threats. Of the 178 countries in the ETR, 13 are identified as facing extremely high ecological threats, and a further 34 face high threats. More than 3.3 billion people live in these 47 countries, accounting for approximately 42.7 per cent of the global population. By 2050, 4.7 billion people are estimated to reside in the countries most exposed to ecological threats. Their populations will account for 48.7 per cent of the world's total population.

While not all of a nation's population will suffer from the direct impact of an adverse ecological event, the indirect repercussions spread widely, especially if national resources, infrastructure and governance are stressed. Displacement of persons and competition for food and water resources may cause the impact of the original shock to transcend across national, and even continental boundaries.

The 2021 ETR identifies that 46 and 35 countries face low and very low ecological threats, respectively. In 2021, their combined population is 1.96 billion people, and by 2050, this figure will slightly increase to 2.18 billion people.



BOX 1.2

Methodology at a glance

The Ecological Threat Register (ETR) is developed to identify countries at the highest risk of ecological threats. The ETR focuses on the problem of resource scarcity and natural disasters and their impact on peacefulness. The ecological threats included in the ETR are *water risk, food risk, population growth, natural disasters* and *temperature anomalies*. The ETR facilitates analysis of the impacts of ecological threats on peacefulness and the role of resilience in determining the ability to adapt and mitigate such risks.

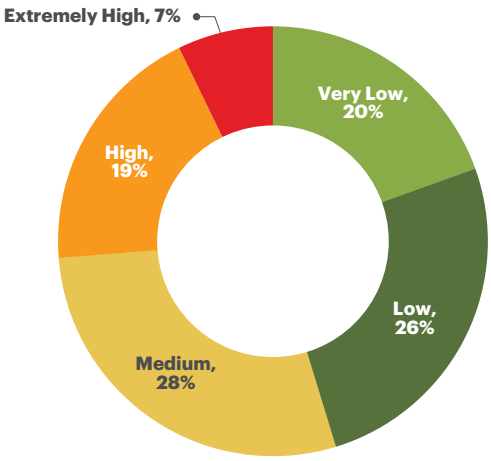
The ETR is a multi-indicator composite index of risk, which is calculated in two steps. In the first step, all indicators are normalised on a one to five scale, with a higher score representing a higher threat level. This calculation is at the sub-national level. In the second step, the overall ETR score is calculated as the average of the individual ecological threats. The score is then aggregated at the country level and represents the overall threat a country faces.

Some countries may have a small number of ecological threats, but they may be severe. When combined with low resilience, these are the countries most at risk and are further discussed in the Catastrophic Threats and Positive Peace and Hotspot sub-sections.

FIGURE 1.2

Distribution of the ETR score, percentage of countries, 2021

Over a quarter of the countries in the ETR are facing high or extremely high ecological threats.



Source: IEP

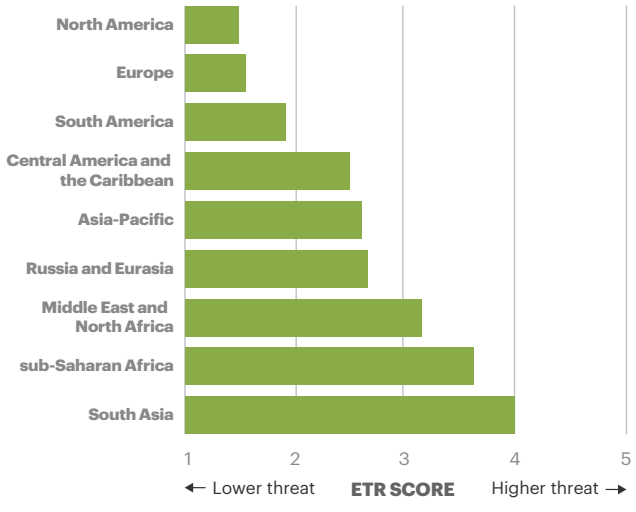
THREAT BY REGION

The level of ecological threat faced is not uniform across regions. Figure 1.3 shows the overall average score for each region on the 2021 ETR. North America and Europe are the two regions with the lowest average score, while South Asia, sub-Saharan Africa and MENA are the regions with the highest average score.

FIGURE 1.3

Average ETR score, by region, 2021

South Asia and sub-Saharan Africa countries have the highest average ETR score.



Source: IEP

South Asia is the worst placed region with *water* and *food risk* driving the average ETR score in the region with approximately 850 million people, or 44 per cent of the population, suffering from moderate to severe food insecurity.[9] The region is also prone to natural disasters, which exacerbates other ecological threats, particularly resource scarcity. All seven countries in South Asia face annual flooding that results in substantial loss of human life, agricultural production and private property damage. Rapid population growth and unplanned urbanisation, coupled with environmental degradation and climate change, have increased the exposure and risk of natural hazards. This will result in more frequent, intense, and costly disasters.[10]

The average ETR score for sub-Saharan Africa is influenced by the high levels of *population growth* which will place increased pressure on existing food and water scarcity. At 66 per cent, sub-Saharan Africa has the highest proportion of its population suffering from food insecurity, highlighting the severity of *water* and *food risks* in the region. This means that two in three people in sub-Saharan Africa are suffering from some level of food insecurity, either severe or moderate.[11] Furthermore, sub-Saharan Africa has the lowest levels of its population with access to safely managed drinking water services.

Population growth and resource scarcity are intrinsically linked with conflict in sub-Saharan Africa. According to the Africa Centre for Strategic Studies, 11 of the 12 African countries in conflict in 2018 were experiencing food insecurity.[12] Conflict leads to the destruction of farming and other economic infrastructure, negatively impacting food production. Conversely, conflict can also arise as a result of competition and scarcity, such as the clashes between farmers and pastoralists over land and water resources. In regions with higher levels of socio-economic resilience as gauged by Positive Peace, competition for resources tends to take place non-violently, as the parties contend through the legal and political systems. However, countries with low levels of Positive Peace often result in the contending parties resorting to physical conflict to assert their holdings over resources.

By 2050, sub-Saharan Africa's population is predicted to rise to 2.1 billion, an increase of over 90 per cent. In addition to the existing food and water stresses, the region's rapid population growth will put additional strain on food and water resources. Not only must the region find a way to provide water and food for the current population without regular access, but also find a way to feed an additional one billion people by 2050. The combination of these environmental issues along with social and economic issues poses a significant challenge for sub-Saharan Africa. The region is experiencing entrenched poverty, environmental degradation, rapid urbanisation, high population growth rates, and climate change.[13]

Most countries across sub-Saharan Africa are dependent on rain-fed agriculture, making the region particularly vulnerable to changes in climatic conditions, such as prolonged droughts and seasonal floods.[14] Agriculture contributes to food security in the region and is also the mainstay of most African economies, accounting for 23 per cent of Gross Domestic Product (GDP).[15] The sector faces detrimental impacts from rising temperatures, as well as increasing water scarcity.

As shown in Table 1.1, the ETR measures nine regions comprising 2,569 administrative units across 178 countries. The majority of the administrative units score 2, 3, or 4 on the ETR, indicating low, medium or high risk, respectively.

No administrative unit in South Asia is classed as very low risk (a score of 1 on the ETR). This compares to Europe, where no administrative unit scores extremely high for the average of the five indicators.[16] At the sub-national level, 71 and 55 per cent of the administrative units in South Asia and sub-Saharan Africa score high or extremely high, respectively.

TABLE 1.1

Regional sub-national breakdown and score, 2021

South Asia and sub-Saharan Africa have the highest percentage of their administrative units scoring high or extremely high.

Region	1 (Very Low)	2 (Low)	3 (Medium)	4 (High)	5 (Extremely High)	Total	% High or Extreme
Asia-Pacific	27	75	219	119	23	463	31%
Central America and the Caribbean	6	63	48	33	11	161	27%
Europe	209	149	135	21	-	514	4%
Middle East and North Africa	4	61	125	75	7	272	30%
North America	14	30	18	1	-	63	2%
Russia and Eurasia	7	101	69	24	1	202	12%
South America	74	86	49	19	1	229	9%
South Asia	-	9	23	36	43	111	71%
sub-Saharan Africa	3	57	189	220	85	554	55%
Grand Total	**344**	**631**	**875**	**548**	**171**	**2569**	**28%**

Source: IEP

THREATS BY COUNTRY

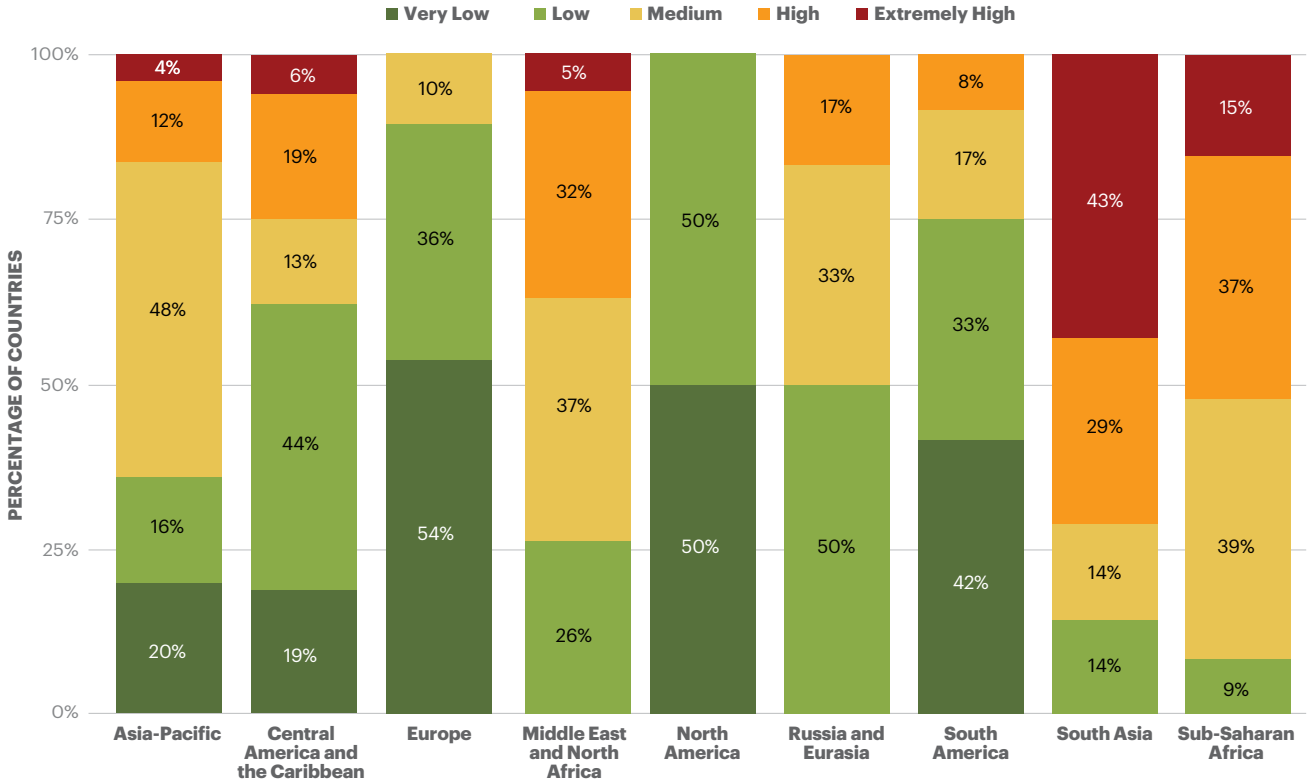
No country receives a very low ETR score in MENA, South Asia and sub-Saharan Africa. In comparison, 90 per cent of Europe's countries face low or very low threats as shown in Figure 1.4. This is due to the lower likelihood of events of ecological threats as well as the more developed and resilient coping mechanisms in place.

Iceland has the lowest ETR score in Europe, followed by Ireland. Of the threats Europe is exposed to, floods are the most common type of natural disaster. However, with most freshwater originating in mountainous areas, such as the Alps, changes in the

FIGURE 1.4

Regional composition by ecological threat score, percentage of region's countries, 2021

The highest percentage of countries facing high and extremely high threats are in South Asia and sub-Saharan Africa.



Source: IEP
Note: Totals may not add to 100 due to rounding.

snow and glacier dynamics and precipitation patterns caused by climate change could lead to water shortages across the region.[17]

In North America, Canada and the United States recorded a low or very low overall ETR score. Canada is predicted to be more affected by rising temperatures, especially in the northern areas. Temperature changes could increase the frequency of heatwaves and droughts and result in a higher risk of wildfires in parts of the country.[18] The United States experienced high exposure to extreme storms, droughts, wildfires and flooding. However, mortality rates from natural disasters are relatively low compared to countries from other regions.

Of the 15 countries with the highest ETR scores, nine are in sub-Saharan Africa, followed by three in south Asia (Table 1.2). While Central America and the Caribbean, MENA and Asia-Pacific each have one country among the 15 countries with the highest ETR score — the Philippines, Guatemala and Yemen.

According to the World Bank, of these 15 countries, 11 have been considered fragile and conflict-affected in the last ten years.[19] One example of note is Afghanistan (Box 1.3).

Many of the 15 countries listed in table 1.2 are ranked among the least peaceful countries globally. Afghanistan and Yemen rank as the two least peaceful countries on the 2021 Global Peace Index and are among the 15 countries with the highest ETR rank. Yemen is also ranked second last on the Positive Peace Index, which highlights the country's low level of socio-economic resilience.

Overall, the 15 countries with the highest ETR score are among the world's 70 least resilient countries as measured by the PPI. Of these 15 high-exposure countries, ten have seen improvements in Positive Peace over the past decade. This means that there is a momentum for improving resilience in these countries, although the momentum is weak in some of these nations. Thus strengthening resilience will help mitigate the ecological threats facing these nations, especially in regards to climate change in coming years. However, countries such as Mozambique and Yemen have recorded strong deteriorations in the PPI. If these trends are not reversed soon, these countries will be facing heightened ecological threats in the future with levels of resilience below what they have today.

BOX 1.3

Ecological threats in Afghanistan

Afghanistan has the highest overall score on the 2021 ETR. All 34 of Afghanistan's sub-national administrative units receive an extremely high ETR score. The average of a country's sub-national entities is used to calculate the national score.

Afghanistan scores extremely high in all five indicators of the 2021 ETR; its highest average score is *water risk*. Overall, seven of the 34 sub-national entities score a max score indicating extreme *water risk*, while another 23 entities score extremely high. The 2021 ETR also identifies that all of Afghanistan's sub-national entities are experiencing severe *food risk*. Afghanistan faces substantial impacts from natural disasters and climate change, hindering prospects for peace and development in the country. Climate change poses a threat to Afghanistan's natural resources, and the alternation of floods and droughts is expected to impact agricultural productivity and output.[20] The ongoing conflict has also undermined Afghanistan's capacity to cope with ecological threats, with natural disasters adding stress to an already weak system of governance.[21]

In the Positive Peace Index 2020, Afghanistan ranked 151 out of the 163 countries assessed. This means that the country operates with a very low level of Positive Peace, which is a gauge for socio-economic resilience. In terms of the Pillars of Positive Peace, Afghanistan's key deficiency is in *Good Relations with Neighbours*. This reflects the country's uneasy relations with its immediate neighbours—Pakistan, Iran, Tajikistan, Turkmenistan, Uzbekistan and China—and three far neighbours—Russia, India and Turkey. The re-take of political power by the Taliban in 2021 may further deteriorate Afghanistan's regional relations.

Other fragilities are found in the *Low Levels of Corruption* and *Well-Functioning Government* Pillars. This suggests that, even before the resurgence of the Taliban, the country was struggling with poor governance, and administrative malfeasance.

Afghanistan's low level of Positive Peace means the country is ill-equipped to protect its population from the ecological threats facing the country. The nation lacks the full support of its hesitant neighbours and the international community, which could help administrators mitigate food and water risk. The effectiveness of the country's administrative apparatus itself may be lacking, and it is still to be seen how the Taliban will be able to address these issues.

TABLE 1.2

The 15 countries with the highest ETR score, 2021

Countries with the highest ETR scores are less peaceful and score poorly on Positive Peace. However, for ten of the 15 countries, the momentum in resilience is positive.

Region	ETR Score Rank (of 178)	GPI 2021 Rank (of 163)	PPI 2020 Rank (of 163)	Resilience Momentum*
Afghanistan	178	163	151	Modest improvement**
Niger	177	137	137	Modest improvement
Madagascar	176	70	131	Modest deterioration
Malawi	175	59	119	Modest improvement
Rwanda	174	83	97	Strong improvement
Burundi	173	129	147	Modest deterioration
Guatemala	172	111	111	Broadly stable
Mozambique	171	104	124	Strong deterioration
Pakistan	170	150	148	Modest improvement
Angola	169	80	145	Strong improvement
Yemen	168	162	162	Strong deterioration
Nepal	167	85	122	Modest improvement
Philippines	166	127	108	Strong improvement
Burkina Faso	165	134	113	Strong improvement
Somalia	164	158	163	Modest improvement

Source: IEP
Note: *Trend in Positive Peace based on the past ten years.

Domains

The five threats included in the ETR can be clustered into two major domains: Resource Scarcity, and Natural Disasters and Temperature Change. The two domains include the following indicators:

- The Resource Scarcity domain measures the threat from *food risk*, *water risk* and *population growth*.
- The Natural Disaster and Temperature Change domain measures the threat from floods, droughts, cyclones, earthquakes, volcanoes, extreme temperature events, significant storms, and rising temperatures.

The Resource Scarcity domain highlights the vulnerability of countries and regions to increasing environmental stress. Resource scarcity is particularly important in the context of low and lower middle-income countries, which are likely to have higher population growth. Low-income countries also tend to be less peaceful and with lower levels of Positive Peace. These countries are more likely to lack the coping capacities to manage resource scarcity shocks. These countries have lower coping capacities due to unsustainable population growth, low or volatile economic growth, high poverty rates, lack of societal resilience and greater prevalence of food insecurity. The majority of the countries experiencing food insecurity, water stress and high population growth are either low or very low peace countries.

The Natural Disaster and Temperature Change domain indicates the exposure to the impacts of natural disasters. Natural disasters lead to losses of human life, destruction of private property and public infrastructure and hinder future development, especially in underdeveloped regions of the world. Changes in weather patterns worldwide have led to a rise in the number of floods and more frequent and longer droughts. Natural disasters affect countries across all regions, levels of peace and resilience.

The two domains give a mechanism to isolate the countries most exposed to disasters, resource scarcity, or both.

RESOURCE SCARCITY DOMAIN

Resource Scarcity highlights the vulnerability of countries and regions to increasing environmental stress. The domain includes *food risk, water risk* and *rapid population growth*. The ten countries with the highest score on the Resource Scarcity domain are displayed in Table 1.3. Eight of these countries reside in sub-Saharan Africa.

TABLE 1.3

ETR rank by Resource Scarcity Domain, 2021

Niger's rapid population growth coupled with its current food and water risks result in it being ranked the lowest on the Resource Scarcity domain.

Country	Resource Scarcity Rank
Niger	178
Afghanistan	177
Yemen	176
Malawi	175
Burundi	174
Eritrea	173
Uganda	172
Burkina Faso	171
Benin	170
Rwanda	169

Source: IEP

Niger ranks as the lowest in the Resource Scarcity domain and all seven of its administrative units score extremely high on the domain. Niger is projected to have the largest percentage increase in its population, increasing by 161 per cent by 2050. The current projected level of population growth in Niger will most likely outpace economic development, leading to a decline in living standards and greater competition for resources. Between 2021 and 2050, Niger is estimated to record a population growth rate of 3.4 per cent each year — the highest rate of any country. Approximately 65 per cent of Niger's population already live below the poverty line resulting in the population's food consumption being seriously compromised and food insecurity and hunger are widespread.[22]

Yemen has the third worst rank on the domain. Years of drought and water stress in the country have combined to exacerbate the already high food insecurity in the country. The competition over resources contributed to further fragmentation of the fragile social structure leading to armed conflict. Conflict in Yemen has further strained food and water resources to the extent of mass starvation. Forty-five per cent of the country's population suffers from undernourishment and the country suffers from high levels of water stress.[23]

Of the ten countries with the highest resource scarcity scores, eight are located in sub-Saharan Africa, one in South Asia and one in MENA. Regionally, more than half of the population in sub-Saharan Africa and one-third of the population in South Asia are facing moderate to severe food insecurity. Currently, 19 of the 20 most food insecure countries are located in sub-Saharan Africa — Afghanistan is the exception.

Water demand is projected to reach crisis levels for some regions over the next few decades. Over a third of countries will experience high or extreme levels of water stress by 2040, meaning that more than half of the available water is being used every year.

While the pace of population growth has declined from its heights in the 1960s, it is still high in many parts of the world. By 2050, the global population is projected to reach nearly ten billion people. However, the increase in population will be unevenly spread. Between 2021 and 2050 onwards, there are 11 countries whose population will more than double — all are located in sub-Saharan Africa. Table 1.4 displays the 11 countries. Many of these countries are already facing resource scarcity. By 2050, it is estimated that 4.8 billion people will reside in the 40 least peaceful countries, increasing by 1.3 billion from 2020 levels. Figure 1.5 displays the population projections by level of peace. The ten countries with the highest Resource Scarcity score are all projected to increase their population by over 55 per cent.

TABLE 1.4

The eleven countries predicted to double their population by 2050

All eleven countries predicted to double their population by 2050 are located in sub-Saharan Africa.

Country	2021 Population (millions)	2050 Population (millions)	Percentage Increase
Niger	25.1	65.6	161.0%
Angola	33.9	77.4	128.2%
Somalia	16.4	34.9	113.5%
Democratic Republic of the Congo	92.4	194.5	110.5%
Tanzania	61.5	129.4	110.4%
Mali	20.9	43.6	109.0%
Zambia	18.9	39.1	106.8%
Burundi	12.3	25.3	106.6%
Mozambique	32.2	65.3	103.1%
Burkina Faso	21.5	43.4	102.0%
Chad	16.9	34.0	101.2%

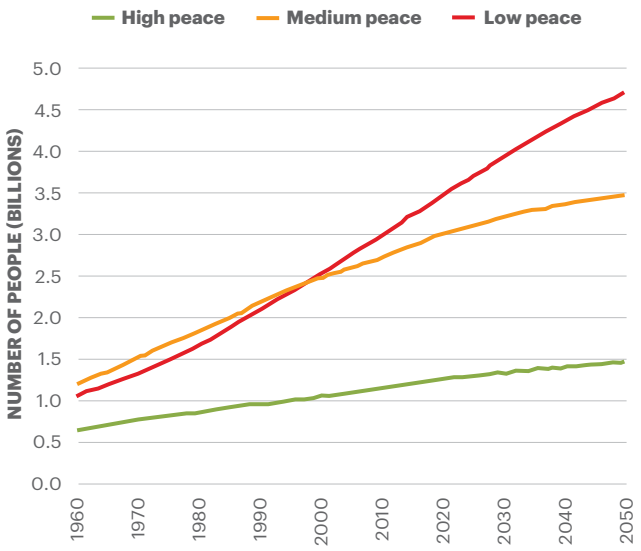
Source: United Nations, IEP

As the population increases, consumption and the depletion of natural resources grow and the effects of climate change will become more pronounced. Additionally, competition will intensify for water from industrial, agricultural, and domestic users in countries with increasing populations. These challenges may negatively affect existing social and political structures, both in the affected countries and their neighbours.

FIGURE 1.5

Projection of global population, by peace level, 1960–2050

The population is projected to increase to 4.6 billion in low peace countries.



Source: United Nations, IEP
Note: Medium-variant projection; High peace line is the aggregate of very high peace and high peace countries as measured on the GPI; Low peace line is the aggregate of low and very low peace countries as measured on the GPI.

Figure 1.6 displays the composition of the Resource Scarcity domain score by region. All countries in sub-Saharan Africa are facing medium to extremely high levels of Resource Scarcity threat. Overall, 87 per cent of the region's countries score high or extremely high — the highest percentage of any region. In contrast, Europe and North and South America have no country scoring medium, high or extremely high on the domain. This indicates that *water* and *food risk* are less prominent in these regions, and the population projections are stable.

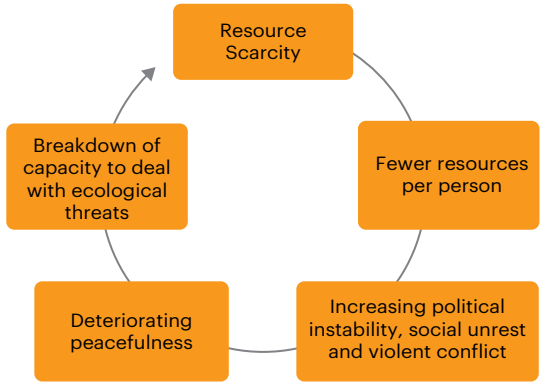
The relationship between peacefulness, food insecurity, water scarcity and population growth is complex. If multiple ecological threats happen simultaneously, they can converge and mutually reinforce, causing a multiplier effect. For example, a country may be exposed to water stress and dedicate resources to addressing this threat. However, the combination of water stress and a rapidly growing population may exacerbate food insecurity, causing water to be redirected to agriculture, thereby decreasing access to clean drinking water.

Multiple stressors are more likely to lead to negative societal outcomes such as political instability, social unrest, and even violent conflict. In turn, this may cause more damage to physical infrastructure and more depletion of the already scarce resources, thus creating further food insecurity and water stress. The interplay between ecological threats and socio-economic dynamics may lead a country into a vicious cycle of progressively greater adversity. Figure 1.7 displays the vicious cycle from resource scarcity and changes to peacefulness.

FIGURE 1.7

The vicious cycle of increasing resource scarcity

Increased stress on resources can lead to deteriorations in peacefulness in a vicious cycle.

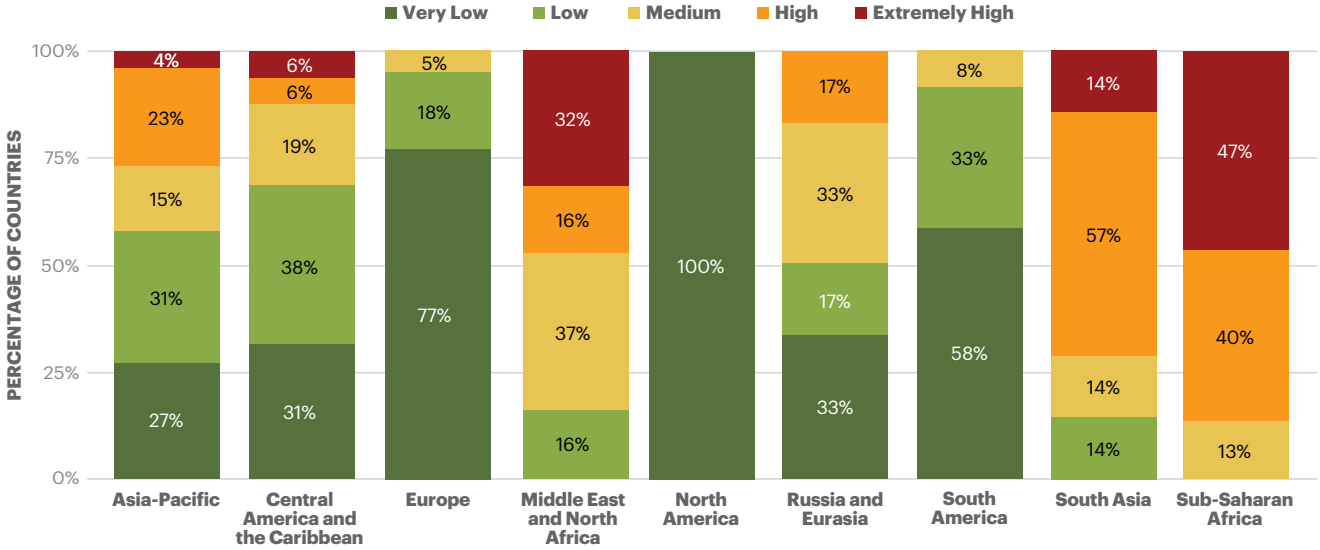


Source: IEP

FIGURE 1.6

Composition of the Resource Scarcity domain score by region, percentage of countries, 2021

South Asia and sub-Saharan Africa are the regions that have the highest percentage of countries facing high and extremely high levels of Resource Scarcity threat.



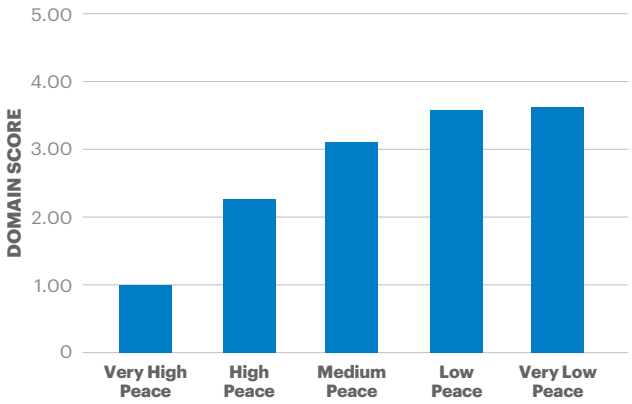
Source: IEP
Note: Totals may not add to 100 due to rounding.

Evidence of this cycle is illustrated in Figure 1.8. It displays the average Resource Scarcity score by the level of peace. Very high peace countries score very low on the Resource Scarcity domain. In contrast, very low peace countries score extremely high. The global average score is 2.64, indicating a low to medium threat level. As peace deteriorates, the Resource Scarcity domain worsens.

FIGURE 1.8

Resource Scarcity score by peacefulness, 2021

As peace deteriorates, the Resource Scarcity domain deteriorates.



Source: IEP

NATURAL DISASTERS AND TEMPERATURE CHANGE DOMAIN

From 1990 to 2020, a total of 10,320 natural disasters occurred globally. Flooding has been the most common natural disaster at 42 per cent of the total. The next largest category was storm events, including cyclones, hurricanes, tornadoes, blizzards, and dust storms, equal to 30 per cent of total events.

The Asia-Pacific region was exposed to the largest number of natural disasters with 2,983 events recorded since 1990. Over two-thirds of natural disasters in the region were either floods or storms with China, the Philippines, Indonesia, Japan and Vietnam being the most affected countries in the region. Figure 1.9 displays the trend in natural disasters since 1980.

In 2020, 177 countries and territories recorded a warmer average temperature compared to their historical average temperatures.[24] Over 70 per cent of these countries recorded an increase above 1.5°C. In total, eight countries experienced a temperature average in 2020 that exceeded three degrees Celsius above their historical average. Russia recorded the highest increase at 3.7°C, followed by Estonia (3.6°C), Belarus and Latvia (3.5°C), Lithuania (3.4°C), Finland (3.3°C), the Republic of Moldova and Ukraine (3.0°C). Because of this, 2020 was the warmest year on instrumental record, averaging 1.7°C above the global 1951–1980 climate normal. The beginning of this decade was the warmest year on record for 55 countries. Over the coming decades, the IPCC has predicted that 1.5°C of global warming will be met with increased heat waves, longer warm seasons and shorter cold seasons.[25] Whereas at 2°C of global warming, heat extremes would more often reach critical thresholds not only for agriculture but also for health.[26]

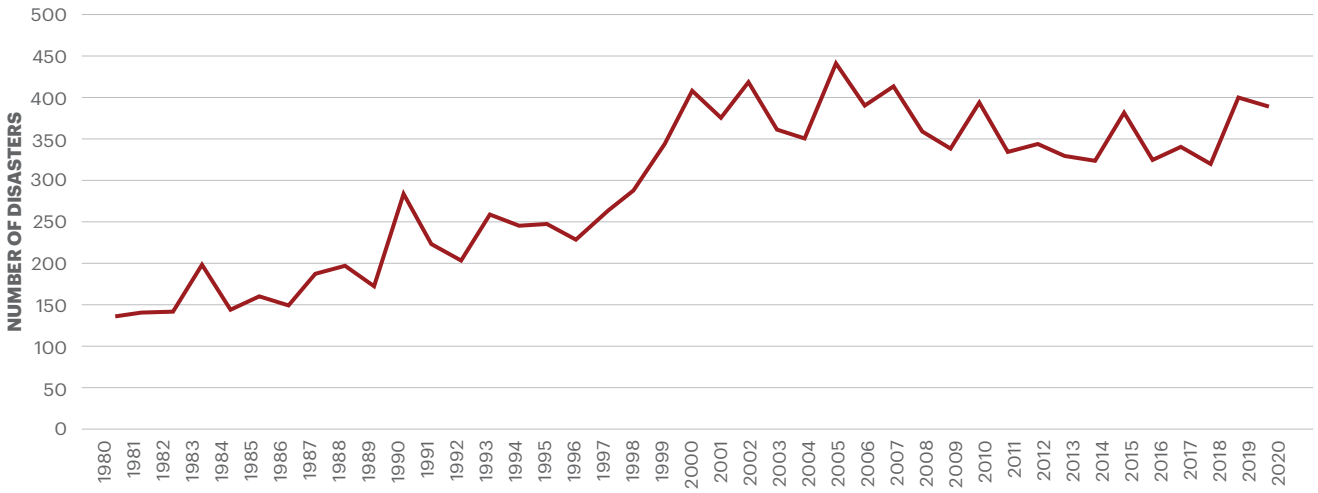
The rise in temperature was more pronounced in some regions than others. The mean annual temperature change was largest in Europe, followed by Asia, Oceania and South America, North America and Africa. Figure 1.10 compares the mean annual temperature changes over the last two decades compared to the 1951 to 1980 average. Since 2001, all the regions in Figure 1.10 have experienced a higher average temperature per decade compared to the 1951–1980 climate normal. The average temperature from 2011 to 2020 was higher in all regions compared to their 2001 to 2010 average.

Figure 1.11 displays the percentage of countries by region and their respective score on the Natural Disaster and Temperature Change domain. This domain indicates that the occurrence of disasters and temperature anomalies is more uniform than the resource scarcity domain. Each region besides Europe has at least one country scoring extremely high. The largest proportion of countries scoring high and extremely high threat on this domain are in South Asia, followed by North America. Four countries in South Asia score extremely high. In Asia-Pacific, ten countries score extremely high for this domain. Seven of the 39 countries included for Europe score high on the domain driven by the higher temperatures discussed above.

FIGURE 1.9

Trend in natural disasters, 1980–2020

Since 2000, the number of disasters has plateaued between 300 and 450 disasters annually.

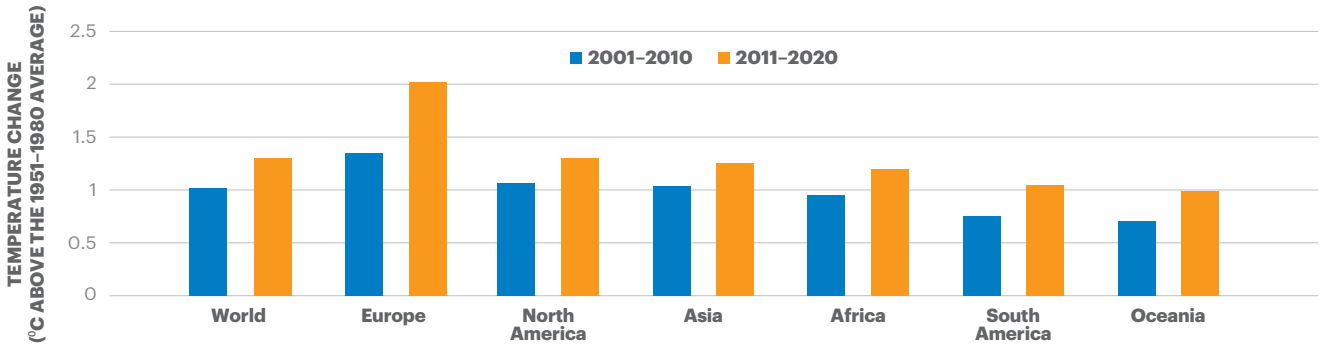


Source: EM-DAT; IEP

FIGURE 1.10

Average temperature per decade above the historical average, 2000–2020

The temperature has increased in all regions, with the latest decade being the hottest on record.



Source: FAOSTAT

Table 1.5 shows the ten worst countries for the domain. Zimbabwe is the country identified as having the highest threat score. The country faces disasters in all its administrative units, contributing to the high national average. While Zimbabwe has not suffered a nationwide disaster, many of the country's administrative units have incurred multiple local disasters over the last 20 years. In addition to the number of disasters, mortality rates also tend to be high in the country.

Japan is ranked the second lowest on the domain, holding an extremely high score for disasters. This is due to the likelihood of earthquakes and tsunamis. The Tohoku earthquake killed over 15,000 people in 2011. This was a magnitude nine earthquake and the subsequent tsunami reached 39 metres above sea level. The waves caused a level-7 nuclear meltdown on the Fukushima Daiichi Nuclear Power Plant, further aggravating the humanitarian crisis. This disaster was estimated to be the costliest natural disaster ever recorded globally at $235 billion.[27]

TABLE 1.5

Bottom ten ranked countries by Natural Disasters and Temperature Change domain, 2021

Zimbabwe is the worst ranked country on the domain.

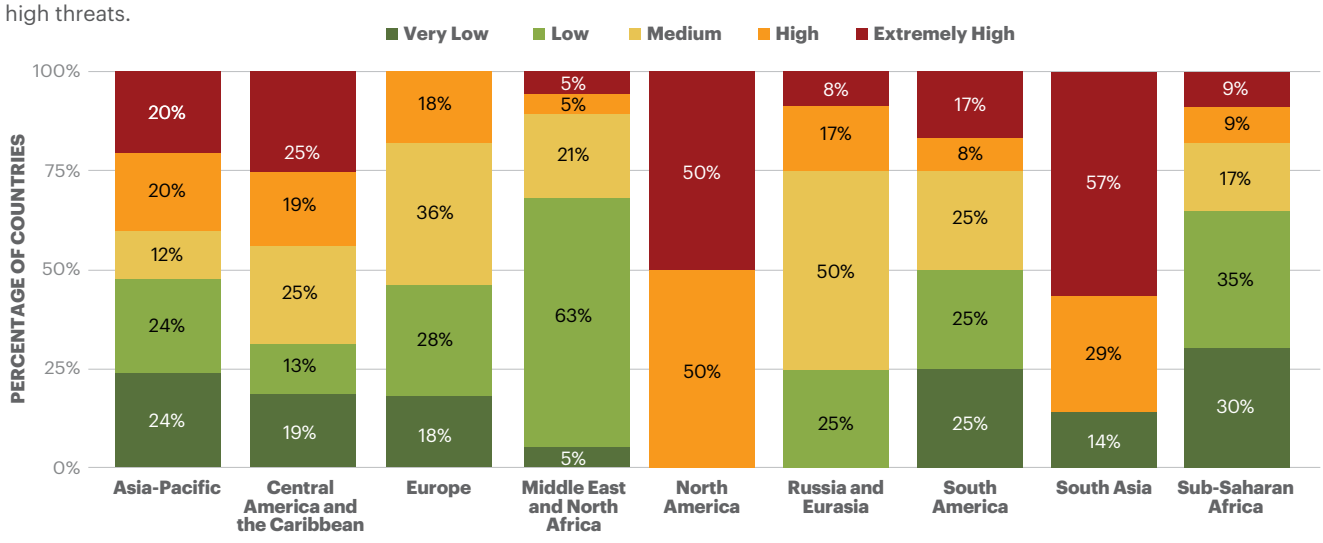
Country	Disasters and Temperature Rise Domain Rank
Zimbabwe	178
Japan	177
Afghanistan	176
Iran	175
El Salvador	174
Bolivia	173
Haiti	172
Tajikistan	171
Nepal	170
Pakistan	169

Source: IEP

FIGURE 1.11

Regional composition by the Natural Disasters and Temperature Change domain score, percentage of countries, 2021

South Asia and sub-Saharan Africa are the regions that have the highest percentage of countries facing high and extremely high threats.



Source: IEP
Note: Totals may not add to 100 due to rounding.

PERCEPTIONS OF CLIMATE THREATS

The World Risk Poll, an initiative of the Lloyd's Register Foundation, includes a measure of public perceptions of risk from climate change. Figure 1.12 displays the responses to the question: "Do you think that climate change is a very serious threat to the people in this country in the next 20 years?". On average, 73 per cent of South Americans perceive climate change to be a very serious threat over the next 20 years — the highest of all regions. In comparison, 28.9 per cent of respondents in MENA perceive climate change as a serious threat — the lowest of all regions. Over half of people surveyed in North America and Europe believe climate change to be a very serious threat.

The second lowest score at 34.5 per cent was recorded for South Asia. In contrast, countries in South Asia, on average, recorded the worst scores on the Natural Disasters and Temperature Change domain.

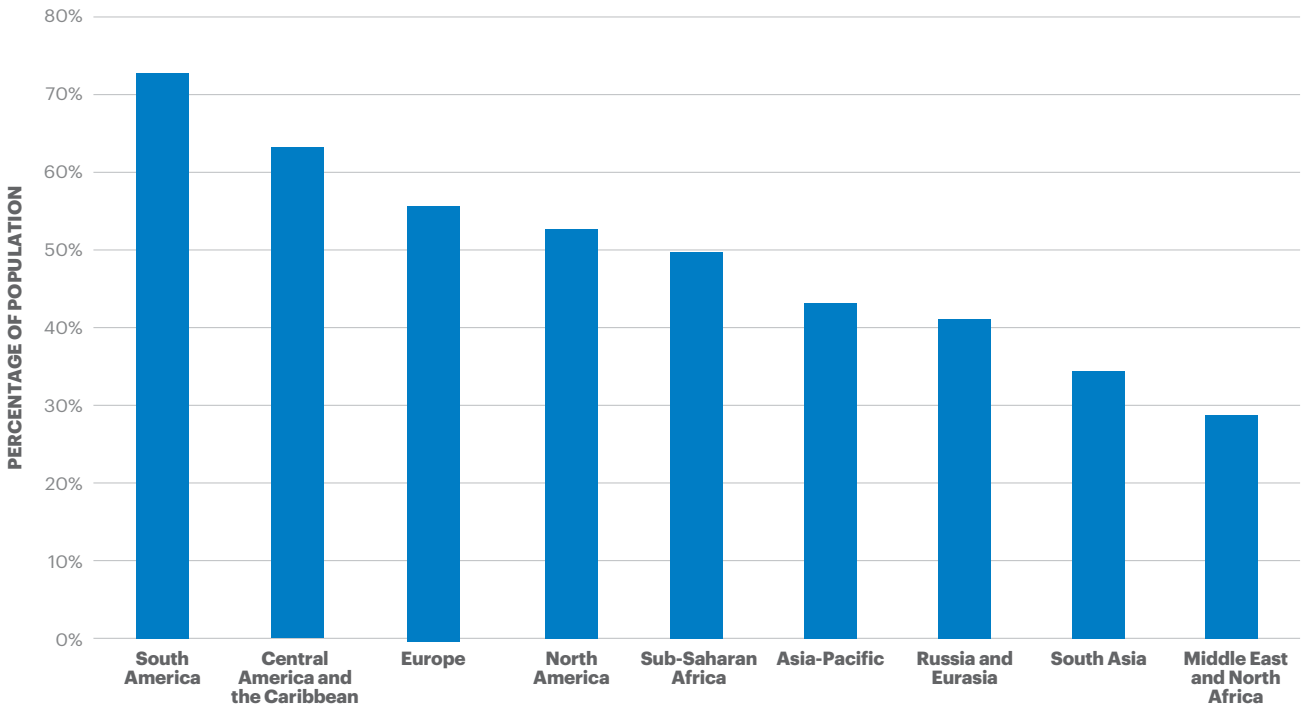
Just 23.3 and 35.1 per cent of the population in of China and India, the two countries with the largest populations and the first and third largest carbon dioxide emitters, perceive climate change to be a major threat over the next 20 years. In comparison, the United States is the second largest carbon dioxide emitter where just over 49 per cent of the population perceive climate change to be a serious threat in the next 20 years.

Regarding the perception of risk to climate change versus the actual risk, the results varied. However, respondents in South Asia, Russia, and Eurasia appear less concerned with climate change than warranted by their regions' actual threat and resilience levels. These regions combine high exposure to natural disasters with low levels of socio-economic resilience, as gauged by their ETR and PPI scores, respectively. In contrast, South American and European respondents appear more strongly concerned with climate risk but face a lower threat relative to other countries given the lower frequency of events and higher levels of resilience.

FIGURE 1.12

Percentage of population that believes climate change will be a serious or very serious threat over the next 20 years, regional average, 2019

On average, 73 per cent of respondents in South America perceive climate change to be a very serious threat over the next 20 years compared to just 28.9 per cent in the MENA region.



Source: Lloyd's Register Foundation 2019 World Risk Poll; IEP

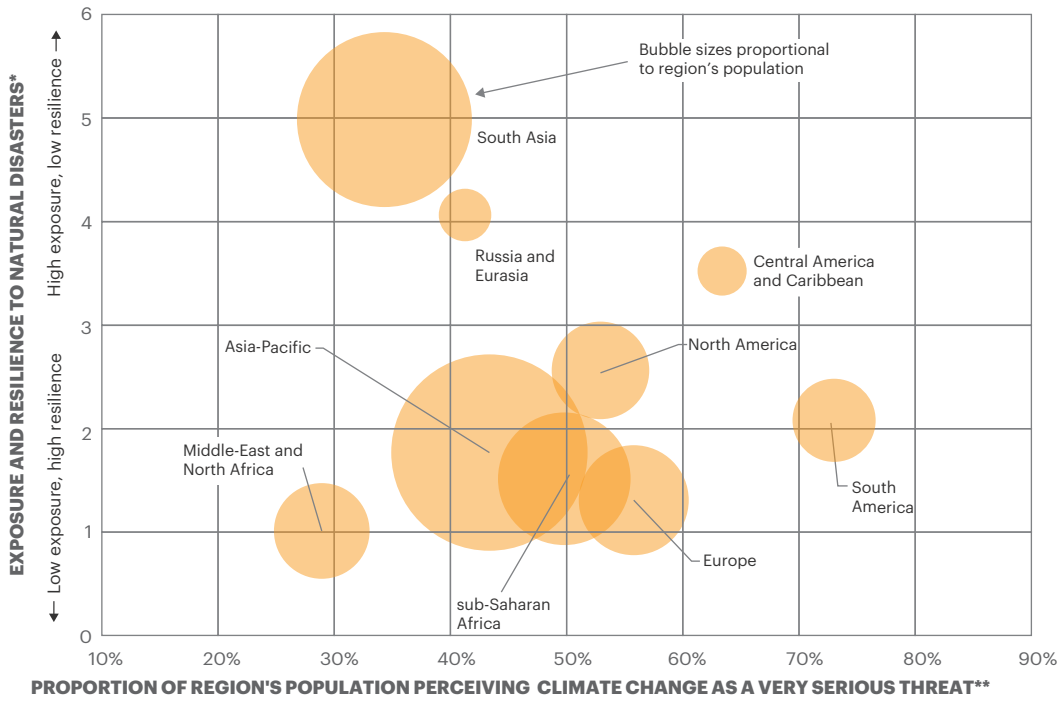
“

Just 23.3 and 35.1 per cent of the populations of China and India, the two countries with the largest populations and the first and third largest carbon dioxide emitters, perceive climate change to be a major threat over the next 20 years.

FIGURE 1.13

Perceptions of the threat of climate change over the next 20 years, very serious threat, average of a region's countries, 2019

South Asia, and Russia and Eurasia appear less concerned with climate change than warranted by their regions' actual threat and resilience levels.



Source: Lloyd's Register Foundation 2019 World Risk Poll; IEP
Note: *Index combining the proportion of countries with high exposure to natural disasters weighed by regional PPI scores. Higher scores represent high exposure, low resilience or both. **The question asked is, "Do you think that climate change is a very serious threat to the people in this country in the next 20 years?"

CATASTROPHIC THREATS

While the average scores present a holistic view of the ecological threats facing countries, in reality, any one of the five threats could prove catastrophic to a country. In addition, even moderate-severity shocks can cause large disruptions to a social system operating with low levels of resilience.

By analysing sub-national data, the ETR is able to identify the largest threat of the five indicators facing a country or administrative unit. The catastrophic threat is the highest scoring indicator facing each country. Box 1.4 explains the difference between the overall ETR score and the catastrophic threat score.

BOX 1.4

The catastrophic threat score

The catastrophic threat indicates the most severe threat faced by a country. The assessment is made at the sub-national administrative unit. An extremely high score on the indicators is given if:

1. *Water Risk* — Score of 4 or 5 on the WRI Water Risk Index.[28]
2. *Food Risk* — A prevalence of stunting above 35 per cent of the population.
3. *Temperature Anomalies* — A projected temperature rise above 1.5 degrees Celsius.
4. *Natural Disaster* — On average, any country that has 20 disasters and a mortality rate of 24 deaths per 100,000 will receive a high threat score.[29]
5. *Rapid Population Growth* —A projected population increase above 74 per cent by 2050

For more details on the indicators and scoring, see the Methodology Section.

The catastrophic threat differs from the overall ETR score as the catastrophic threat score is calculated using the maximum score of any one indicator. In contrast, the overall score is calculated as the average of the five indicators. Note that these threats do not account for a country's capacity to address the threats. Nor is it suggesting that one threat is generally more threatening than another.

At the sub-national level, 2,156 administrative units score an extremely high threat in at least one of the five ETR indicators. In contrast, just 38 administrative units score a very low threat in all five indicators. In total, 21 countries, including Ireland, Singapore, Iceland, Norway and Demark do not have any administrative units that face at least one extreme catastrophic threat.[30]

The most common catastrophic threat is *water risk*. In total, *water risk* is the highest scoring threat for 49 countries as shown in Figure 1.14.[31] This is followed by *temperature anomalies* and *food risk*. The *temperature anomalies* indicator refers to the increase in temperatures projected between 2021 to 2040 compared to the historical average. It should be highlighted that although the *temperature anomalies* indicator is the highest catastrophic threat in 43 countries, it does not mean that its long-term impact will be more pronounced than the other four indicators. The way each country will adjust to and combat the threat will differ, and so will the ultimate impact of the shock. Because of this, the report does not assess one particular threat as potentially more disruptive than others.

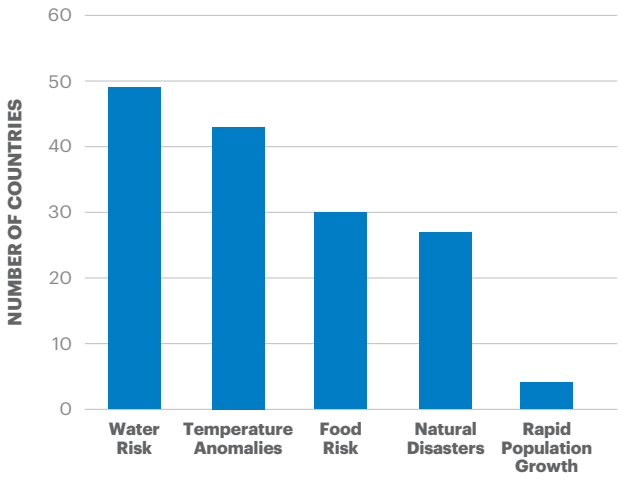
Each country's response to *water risk, food risk and temperature anomalies* will vary according to the respective degree of Positive Peace. Nations with high levels of resilience will conduct research to increase yields, reduce dependency on volatile agriculture, tap international markets to source food from abroad, and implement robust water management and prioritisation initiatives. Some nations are fast developing new technologies in the areas of food factories, desalination plants, waste-water recycling and other areas, which will mitigate the impact of ecological risks. Nations with low levels of resilience may find it increasingly difficult to manage the internal competition for resources without contending parties resorting to violence.

All countries in MENA, North America, Russia and Eurasia and South Asia face at least one indicator that is high to extremely high. The majority in sub-Saharan Africa face at least one high or extreme threat. Figure 1.15 displays the percentage of countries that score at least high or extremely high in at least one of the five indicators.

FIGURE 1.14

The frequency of the maximum catastrophic threat type, high or extremely high threat, number of countries, 2021

Water risk is the most common maximum threat. Forty-nine countries score high and extremely high for *water risk* as well as it being the highest scoring indicator of the country.

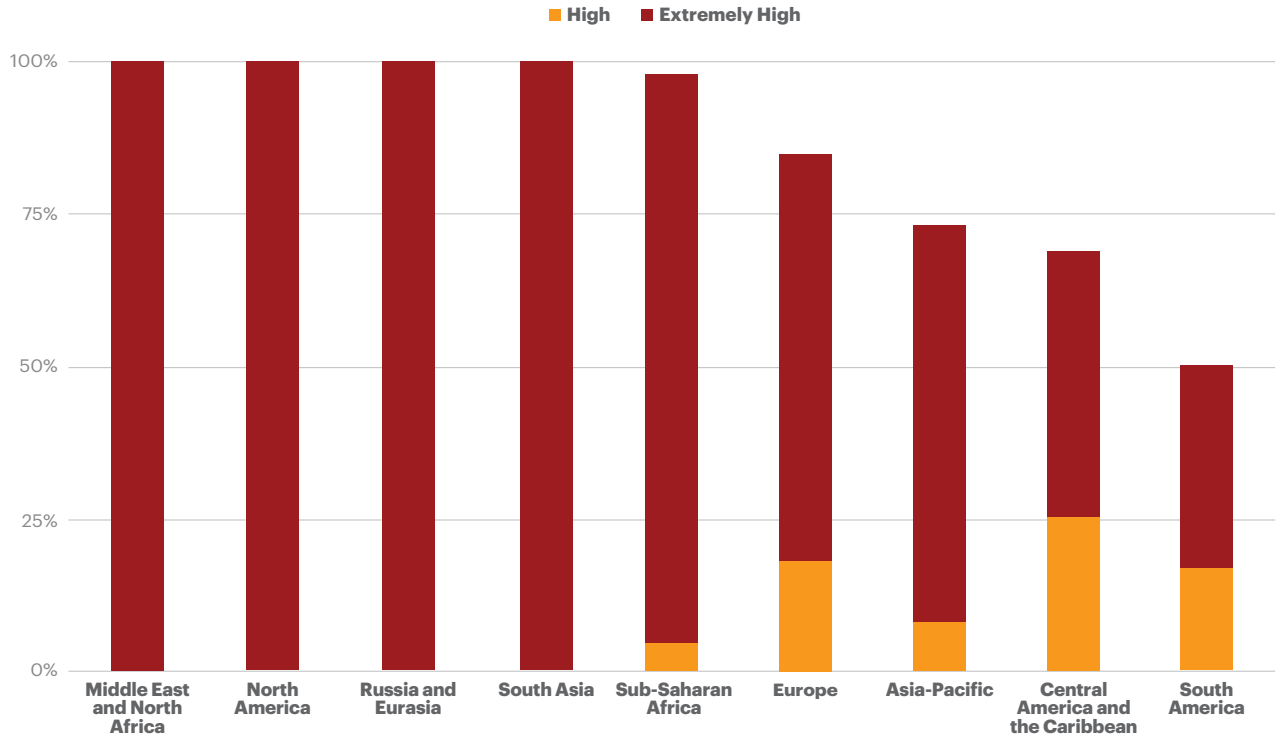


Source: IEP

FIGURE 1.15

Percentage of countries facing at least one high or extremely high threat, catastrophic score, by region, 2021

Every country in MENA, North America, Russia and Eurasia and South Asia faces at least one high or extremely high threat.



Source: IEP

Table 1.6 displays the ten countries that have the highest catastrophic score and the threat faced. Niger's highest scoring threat is *rapid population growth* given the population is projected to grow by 160 per cent by 2050. Lebanon and Samoa's catastrophic threat is *water risk*.

Food risk is proxied by the prevalence of children with a low height for age (stunting). The percentage reflects the cumulative effects of undernutrition and infections during the first five years of a child's life. Consequently, this measure can be interpreted as an indication of poor environmental conditions or long-term restrictions to food access. Burundi is the country with the highest level of *food risk* as measured by the prevalence of stunting. Burundi has a prevalence of stunting estimated at 57.6 per cent of the population under five in 2020. UNICEF data indicates that boys are more affected than girls. The country's high rate is influenced by multiple causes such as poverty, poor economic development, poor nutrition for children and their mothers, high prevalence of diseases, lack of hygiene and sanitation, and early and close pregnancies.[32]

Nepal's history of natural disasters places it among the most exposed to catastrophic threats. Since 1990, Nepal has recorded 57 natural disasters, the most common of which have been floods. Over this period, disasters have claimed more than 11,000 lives in Nepal. The 2015 Gorkha Earthquake that struck Nepal was its deadliest disaster and is estimated to have killed 9,000 people and injured more than double that number.

Bangladesh also ranks among the countries most exposed to catastrophic threats, with a long history of natural disasters. The 2007 Cyclone Sidr is estimated to have caused over 3,000 deaths. Bangladesh is ranked as the seventh worst country affected by extreme weather events by the Global Climate Risk Index, indicating it is especially vulnerable to climate change.[33] More than a quarter of the population lives in low-lying areas heavily impacted by sea-level rise and saltwater incursion. This has led to higher water and soil salinity resulting in millions of people being food and water scarce. These impacts are further compounded by the Rohingya refugee crisis which has led to roughly 900,000 Rohingya refugees living in high-risk areas along the southern coastline of Bangladesh.

TABLE 1.6

The ten countries with the highest catastrophic ETR score, 2021

Seven countries of the ten countries with the worst catastrophic ETR ranks also fare poorly on the GPI and the PPI.

Country	Catastrophic Score Rank	Risk Type	GPI 2021 Rank (of 163)	PPI 2020 Rank (of 163)
Niger	=178	Rapid Population Growth	137	137
Lebanon	=178	Water Risk	147	99
Bangladesh	=178	Natural Disaster	91	139
Nepal	=178	Natural Disaster	85	122
Burundi	=178	Food Risk	129	147
Samoa*	=178	Water Risk		
Japan	172	Natural Disaster	12	16
Philippines	171	Natural Disaster	127	108
Haiti	170	Natural Disaster	108	149
Timor-Leste	169	Food Risk	56	121

Source: IEP
Note: * Samoa is not included in the GPI or PPI.

Positive Peace and Hotspots

FIGURE 1.16

ETR hotspots, 2021

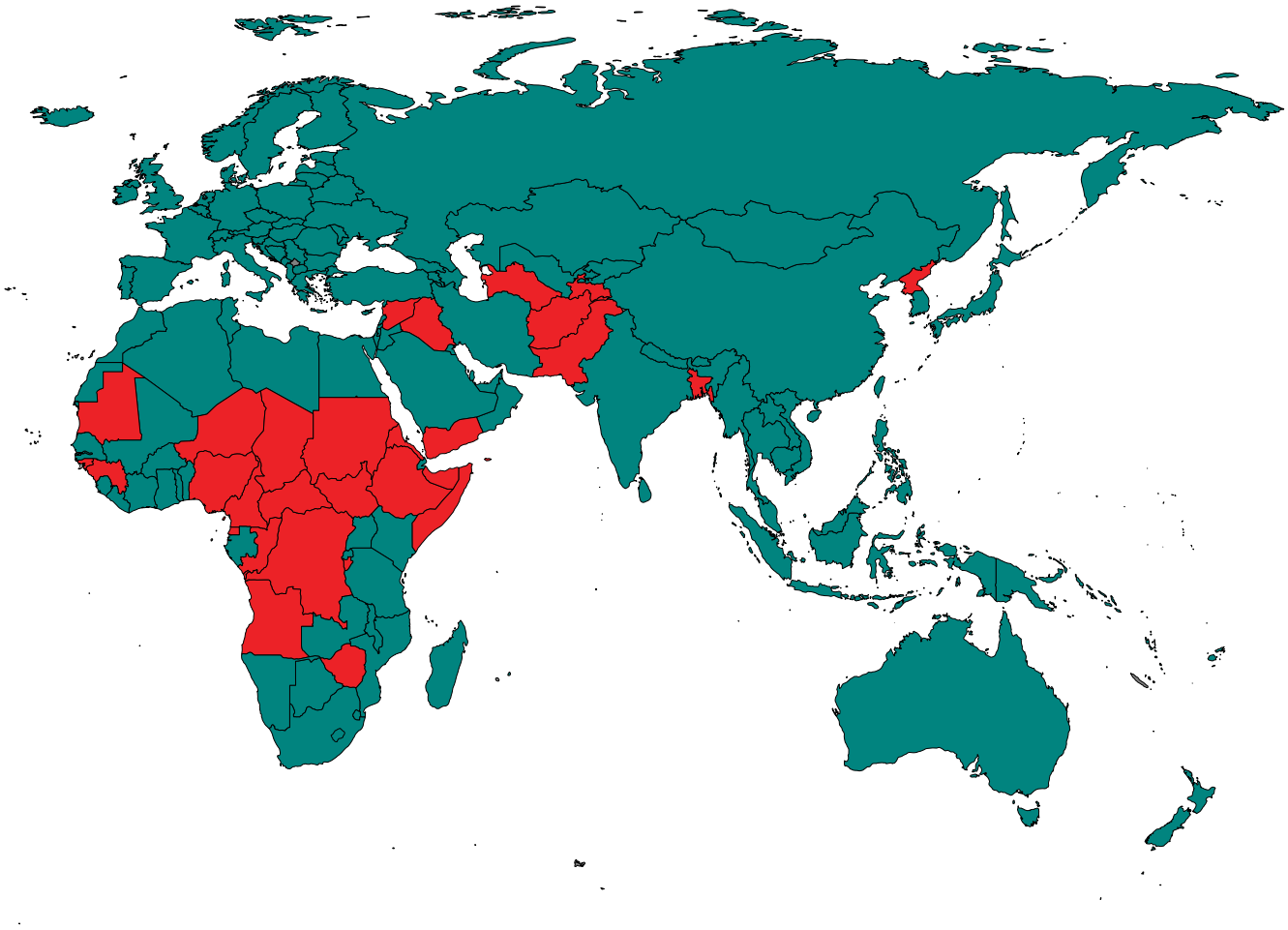
Thirty countries are identified as combining a medium to extremely high level of ecological threat with extremely low societal resilience, as measured by the PPI.

Source: IEP

National societal systems have different levels of capacity to respond to ecological threats. Many countries that have strong societal resilience mechanisms in the form of high levels of Positive Peace are better prepared for future threats. These national systems may be capable of absorbing adverse ecological threats with minimal disruption to their internal structures.

Conversely, many countries have low levels of resilience as gauged by the PPI. This suggests that even moderate shocks may engender disorderly re-arrangements in the structure of the economy and the fabric of society.

Positive Peace shows high statistical associations with improved levels of food and water security and the ability to manage natural disasters. This is because countries with greater degrees of socio-economic development are better resourced to provide their populations with basic staples. They also have more effective disaster response mechanisms and their governance systems are more transparent, responsive and adaptable. Box 1.5 provides a summary of the concept of Positive Peace.

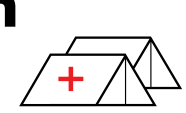


KEY FINDINGS

ECOLOGICAL THREATS

1.26 billion

There are 30 countries facing the highest level of ecological threat, home to 1.26 billion people. They have both low socio-economic resilience and medium or extremely high ecological threats.



FOOD SECURITY

Eleven of the 12 African countries in conflict in 2018 were experiencing food insecurity.

NATURAL DISASTERS

10,320

From 1990 to 2020, a total of 10,320 natural disasters occurred globally. Flooding has been the most common natural disaster, accounting for 42 per cent of the total.

BOX 1.5

What is Positive Peace?

Positive Peace is defined as the *attitudes, institutions and structures that create and sustain peaceful societies*. These same factors also lead to many other positive outcomes which society feels are important. Higher levels of Positive Peace are statistically linked to higher GDP growth, better environmental outcomes, higher measures of well-being, better developmental outcomes and stronger resilience.

Positive Peace as a term was first introduced in the 1960's by sociologist Johan Galtung and has historically been understood qualitatively based on idealistic or moral concepts of a peaceful society. The distinguishing feature of IEP's work on Positive Peace is that it is empirically derived. Statistical analysis and mathematical modelling was used to identify the common characteristics of the world's most peaceful countries. It therefore forms an important evidence base to understand Positive Peace and avoids subjective value judgements.

This process allowed the development of the Positive Peace Index (PPI), which consists of eight Pillars, each containing three statistical indicators. This provides a baseline measure of the effectiveness of a country's capabilities to build and maintain peace. It also provides a measure for policymakers, researchers and corporations to use for effective intervention design, monitoring and evaluation.

To construct the PPI nearly 25,000 national datasets, indexes and attitudinal surveys were statistically compared to the internal measures of the Global Peace Index to determine which factors had the highest statistical correlations. Indicators were then qualitatively assessed and where multiple variables measured similar phenomena, the least significant were dropped. The remaining factors were clustered using statistical techniques into the eight Pillars of Positive Peace. Three indicators were selected for each Pillar which represents distinct but complementary conceptual aspects. The index was constructed with the weights for the indicators being assigned according to the strength of the correlation coefficient to the GPI Internal Peace score. This empirical approach to the construction of the index means it is free from pre-established biases or value judgements.

Positive Peace can be used as the basis for empirically measuring a country's resilience - its ability to absorb, adapt and recover from shocks, such as climate change or economic transformation. It can also measure fragility and help predict the likelihood of conflict, violence and instability.

Resilience is a fundamental tool for countries facing ecological threats. Firstly, it provides a country with the capacity to cope with ecological shocks, minimising their negative impact on the population and economic structure. Secondly, it facilitates the recovery or rebuild of the socio-economic system in the aftermath of an ecological shock.

TABLE 1.7

Greatest threat faced by hotspot countries, 2021

Eighteen of the 30 hotspot countries are in sub-Saharan Africa.

Country	Catastrophic Score	Greatest Threat	PPI Rank	GPI Rank
Afghanistan	5	Food Risk	151	163
Angola	5	Food Risk	145	80
Bangladesh	5	Natural Disaster	139	91
Burundi	5	Food Risk	147	129
Cameroon	5	Food Risk	142	145
Central African Republic	5	Food Risk	159	155
Chad	5	Food Risk	158	132
Democratic Republic of the Congo	5	Food Risk	156	157
Equatorial Guinea	5	Water Risk	155	62
Eritrea	5	Food Risk	160	136
Ethiopia	5	Food Risk	134	139
Guinea	5	Food Risk	143	92
Guinea-Bissau	5	Water Risk	152	99
Haiti	5	Natural Disaster	149	108
Iraq	5	Temperature Anomalies	144	159
Mauritania	5	Water Risk	141	118
Niger	5	Population Risk	137	137
Nigeria	5	Water Risk	146	146
North Korea	5	Natural Disaster	138	151
Pakistan	5	Natural Disaster	148	150
Republic of Congo	3	Water Risk	150	119
Somalia	5	Natural Disaster	163	158
South Sudan	5	Food Risk	161	160
Sudan	5	Food Risk	154	153
Syria	5	Water Risk	157	161
Tajikistan	5	Water Risk	140	97
Turkmenistan	5	Temperature Anomalies	135	109
Venezuela	3	Water Risk	136	152
Yemen	5	Food Risk	162	162
Zimbabwe	5	Natural Disaster	153	133

Source: IEP

The ETR uses the PPI and the catastrophic ETR score to identify countries where resilience is unlikely to be strong enough to adapt or cope with ecological threats. The 30 countries that combine the lowest PPI scores with catastrophic ETR scores of medium, high or extremely high are considered hotspots.

Of the 178 countries in the ETR, 30 are identified as hotspots meaning they have low levels of resilience and a medium to extremely high catastrophic threat score. Table 1.7 Displays these 30 countries.

Currently, 1.26 billion people live in these hotspot countries. Table 1.8 displays the number of countries and the population for hotspot and non-hotspot countries.

TABLE 1.8

Population living in hotspot countries, 2021

Approximately 1.26 billion people are currently living in hotspot countries.

Category	Number of countries	Population 2021 (billions)
Hotspot	30	1.26
Non-hotspot	148	6.6
Grand Total	**178**	**7.86**

Source: IEP

Among the 30 hotspot countries, five countries contain administrative units that score high or extremely high threat to each of the five ETR indicators and have low positive peace levels. This indicates that any one of the five indicators could be a catastrophic threat. These five countries are Afghanistan, Niger, Rwanda, Malawi and Angola. In total, 43 of their potential 85 administrative units face high or extremely high threat in each ETR indicator. An estimated 72 million people live in these administrative units.

Of the five countries identified, Afghanistan has the highest exposure where 91 per cent of the country is living in areas where *food risk*, *water risk*, *rapid population growth*, *temperature anomalies* and *natural disasters* are estimated to be of extremely high or high threat. This is followed by Niger where 83 per cent of the population lives in areas of high or extreme threat for each ETR indicator.

Catastrophic threats are particularly important from the perspective of social stability and resilience. They can result in substantial population displacement or increases in resource scarcity. This is due to their impact being severe enough to damage the physical infrastructure, the economic foundations or the social order in a country. Box 1.6 compares two examples of resilience in the face of severe natural disasters.

TABLE 1.9

Population living in sub-national hotspots, every ETR indicator high or extremely high threat, 2021

Population living in sub-national hotspot, every ETR indicator high or extremely high threat, 2021.

Country	Population Exposed	Sub-national Administrative Units Exposed	Percentage of Country's Population Exposed	Percentage of Country's Administrative Units Exposed
Afghanistan	35,261,012	27	91%	79%
Niger	20,035,399	5	83%	71%
Rwanda	10,327,044	3	80%	75%
Malawi	3,856,760	6	20%	26%
Angola	2,862,372	2	9%	12%
Total	**72,342,587**	**43**	**56%**	**51%**

Source: IEP

BOX 1.6

Contrasting levels of resilience: The cases of Haiti and Japan

The magnitude 7.0 earthquake that struck Haiti in 2010 was a catastrophic event exacerbated by the extreme vulnerability of the population and the lack of preparedness and response capacity of national authorities.[34] The 2010 earthquake was one of the biggest natural disasters in the country's history resulting in over 200,000 fatalities[35] and the displacement of approximately 1.5 million people.[36] Prior to the earthquake, Haiti suffered from high levels of poverty and weak institutions of governance, increasing the country's vulnerability in the immediate aftermath of the disaster. The slow distribution of resources in the days after the earthquake resulted in civil unrest and looting.[37]

In contrast, Japan fared better after the 2011 tsunami, which led to a nuclear power plant meltdown and the contamination of large areas with radiation. Despite the 15,000 fatalities and destruction, the incident did not fuel social or political instability. The Japanese government was able to address both the destruction from the tsunami and contain the damage from the nuclear power plant meltdown. It also coordinated an effective program for economic recovery.

The difference in immediate impacts and repercussions in these two episodes stem from the two countries operating at vastly different levels of Positive Peace. While Haiti displays a very low Positive Peace standing, ranking 149th in 2020, Japan is among the top 20 Positive Peace countries in the world. This contrast highlights the role of Positive Peace as a measure of resilience, capable of protecting the population from the worst impact of a disaster and rebuilding the socio-economic system in its aftermath.

The outcome of these destabilising threats will impact countries internally, as well as having flow-on effects, including international displacement. While most population displacements happen within the affected country, the United Nations High Commission for Refugees (UNHCR) estimates that nearly 73 per cent of refugees live in neighbouring countries.[39] This places significant stress on recipient countries.

Countries such as Afghanistan, Yemen, Somalia, Zimbabwe, Burundi and Pakistan have very low resilience and are already experiencing adverse effects from ongoing conflict and the COVID-19 pandemic. Without strong improvements in Positive Peace, the lack of coping capacity in these countries could lead to worsening food insecurity, civil unrest, mass displacement or competition over finite resources. Afghanistan, Somalia and Zimbabwe have posted some improvement in Positive Peace over the past decade. This suggests that there could be a mechanism of improving socio-economic resilience helping these countries mitigate ecological risk in the future. Whether Positive Peace will continue improving in Afghanistan under the Taliban's leadership is uncertain. Burundi and Yemen recorded long trends of deteriorating resilience which suggests that these countries may find it even harder to handle ecological threats in the future.

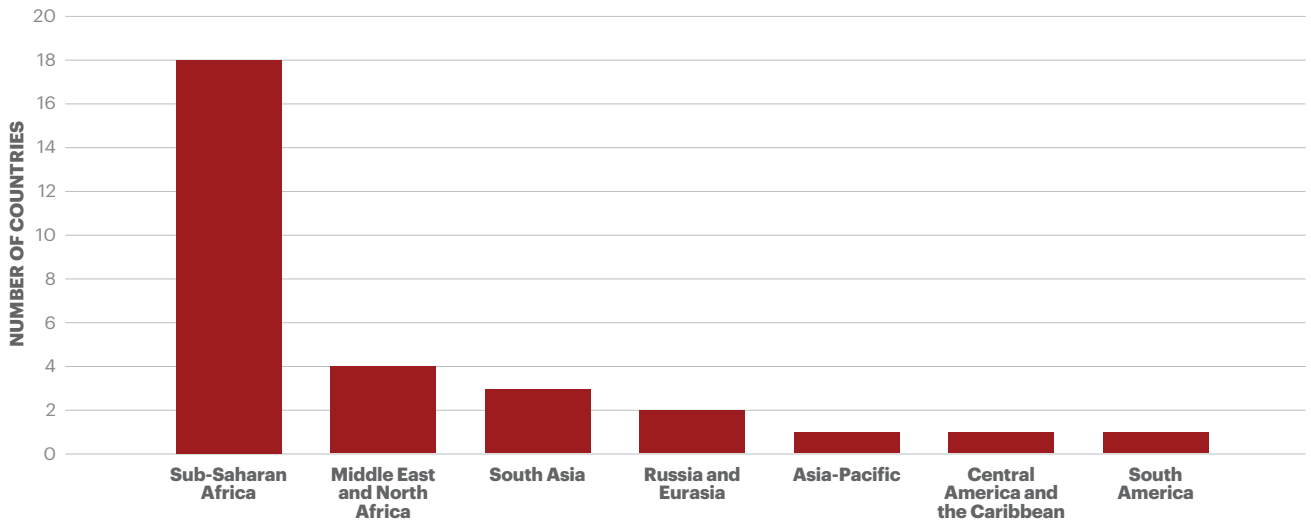
Ecological hotspots tend to be clustered in certain geographical areas. Figure 1.17 displays the number of countries identified as a hotspot by region. At 18 countries, sub-Saharan Africa has the highest number of countries of any one region considered to be a hotspot. This is followed by MENA and South Asia at four and three countries respectively. This clustering is significant because ecological and humanitarian crises often spill over across international borders. This spill over effect occurs through refugee flows, cross-border conflict and logistic links. One example of this is the European Migrant Crisis where over 5.2 million refugees entered Europe between 2010 and 2016, primarily from conflict-affected countries such as Syria, Iraq and Afghanistan. Neighbouring countries and regions with high resilience may be the likely destinations of future displacement from ecological threats.

> “
> At 18 countries, sub-Saharan Africa has the highest number of countries of any one region considered to be a hotspot.

FIGURE 1.17

Number of hotspot countries by region, 2021

Sub-Saharan Africa has the highest number of countries identified as hotspots.



Source: IEP

BOX 1.7

Pacific Islands among the most vulnerable to ecological threats

The Pacific Region is home to around 2.3 million people across hundreds of islands, equivalent to 15 per cent of the earth's surface. Due to data scarcity on socio-economic outcomes, many of the Pacific countries are excluded from the PPI. This means they cannot be included in the hotspot identification. However, these countries are among the countries most vulnerable to natural disasters and climate change. The region faces a myriad of stresses, including climate change, religious extremism, political populism, rising migration rates, transnational crime and intensified competition for resources. In terms of ecological threats, the region suffers from king tides, frequent cyclones, sustained droughts, and the increasing salinity in water tables, making it impossible to grow crops. The threat of land loss of low-lying islands to sea-level rise is imminent. As the world warms, these events are expected to increase in frequency and severity.

Fiji, Papua New Guinea, Samoa and the Solomon Islands are the Pacific Island countries included in the ETR. All four countries have an extremely high catastrophic threat level. Table 1.10 displays the maximum threat each country faces.

TABLE 1.10

Catastrophic threat type by country, Pacific Islands, 2021

Pacific islands are among the most exposed to ecological threats.

Country	Ecological Threat	Catastrophic Threat Level
Fiji	Natural Disaster	Extremely High
Papua New Guinea	Food Risk	Extremely High
Samoa	Water Risk	Extremely High
Solomon Islands	Food Risk	Extremely High

Source: IEP

Ecological threats will exacerbate existing challenges that the Pacific region faces. Many countries in the Pacific are already experiencing the adverse effects of climate change, most notably increased extreme weather events, rising sea levels and increased resource scarcity.[40] Pacific Island countries are among those at the highest risk from natural disasters. The flow-on effects, such as displacement, are predicted to compound instabilities with the potential to spill over into neighbouring countries.

Pacific Island economies are limited by the options for development, meaning growth is heavily reliant on natural resources. Land use for either resource extraction income versus land for subsistence and cultural living are among the leading causes of tension and conflict. Resource-based conflicts in the region have therefore been primarily within countries rather than across countries. The effects of climate change will hamper livelihoods and reduce available land which may exacerbate tensions.[41] Resource scarcity is compounded by rates of urbanisation and population growth. For example, the Solomon Islands and Vanuatu are expected to record high population growth, with a projected increase of over 75 per cent over the next 30 years.

The Pacific is highly susceptible to climate change, making it a hotspot for ecological threats. Climate change is a threat multiplier that will exacerbate many of the region's challenges, and make it more difficult to build resilience to respond to natural disaster shocks, population growth, food scarcity and water risk.

Pacific Islands among the most vulnerable to ecological threats box 1.7 explores this further.

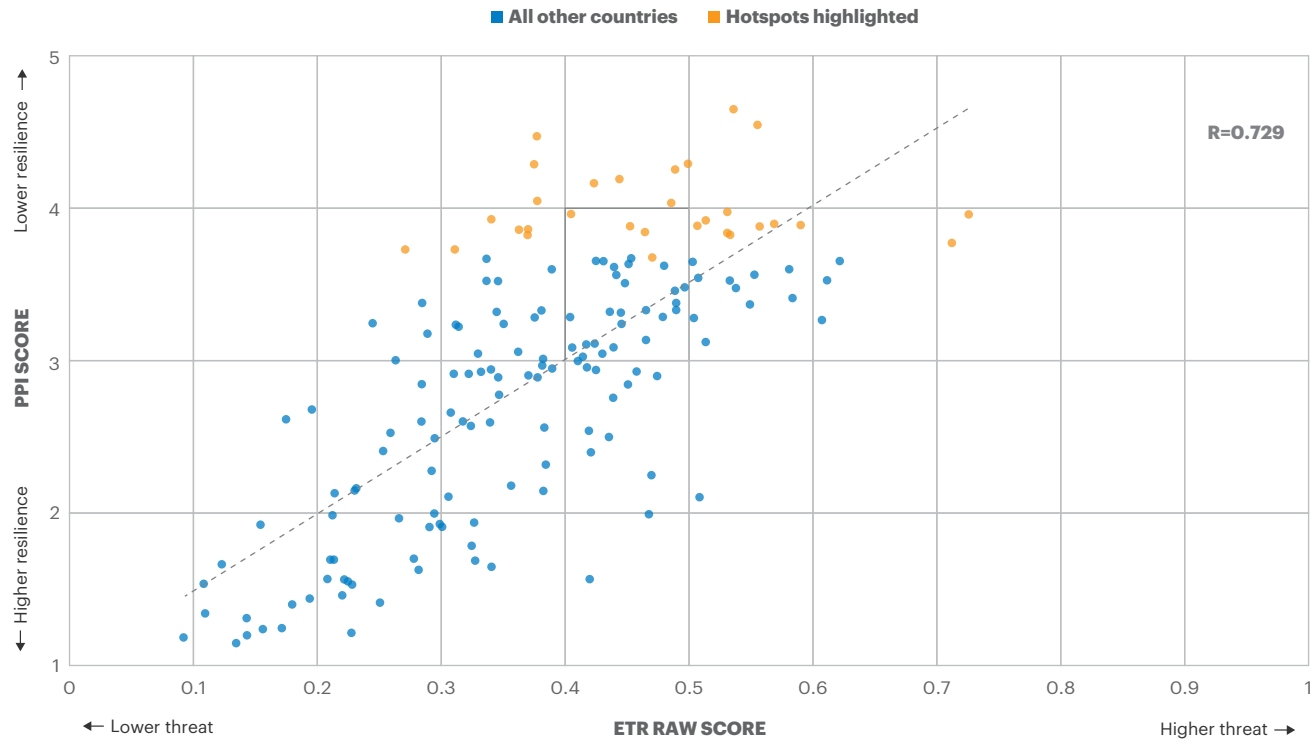
The conceptual relationship between ecological threats and Positive Peace levels is also empirically verified. The correlation between the ETR and the Positive Peace score for the 163 countries is significant at 0.73, as shown in Figure 1.18. This means that the countries with higher exposure to ecological threats are, on average, those with the least capacity to handle such shocks. This figure indicates that the countries most exposed to ecological threats are also those with lower levels of Positive Peace.

This is because some of the threats – such as *water risk* and *food risk* – are accentuated by poor socio-economic development. Others, like droughts and floods, are natural phenomena whose impact on society could be mitigated and managed through the combined use of the Pillars of Positive Peace. In addition to being less exposed to ecological shocks, high Positive Peace countries are also better equipped to handle such shocks. This is through superior coping capacity in terms of physical infrastructure, regulatory frameworks, economic strength and diversification, emergency preparedness and response systems. In addition, they also have an increased capacity to rebuild their socio-economic systems in the aftermath of the shocks.

FIGURE 1.18

Raw ETR score versus PPI score, 2021

Countries with the lowest Positive Peace tend to have higher ETR scores.



Source: IEP

RESILIENCE AT RISK

The 30 countries with the lowest levels of resilience are used to identify the hotspot areas. However, countries with reoccurring and high ecological threats and not among the 30 hotspot countries may also be at risk.

A country may not have a level of resilience low enough to be considered a hotspot. However, if it is met with a sufficiently severe shock or a sequence of shocks, its resources, infrastructure and governance may come under stress. This could lower its Positive Peace level and leave it less equipped to deal with future shocks.

This mechanism is known as a vicious cycle and is another characteristic of the evolution of social systems (Figure 1.19).

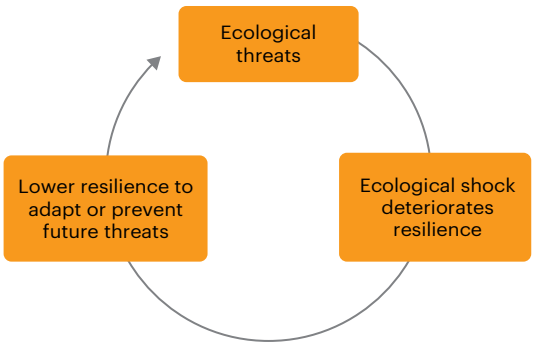
Reoccurring, compounding, or high impact threats have the potential to disrupt or break down a country's level of resilience. Excluding hotspot countries, the next 50 lowest ranks in the PPI form the group of nations at risk of falling into vicious ecological cycles.[41]

Figure 1.20 displays the number of countries at risk by region. Of the 50 countries identified, 20 countries in sub-Saharan Africa face extreme catastrophic threats and a further two face a high catastrophic ecological threat. This indicates that sub-Saharan Africa has the most hotspots as discussed previously and the most countries at risk of deteriorating resilience. Europe has one country at risk of falling resilience due to the catastrophic ETR score — Turkey which faces major threats from *temperature anomalies*, *water risk* and *food risk*.

FIGURE 1.19

Vicious cycle from deteriorating resilience

Increased stresses caused by ecological threats may damage resilience and make a society less equipped to deal with future threats.



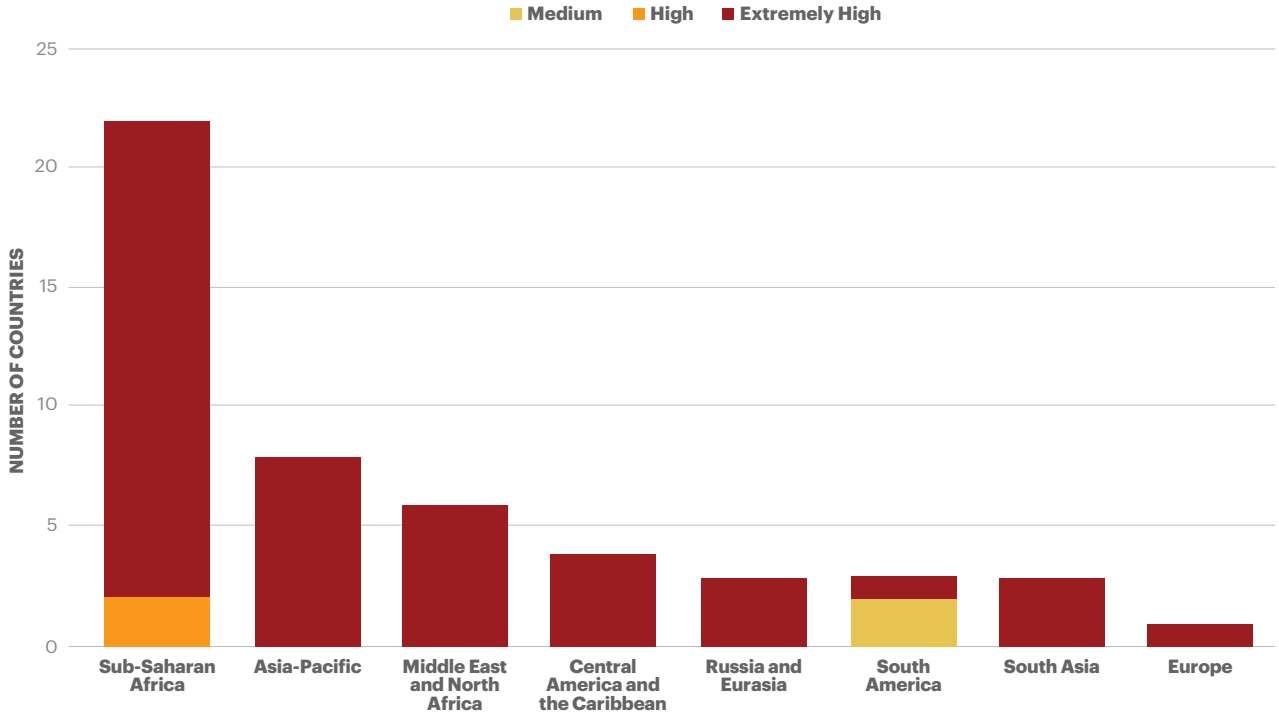
Source: IEP

> “Reoccurring, compounding, or high impact threats have the potential to disrupt or break down a country's level of resilience.

FIGURE 1.20

Number of countries at risk of deteriorating Positive Peace, by region and catastrophic ETR score, 2021

Sub-Saharan Africa has the most countries at risk of deteriorating resilience due to the high and extremely high catastrophic threat score.



Source: IEP

ETR and Conflict - Threat Multipliers

Conflict and ecological threats tend to interact and reinforce one another. Often, conflict arises as a result of competition for natural resources. In turn, the conflict itself destroys lives, livelihoods and governance, further depleting a region's ecological resources.

Overall, 19 of the 20 countries with the highest ETR score are among the world's 100 least peaceful countries as measured by the GPI. These countries include Afghanistan, Yemen, Somalia, Niger, Burkina Faso and Pakistan. Figure 1.21 displays the average ETR score by level of peacefulness, as measured by the 2021 GPI. As peacefulness deteriorates, the ETR score tends to worsen. As a result, the very high and high peace countries tend to have a better ETR score than medium, low and very low peace countries.

The relationship between peacefulness and food insecurity, water scarcity and population growth is complex. Adverse changes in the natural environment can lead to increased social tensions and civil unrest if societies do not have the necessary levels of resilience to deal with these threats. Similarly, conflict and uncontrolled population growth have well-documented negative impacts on the environment. These two dynamics of increasing resource scarcity and conflict can create a vicious cycle where one increases the likelihood of the other, leading to societies failing. While natural disasters may be relatively uniform across peace levels, how a country manages the disasters and their consequential impact differs. Countries that suffer from multiple issues, such as widespread violence, terrorism or political instability, may find it more difficult to prepare for disasters and therefore, the threat is heightened. Table 1.11 displays the ETR score by the different levels of peace. No high or very high peace country scores extremely high on the ETR. On the other hand, no low or very low peace country scores very low on the ETR.

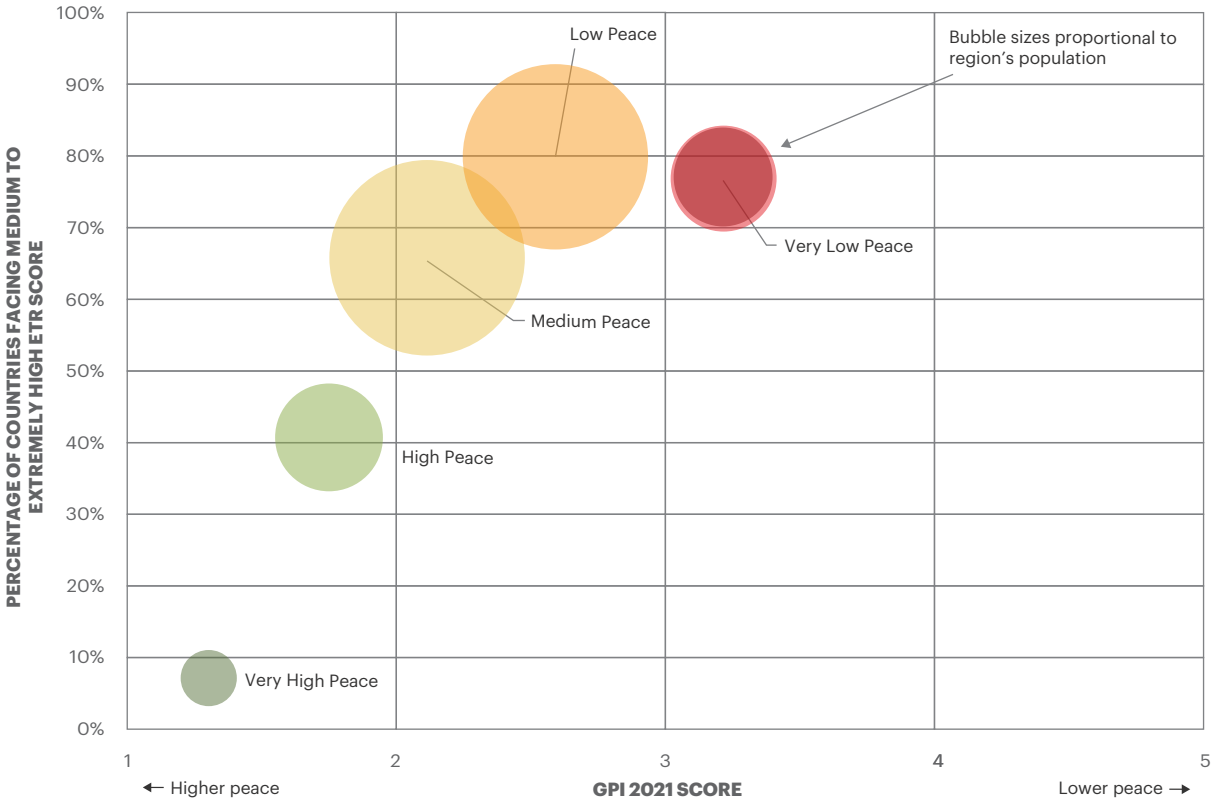
Emerging ecological threats act as stressors, however countries react differently to shocks depending on their levels of resilience. Resilience, or the ability of nations to mitigate and adapt to new ecological threats, will be critical in managing future ecological shocks to ensure the stability of political institutions and prevent future social unrest and violence.

The ETR shows that ecological threats and climate change pose serious challenges to global development and peacefulness. The adverse impacts will disproportionately affect the world's poorest and most vulnerable countries and create spill-over pressures on neighbouring countries through mass movements of people and resource extraction. Building resilience to ecological threats will become increasingly important and will require substantial investment today.

FIGURE 1.21

ETR Score by Peacefulness - ETR score versus GPI score, 2021

As peacefulness deteriorates as measured by the GPI, the ETR score tends to worsen.



Source: IEP

TABLE 1.11

ETR score by the different levels of peace, as measured by the Global Peace Index, 2021

No high or very high peace country suffers from an extremely high ETR score.

GPI Classification	1 (Very Low)	2 (Low)	3 (Medium)	4 (High)	5 (Extremely High)	Total	% High or Extreme
Very High Peace	12	1	1			14	0%
High Peace	13	13	14	4		44	9%
Medium Peace	3	20	20	15	7	65	34%
Low Peace		5	6	12	4	27	59%
Very Low Peace		3	5	3	2	13	38%
Grand Total	**28**	**42**	**46**	**34**	**13**	**163**	**29%**

Source: IEP
Note: Data is only available for 163 countries

2 Food Security

KEY FINDINGS

- The number and percentage of food-insecure people globally has risen every year since 2014. In 2020, 2.4 billion people or 30.4 per cent of the population were food insecure. This is an increase of 44 per cent since 2014.
- Since 2005 the number of undernourished people had been decreasing. The reversal of this trend began in 2015 with undernourishment steadily increasing since.
- 2020 recorded the largest increases in food insecurity and undernourishment since at least 2014, with over 300 million more people suffering from food insecurity and an additional 118 million from undernourishment.
- By 2050, the number of food-insecure people is expected to increase by 43 per cent to 3.4 billion people.
- The number of undernourished people is projected to rise by 343 million people by 2050, a 45 per cent increase from 2020.
- The COVID-19 lockdowns will likely have a long-lasting negative impact on world hunger.
- By 2050, the global demand for food will increase by 50 per cent from current levels.
- As of 2020, 768 million people suffer from undernutrition globally, leaving them at the highest risk of starvation.
- Two-thirds of people in sub-Saharan Africa currently face food insecurity, the highest rate of any region, while 264 million suffer from undernourishment. It is followed by South Asia, where 44 per cent of the population suffer from food insecurity.
- Europe has the lowest prevalence of food insecurity, with less than six per cent of its population affected.
- Rates of male thinness in low-peace countries are on average almost twice that of females. Lesotho, Zimbabwe and Togo have the highest differentials. In those countries, young males are very thin at rates 3.4 to 5.7 times higher than young females.
- The five most undernourished countries are Somalia, the Central African Republic, Haiti, Yemen and Madagascar.
- Almost two-thirds of Afghanistan's population faced food insecurity in 2020. This situation may worsen following the Taliban's return to power in 2021.
- Global food prices have increased dramatically since 2019 as a result of the COVID-19 pandemic and the associated economic downturn. By the first half of 2021, the Food Price Index had recorded a 26.8 per cent rise relative to 2019 prices. These rising prices will exacerbate the problem of food insecurity in the coming years.

A Snapshot of Food Security in the World

Approximately 2.4 billion people globally face food insecurity, characterised by a lack of access to a sufficient quantity of food necessary for a healthy life. The number of food-insecure people is rising, increasing by more than 700 million people since 2014. Today, around 30 per cent of the global population is food insecure, compared with 23 per cent in 2014.

Of the 2.4 billion people who are currently food insecure, around 930 million experience a severe form of food insecurity, defined as a person having to skip meals or go without food for an entire day. Box 2.1 provides the definitions of various types of food insecurity as well as undernourishment. Severe food insecurity has adverse consequences on a person's physical and mental health. It also affects economic productivity. When large proportions of a country's population are severely and regularly food insecure, economic development is stifled. Table 2.1 shows the number of food-insecure people as well as the prevalence of food insecurity globally.

The number of food-insecure people grew by over 720 million in the six years between 2014 and 2020, an increase of 44 per cent.

The year 2020 saw a large increase in the number of food-insecure people due to the reduction of economic activity that has occurred during the COVID-19 pandemic. The number of food-insecure people grew by 318 million in 2020.

The vast majority of this 2020 increase occurred in three regions: South Asia, sub-Saharan Africa and South America, where the numbers of food-insecure people rose by 128 million, 86 million and 40 million, respectively.

All regions except Europe saw their rates of food insecurity rise in 2020. In relative terms, the Russia and Eurasia region experienced the largest increase in food insecurity in 2020, although it was coming off a relatively low base. The number of food-insecure people in Russia and Eurasia increased by 41.8 per cent, or 17 million people. Food insecurity in the Russia and Eurasia region is expected to increase slightly in the future.

In 2020, hunger increased most in countries affected by conflict, climate extremes or economic downturns.[1]

TABLE 2.1

Global food insecurity, 2014–2020

The number of food-insecure people rose by over 300 million people in 2020 from the previous year, the largest annual increase on record.

Indicator	2014	2015	2016	2017	2018	2019	2020
Total population in moderate or severe food insecurity (billions of people)	1.65	1.68	1.76	1.88	1.98	2.05	2.37
Prevalence of moderate or severe food insecurity in the adult population	22.6%	22.8%	23.6%	24.9%	25.9%	26.6%	30.4%

Source: FAO

BOX 2.1

Food insecurity and undernourishment

The concepts of food insecurity and undernourishment are related but not equivalent.

Food security primarily refers to access to food. If access is difficult, uncertain or intermittent, a person or group is said to face food insecurity.

Undernourishment takes place when a person's or group's actual intake of food is insufficient to meet their dietary energy requirements.

Therefore, it is possible for a person or group to be food insecure but not undernourished. This happens when despite the difficulty and unpredictability of daily access to food, the actual intake remains on average at or above minimum required levels.

The key concepts are defined as follows. Food security is achieved when at all times, people have physical, social, and economic access to sufficient, safe, and nutritious food that meets their basic food preferences and dietary needs for an active and healthy life.[2]

- **Moderate food insecurity** is where an individual experiences uncertainty in obtaining food and may be forced to compromise on the dietary quality or quantity of food consumed. Thus, normal eating patterns may be disrupted, with negative impacts on their nutrition, health and well-being.
- **Severe food insecurity** is where an individual may have exhausted their food, or gone at least a day without eating. Their health, nutrition and well-being are at severe risk.
- **Undernourishment** is where an individual's habitual food consumption is insufficient to provide the dietary energy levels required to maintain their daily functions and a healthy life.

Food Security and Undernourishment

For food security to be achieved, people must have access to sufficient food that meets their basic preferences and dietary needs for an active and healthy life.[3] Food security comprises two dimensions: *availability* and *accessibility*.

- Food availability requires that a sufficient amount of food of appropriate quality be supplied, whether through domestic production, imports or aid.
- Food accessibility requires that legal, political, economic and social arrangements provide people with the ability to acquire food.

If either of these dimensions is not met, food security is compromised. There can be many sources of disruptions to the domestic food supply. In addition to ecological shocks, they can be related to changes in food subsidies, conflict, criminal activity and poor logistics, which can have an effect on the pricing and availability of food. Sudden shocks not only disrupt the accessibility of food; they can also create knock-on effects that result in heightened political instability, higher levels of civil unrest, higher numbers of forced migration and a higher likelihood of civil conflict.

In 2020, 768 million people worldwide were estimated to be undernourished, up by 118 million from 2019. Undernourishment occurs when a person is unable to acquire enough food to meet the daily minimum dietary energy requirements over a period of a year or more.[4] It results from persistent food insecurity and can significantly compromise a person's ability to lead a healthy life. In the early years of life, adequate nutrition is important for brain development and is positively related to benefits in later life in regards to education, job potential and mental health. Studies indicate that early childhood deficiencies in the intake of protein, zinc and vitamin B, for example, lead to higher rates of aggression and hyperactivity in later years. Similarly, low levels of iron have been linked to conduct disorder and juvenile delinquency.[5]

The link between malnutrition in childhood and violence is controversial and the research is limited. Given that countries with high levels of violence also tend to suffer from food shortages, further research should be undertaken. Further research into this relationship could identify areas where providing an adequate supply of food may prove beneficial in preventing conflict.

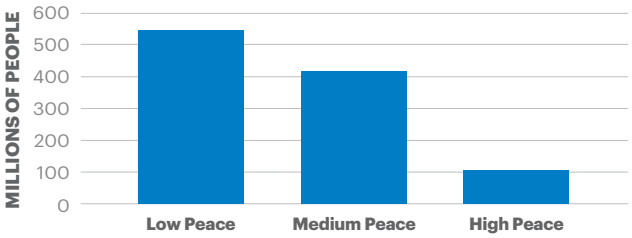
Figure 2.1 displays the levels of global undernourishment since 2005. Starting in 2015, the number of undernourished people began to rise after a decade of decline. This has resulted in the number of undernourished people globally nearly reverting back to 2005 levels. This trend is expected to deteriorate further in the next couple of years due to the COVID-19 pandemic and the associated economic downturns. Estimates of the consequences of the downturns indicate that by 2030 an additional 30 million people will experience hunger compared to scenarios in which the pandemic had not occurred.[6]

Undernourishment afflicts poorer and lower peace countries much more severely than wealthier, higher peace ones. The average undernourishment rate in low-peace countries, defined as having a Global Peace Index (GPI) score above 2.35, is 16 per cent, while the average undernourishment rate in high-peace countries, defined as having a GPI score below 1.9, is less than eight per cent. Forty of the 163 countries in the GPI are considered to be low-peace countries, while 58 are considered high-peace countries. Figure 2.2 shows the total number of undernourished people by country peace levels.

FIGURE 2.2

Total undernourished population by peacefulness, 2020

More than half of undernourished people live in low-peace countries.

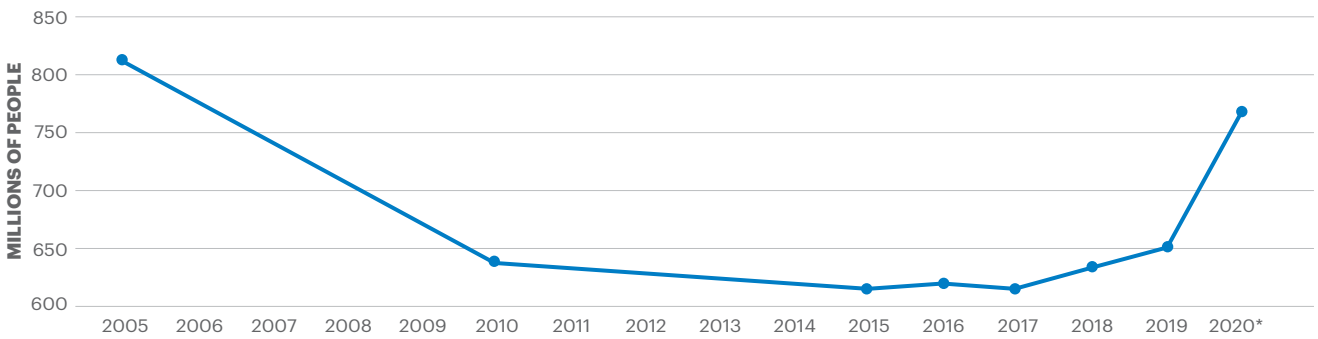


Source: FAO; IEP calculations

FIGURE 2.1

Number of undernourished globally, 2005–2020

The number of undernourished people rose by an estimated 118 million, marking the sharpest increase since at least 2005.



Source: FAO
Note: *Figures for 2020 are projections. 768 million represents a middle projection between a possible high of 811 million and a possible low of 720.4 million.

South Asia and sub-Saharan Africa have the highest rates of undernourishment, equal to 16 and 24 per cent of the population, respectively. With a total of 306 million undernourished people in South Asia and 264 million people in sub-Saharan Africa, these two regions account for almost three-quarters of the world's undernourished. Along with food insecurity, undernourishment was on the rise in many regions of the world even prior to the COVID-19 pandemic. Between 2015 and 2019, it increased in sub-Saharan Africa, the Middle East and North Africa (MENA), South America, and Central America and the Caribbean.

Table 2.2 outlines the 20 countries with the highest rates of undernourishment in 2020. Thirteen are located in sub-Saharan Africa, while the remaining seven are located in five other regions. Somalia ranks as the most severely undernourished country in the world. In 2020, it was the only country where more than half of the population was undernourished. Driving this situation has been a combination of environmental and conflict-related factors. Box 2.2 gives an overview of the role that conflict, environmental and political instability factors have on undernourishment in Somalia.

TABLE 2.2

Countries with the highest levels of undernourishment, 2020

Half of the most undernourished countries are projected to experience population growth exceeding 75 per cent in the next three decades.

	Country	Region	Prevalence of undernourishment (per cent of the population)	2020 population	Projected population change to 2050
1	Somalia	Sub-Saharan Africa	60%	15,893,219	120%
2	Central African Republic	Sub-Saharan Africa	48%	4,829,764	74%
3	Haiti	Central America and the Caribbean	47%	11,402,533	30%
4	Yemen	MENA	45%	29,825,968	61%
5	Madagascar	Sub-Saharan Africa	43%	27,691,019	95%
6	North Korea	Asia-Pacific	42%	25,778,815	3%
7	Democratic Republic of the Congo	Sub-Saharan Africa	42%	89,561,404	117%
8	Liberia	Sub-Saharan Africa	39%	5,057,677	85%
9	Republic of the Congo	Sub-Saharan Africa	38%	5,518,092	94%
10	Iraq	MENA	38%	40,222,503	76%
11	Rwanda	Sub-Saharan Africa	35%	12,952,209	78%
12	Chad	Sub-Saharan Africa	32%	16,425,859	107%
13	Mozambique	Sub-Saharan Africa	31%	31,255,435	109%
14	Botswana	Sub-Saharan Africa	29%	2,351,625	49%
15	Venezuela	South America	27%	28,435,943	30%
16	Sierra Leone	Sub-Saharan Africa	26%	7,976,985	62%
17	Afghanistan	South Asia	26%	38,928,341	66%
18	Tanzania	Sub-Saharan Africa	25%	59,734,213	117%
19	Kenya	Sub-Saharan Africa	25%	53,771,300	70%
20	Papua New Guinea	Asia-Pacific	25%	8,947,027	59%

Source: FAO; UNSTATS; World Bank; IEP calculations

BOX 2.2

Extreme levels of undernourishment – Somalia

Climate extremes and conflict drive high undernourishment rates in Somalia.[7] In 2020, more than half of its population were deemed to be undernourished.

Violence and political unrest have plagued Somalia since at least the start of its civil war in 1991. The protracted conflict has caused the loss of hundreds of thousands of lives as well as the displacement of more than a million Somalis.[8] Although the re-establishment of the Federal Government in 2012 brought greater stability to much of the country, its territory remains divided and under the control of multiple authorities. The presidential elections scheduled for late 2021 could reignite civil tensions, with the outcome likely to cause political instability, violence and increased food insecurity.

In addition to conflict, numerous ecological factors have contributed to Somalia's food insecurity. After experiencing a drought-induced famine in 2011, food production and distribution improved somewhat in the subsequent years. However, recent seasons of poor rainfall and low river water levels have resulted in crop failures. This is being exacerbated by locust outbreaks that are destroying local crops, reduced rural employment opportunities and increased numbers of livestock deaths.[9]

By 2018, 2.7 million Somalis could not meet their daily food requirements and more than half a million were on the brink of famine. Approximately 300,000 children under the age of five in Somalia are malnourished, of which nearly 50,000 are severely malnourished and face a high risk of disease and death.[10]

The COVID-19 pandemic and the associated economic downturn has aggravated Somalia's food security situation in a number of ways. It has caused a significant decline in livestock exports, which account for three-quarters of the country's total exports. With the animals being sold locally at reduced prices, many poor farmers and others involved in the livestock trade have struggled to cover basic necessities, especially as imported staple goods have become more expensive amid the trade slowdown.[11] The socio-economic fallout from COVID-19 has resulted in falling incomes. Coupled with higher food prices, this decline in incomes will continue to impede food security and rising undernourishment is likely to follow.

Undernourishment by Gender

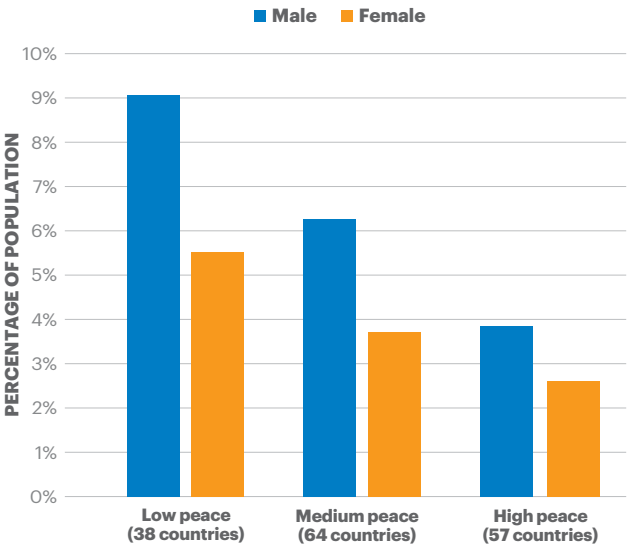
Figure 2.3 shows undernourishment by thinness, as measured as a Body Mass Index (BMI) more than two standard deviations below the median, broken down by gender for ages 5-19. In countries with the lowest levels of peace, thinness is, on average, twice as prevalent in males as it is in females.

Stunting for children under five years old is also more common in males than females. Based on figures from 133 countries, the average stunting rate for boys is 22.3 per cent, while for girls it is 19.4 per cent.[12] The five countries with the largest differences in stunting rates are Morocco, Nigeria, Mozambique, Vanuatu and Equatorial Guinea, where between 8.1 and 9.3 per cent more boys experience stunting than girls.

FIGURE 2.3

Thinness by gender, ages 5-19, 2016

In countries with the lowest levels of peace, thinness is, on average, almost twice as prevalent in males as it is in females.



Source: WHO; IEP

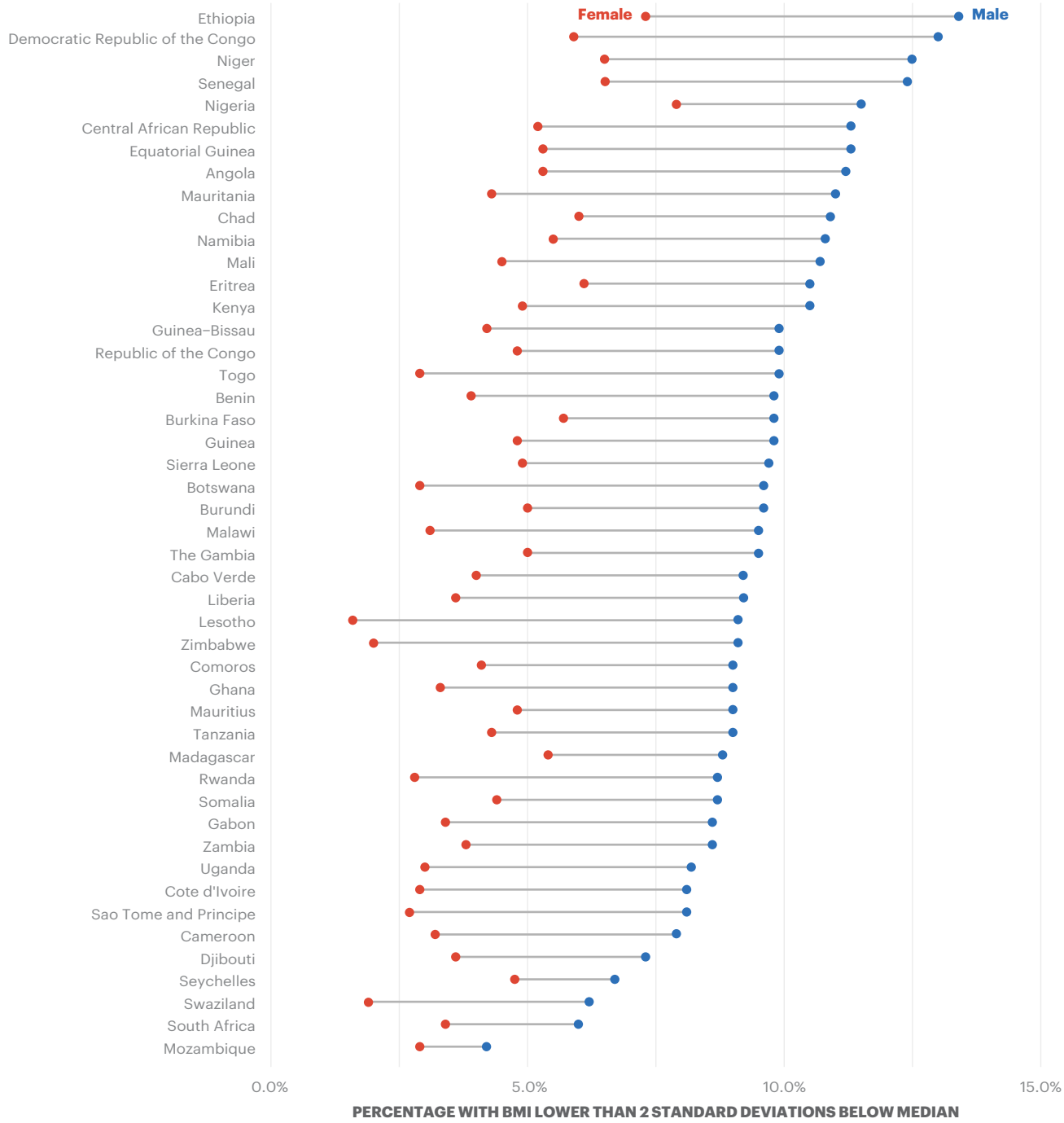
Looking specifically at sub-Saharan Africa as a region with very high rates of undernourishment, Figure 2.4 shows that thinness is between 1.5 and 5.7 times more common in males than in females within the 5-19 age bracket. Lesotho has the highest differential, with very high levels of male thinness at 9.1 per cent as compared to 1.6 per cent in females, equating to a 5.68 ratio between genders. This is followed by Zimbabwe, with a ratio of 4.55, and Togo, with a ratio of 3.4. Ethiopia has the highest rate of male thinness at 13.4 per cent, followed by the Democratic Republic of the Congo and Niger.

In 14 of the 44 sub-Saharan African countries covered in the GPI, more than 10 per cent of young males suffer from very high levels of thinness. Seven of these are among the 10 least peaceful countries in sub-Saharan Africa, and five are among the 10 countries with the highest levels of terrorism in the region. The connection between thinness, undernourishment and conflict is an under-researched area with limited available data. Analysing these relationships could be important to better understand how malnourishment contributes to broader conflict in society, particularly among its young men.[13]

FIGURE 2.4

Gender differentials in thinness, sub-Saharan Africa, 2016

In some countries in sub-Saharan Africa, thinness is three times as prevalent in males as in females in the 5-19 age bracket.



Source: WHO; IEP

Food Insecurity by Region

Sub-Saharan Africa is the most food-insecure region in the world. More than 700 million people in the region face food insecurity, equivalent to 66 per cent of the population. This means that two in three people in sub-Saharan Africa suffer from either moderate or severe food insecurity. Nineteen of the world's 20 most food-insecure countries are located in sub-Saharan Africa.[14] These realities are particularly concerning given that the region's population is expected to nearly double in the next 30 years. By 2050, sub-Saharan Africa's population is projected to be 2.1 billion, a 94 per cent increase. Such rapid population growth could translate to hundreds of millions of additional food-insecure people over the next few decades.

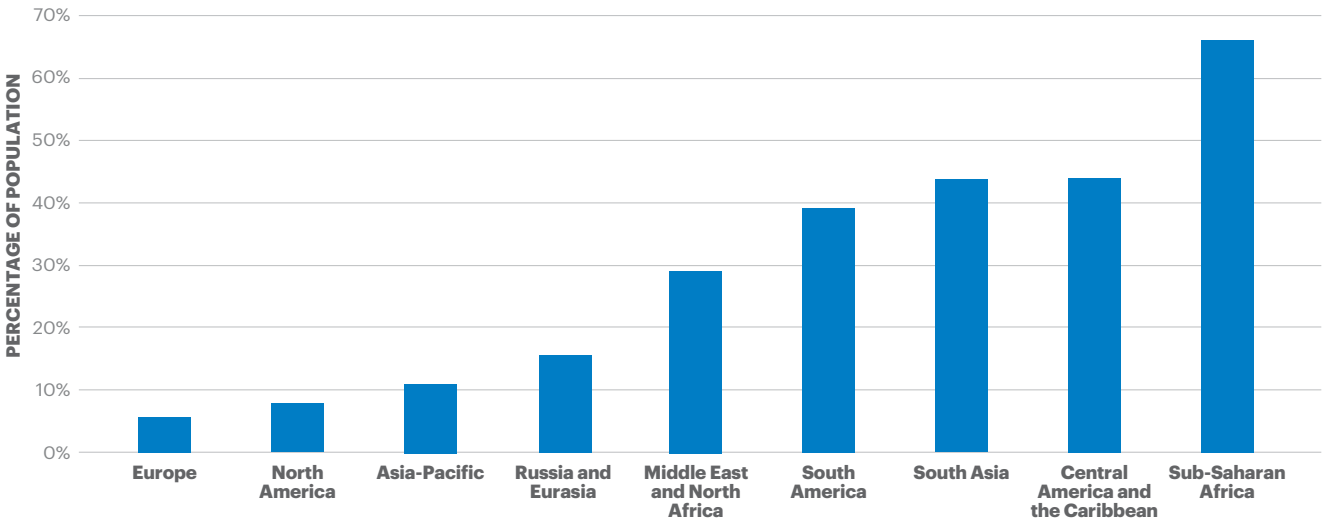
Not only must sub-Saharan Africa address current food insecurity, but it also must find a means of addressing the food requirements of the growing population. While sub-Saharan Africa is the region with the highest prevalence of food insecurity, South Asia has the greatest absolute number of food-insecure people – approximately 850 million people or 44 per cent of its population.

With just six per cent of its population considered food insecure, Europe has the lowest prevalence of food insecurity in the world. In terms of severe levels of food insecurity, the proportion is less than 1.5 per cent. Although food insecurity is less prevalent in Europe and North America, the phenomenon is not limited to low- and middle-income countries. Figure 2.5 shows the prevalence of food insecurity across the regions of the world in 2020.

FIGURE 2.5

Food-insecure people by region, percentage of total population, 2020

Sub-Saharan Africa has the highest prevalence of food insecurity, with 66 per cent of the population deemed food insecure.



Source: FAO; IEP calculations

Food Security and Conflict

In 2020, there were at least 19 countries in which conflict was the main driver of acute food insecurity.[15] In many of these, protracted civil wars and other internal conflicts have undermined food security for a variety of reasons: the confinement or displacement of communities, the disruption of patterns of trade, the abandonment of agricultural land, the destruction of assets, the obstruction of humanitarian assistance and the loss of life.[16]

While food insecurity can result from violence, conflict and political instability, it can also be a trigger to and stressor of social tensions, leading to further conflict. Conflict, extreme poverty and severe food insecurity interact in systemic ways and generate negative feedback loops. This is where social order deteriorates continuously, along with the food and water resources. These vicious cycles can be difficult to break.

Afghanistan, the Democratic Republic of the Congo, Nigeria, South Sudan and Sudan experienced the largest increases in the number of people facing crisis levels of food insecurity in 2020. In such settings, emergency action was needed to save lives and livelihoods.[17] Box 2.3 discusses the impacts of conflict on South Sudan. Driven by conflict, acute food insecurity is projected by the United Nation's Food and Agriculture Organisation to affect twice as many people in Burkina Faso, Cameroon, Chad, Mali and Niger in 2021 than in 2020.[18]

BOX 2.3

The world's most food insecure - South Sudan

South Sudan presents an example of how environmental and conflict-related factors can compound to create a situation of extreme food insecurity. Two years after gaining independence from Sudan in 2011, South Sudan erupted in a civil war that caused significant levels of displacement, destruction and loss of life. By 2018, it was estimated that there had been 190,000 violent deaths directly attributable to the war, while conflict-related disruptions to food production and health systems had resulted in an estimated additional 193,000 lives lost. In 2021, there were approximately 1.47 million internally displaced people in the country of 11 million and another 2.2 million living as refugees in neighbouring countries.[20]

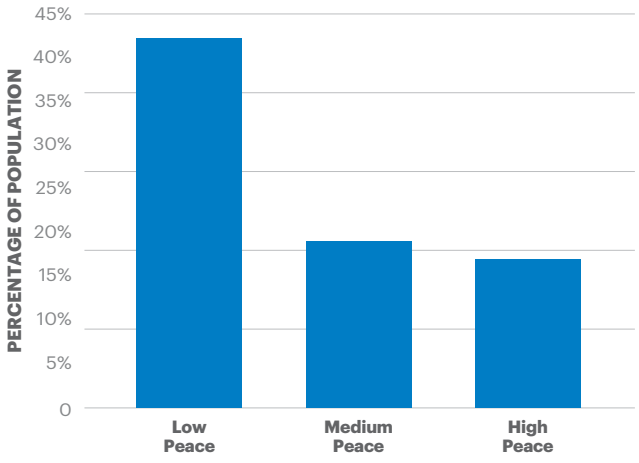
Several interconnected factors – including communities abandoning their lands, a collapsing economy, an over-dependence on food imports and low crop production caused by both flooding and drought – have combined to create a food crisis in the country.[21] In 2017, famine was declared in two of South Sudan's counties.[22] The impact of the famine has been mitigated by significant humanitarian responses. However, the situation is far from resolved, as almost 85 per cent of the population struggled to find enough food each day in 2020.

In low-peace countries, nearly 1.4 billion people experience food insecurity, equivalent to 40 per cent of the population.[23] Forty of the 163 countries in the GPI are considered to be low-peace countries. This compares to 155 million people or 11 per cent of the population in high-peace countries.[24] There are 58 countries classified as high peace. Among high-peace countries, Sierra Leone has the highest prevalence of food insecurity, at 85 per cent. Figure 2.6 shows the prevalence of food insecurity by levels of peacefulness.[25]

FIGURE 2.6

Average population facing food insecurity, by peacefulness, 2020

The prevalence of food insecurity is significantly greater in low-peace countries.



Source: FAO; IEP calculations

Food Insecurity by Country

In 2020, there were four countries in which more than half of the population was afflicted with severe food insecurity – South Sudan, the Central African Republic, the Republic of the Congo and Malawi.[26] In these countries, more than one in two people do not have enough food and can go days without eating. Two of these countries, Malawi and the Central African Republic, are among the poorest in the world, each with a GDP per capita below US$500.

Table 2.3 outlines the 20 countries with the highest rates of food insecurity in 2020.[27] The Republic of the Congo was the world's most food-insecure country in 2020, with 88 per cent of the population facing food insecurity. This high level of food insecurity led to 38 per cent of the country's population being undernourished. Box 2.4 gives a summary of food insecurity in the Republic of the Congo.

With almost two-thirds of its people facing difficulties in securing adequate and regular nutrition, Afghanistan has one of the highest levels of food insecurity, as shown in Table 2.3. The World Food Programme estimates that in 2020 one in three Afghans faced acute food insecurity. With the takeover of the Taliban in mid-2021, this situation may worsen. Hunger in Afghanistan has been a result of environmental and human factors, with recurrent droughts and ongoing conflict combining to reduce food production and drive poverty in the country. It is possible that under the Taliban, economic activity and food production will be further curtailed.

TABLE 2.3

Countries with the highest levels of food insecurity, 2020

The 15 countries with the highest prevalence of food insecurity are located in sub-Saharan Africa, and their combined population is projected to double in the next three decades.

	Country	Region	Prevalence of food insecurity (per cent of the population)	2020 population	Projected population change to 2050
1	Republic of the Congo	Sub-Saharan Africa	88%	5,518,092	94%
2	South Sudan	Sub-Saharan Africa	85%	11,193,729	78%
3	Sierra Leone	Sub-Saharan Africa	84%	7,976,985	62%
4	Malawi	Sub-Saharan Africa	82%	19,129,955	99%
5	Central African Republic	Sub-Saharan Africa	81%	4,829,764	74%
6	Liberia	Sub-Saharan Africa	81%	5,057,677	85%
7	Somalia	Sub-Saharan Africa	79%	15,893,219	120%
8	Guinea	Sub-Saharan Africa	74%	13,132,792	98%
9	Angola	Sub-Saharan Africa	74%	32,866,268	136%
10	Mozambique	Sub-Saharan Africa	71%	31,255,435	109%
11	Zimbabwe	Sub-Saharan Africa	70%	14,862,927	61%
12	Democratic Republic of the Congo	Sub-Saharan Africa	69%	89,561,404	117%
13	Uganda	Sub-Saharan Africa	69%	45,741,000	96%
14	Kenya	Sub-Saharan Africa	69%	53,771,300	70%
15	Eswatini	Sub-Saharan Africa	64%	1,160,164	68%
16	Afghanistan	South Asia	63%	38,928,341	66%
17	Nigeria	Sub-Saharan Africa	58%	206,139,587	95%
18	Namibia	Sub-Saharan Africa	58%	2,540,916	57%
19	Tanzania	Sub-Saharan Africa	56%	59,734,213	117%
20	Ethiopia	Sub-Saharan Africa	56%	114,963,583	79%

Source: FAO; UNSTATS; World Bank; IEP calculations

BOX 2.4

The world's most food insecure - Republic of the Congo

Despite being an oil-rich country that is economically better off than several of its neighbours, the Republic of the Congo faces high levels of poverty and inequality. Forty-eight per cent of the population lives on less than US$1.25 per day.[28] Agriculture is largely limited to subsistence farming, an activity in which about 40 per cent of the population is engaged, and the production of cash crops such as beans, sugar cane, cocoa and coffee. However, with 95 per cent of the country's arable land uncultivated, significant inroads to reducing food insecurity could be achieved by increasing cultivation and food production.[29]

Domestic production only covers 20-30 per cent of local food needs. The Republic of the Congo therefore relies heavily on food imports.[30] Between 2011 and 2020, the prices of most food staples rose. The price of cassava, which is grown locally, rose by 60 per cent, while the prices of rice and wheat flour rose by 35 and 44 per cent, respectively. In contrast, the cost of white beans fell by 11 per cent.

Recurring social and political conflicts, which have resulted in people abandoning their land, homes and jobs as well as discouraging long-term investments, have also undermined the country's ability to foster higher levels of food security. Hostilities in the administrative unit of Pool, for example, caused significant population displacement that led families to experience precarious nutrition conditions.

At the end of 2020, over 250,000 people were forcibly displaced from the Republic of the Congo. However, the Republic of the Congo also recorded refugees from neighbouring countries such as the Central African Republic and the Democratic Republic of the Congo. This could potentially put additional stress on the already limited food supply. These refugees fleeing to the Republic of Congo are highly dependent on humanitarian food assistance.[31]

Projections to 2050

By 2050, the global demand for food is projected to increase by 50 per cent.[32] In order to provide everyone with adequate food, the number of calories produced will need to exceed 20,500 trillion. This is a 56 per cent increase from the number of calories produced in 2010.[33]

Based on country population growth projections, if levels of food insecurity remain the same, the number of food-insecure people will grow by 43 per cent by 2050. This would mean 3.4 billion food-insecure people in the world, a billion more than there are today. Based on these estimates, sub-Saharan Africa will be home to the vast majority of food-insecure people by 2050. Figure 2.7 displays the projected number of food-insecure people in 2020 and 2050.

The countries projected to have the most rapid population growth tend to be those where food insecurity is most prevalent. The populations of the 50 countries with the lowest undernourishment rates are projected to grow by three per cent over the next three decades, making them home to just 37 million additional people. In contrast, the 50 countries with the highest undernourishment rates are on average expected to grow by 67 per cent, meaning they will have 1.4 billion more people.[34]

All regions but Europe are projected to experience increases in their levels of food insecurity, although the increases in Russia and Eurasia are slight. Two-thirds of the additional food-insecure people will be in sub-Saharan Africa. Figure 2.8 shows the numbers of food insecure people by region in 2020 and the projected number in 2050.[35]

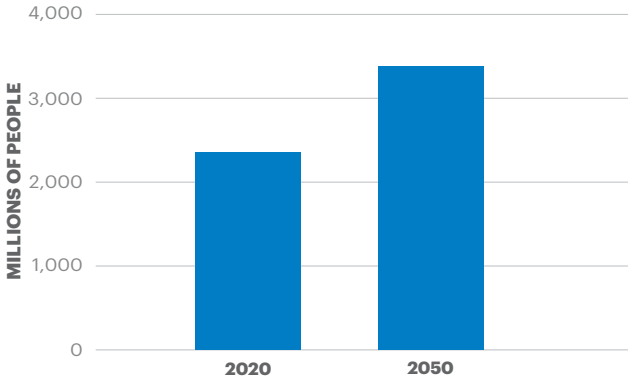
Not all those who are food-insecure are undernourished. Undernourishment levels in a country typically represent about a third of the total food-insecure population. Therefore, it is unsurprising that the increase in the number of food insecure people by 2050 is projected to be significantly larger than the increase in the number of undernourished people. Based on population projections and current undernourishment rates, there may be 1.1 billion undernourished people by 2050, 343 million more than there are today.

Avoiding a future in which the world has 343 million more undernourished and a billion more food-insecure people will be a significant challenge. There are a variety of issues that will need to be addressed to ensure that the world has access to adequate amounts of food. These include efforts to limit population growth, reduce food waste and promote patterns of sustainable food consumption. The challenge will also require improving agricultural land productivity, sustainably developing additional agricultural land, increasing humanitarian aid and mitigating the impacts of ecological shocks on food production.

FIGURE 2.7

Food-insecure people, 2020 and 2050 projection

The number of people suffering from food insecurity is projected to increase by one billion by 2050.

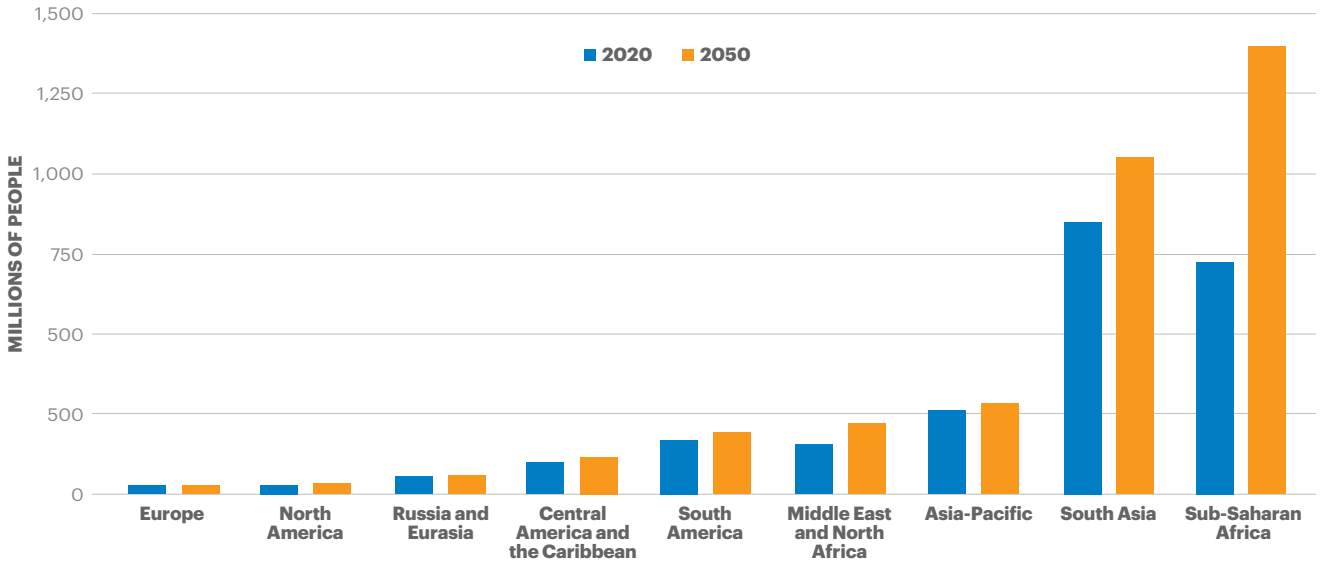


Source: FAO; IEP calculations

FIGURE 2.8

Food-insecure people by region, 2020 and 2050 projections

The number of food insecure people in sub-Saharan Africa is projected to nearly double.



Source: FAO; IEP calculations

Food Price Volatility

Since 2006, food prices have become more volatile. Although in real terms, agricultural commodity prices are not significantly higher today than in the 1970s, in the last fifteen years, food price indices have been marked by larger swings and fluctuations. While prices achieved a greater degree of stability between 2015 and 2019, the COVID-19 pandemic and the interruption of global economic activity have caused significant disruptions to the global food market since 2020.

Figure 2.9 displays the trend in food price indices from 1990 to 2021. Food prices are a potential stressor that can increase a country's instability, including violent demonstrations and civil unrest. In already fragile countries, sudden price rises in food can increase the number of hungry people, while sudden declines in prices can undermine subsistence livelihoods and make local markets uncompetitive. This is especially the case in places struggling with food security.

Food prices peaked in February 2011. In the prior year, droughts in Argentina, China, Russia and Ukraine, combined with torrential rains and flooding in Australia, Brazil and Canada, significantly diminished global wheat and grains supplies.[36] This led to increases in global food prices, which were intensely felt in the Middle East and North Africa. As the most food import dependent region in the world,[37] MENA relies on imports to meet 40 per cent of its food needs.[38]

The price increases provoked considerable social unrest in the region and became a major instigator in the massive protest movement that would come to be known as the Arab Spring.[39] Initially dismissed as another manifestation of the longstanding regional practice of "bread riots", the movement spread and eventually led to the toppling of four governments, including that of Egypt, the world's largest wheat importer.[40] The movement was also the catalyst for two civil wars, one leading to the overthrow of the Libyan government and the other costing hundreds of thousands of lives and continuing to the present in Syria. While food price increases do not necessarily lead to societal upheaval, fluctuations commonly have dire consequences for food-insecure people. Even when price increases are temporary, they can severely worsen a vulnerable person's food situation, raising risks of undernourishment, disease and starvation.

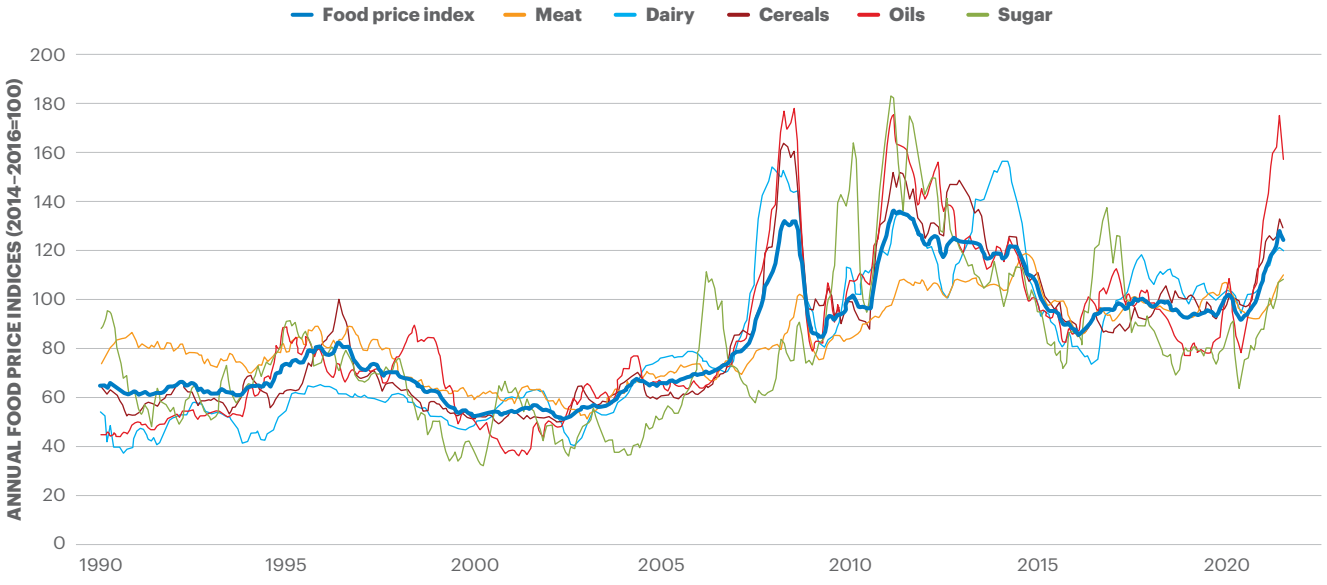
For food security to be achieved, the access and availability to food must be improved and stabilised. Stability is achieved when the food supply is maintained over the long term. There are a number of practical mechanisms that can support this goal, including cultivating a greater diversity of crops, better capturing and storing water and creating food banks to offset years when crops fail.

> “
>
> Global food prices have increased dramatically since 2019 as a result of the COVID-19 pandemic and the associated economic downturn. By the first half of 2021, the Food Price Index had recorded a 26.8 per cent rise relative to 2019 prices.

FIGURE 2.9

Monthly food price indices (2014-2016=100), 2000–2021

In the first half of 2021, food prices reached highs not experienced since 2011–2013.

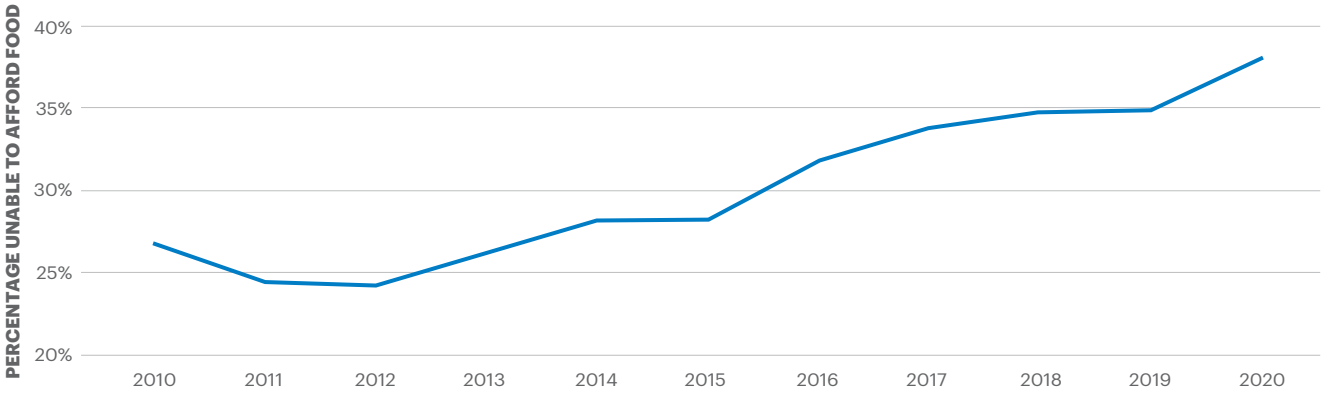


Source: FAO

FIGURE 2.10

Proportion of the global population unable to afford food, weighted by country populations, 2010–2020

The percentage of people without enough money to consistently buy food has risen by more than ten per cent over the past decade.



Source: Gallup; IEP calculations

FOOD AFFORDABILITY

Survey data indicates that, around the world, food affordability has grown worse over time. The Gallup World Poll, the leading global survey of public perceptions, collects information on citizens' ability to afford an adequate amount of food over the course of a full year. Between 2010 and 2020, the proportion of people across 163 countries reporting an inability to afford food at some point during the previous 12 months rose from 27 to 38 per cent. As shown in Figure 2.10, the largest single-year increases occurred in 2016 and 2020, when the proportion rose by four and three per cent, respectively.[41]

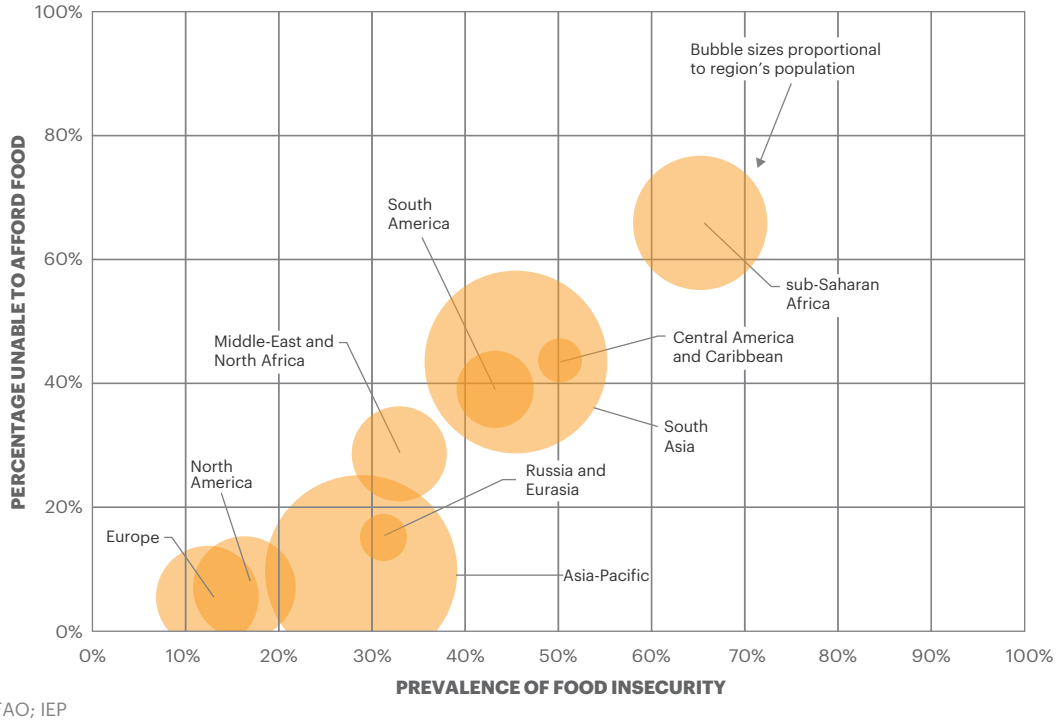
The rates at which people report being unable to afford adequate food vary from region to region, as shown in Figure 2.11. At 66 per cent, sub-Saharan Africa had the highest proportion, followed by Central America and the Caribbean at 50 per cent. In Europe and North America, the proportion of the population unable to afford adequate food was much lower, at 13 and 16 per cent, respectively. Unsurprisingly, regions that have a higher percentage of the population unable to afford food are those with higher levels of food insecurity.

Between 2010 and 2020, the rates of people reporting an inability to afford food rose in all regions except for Europe, where it fell by five per cent. South Asia recorded the steepest increase, rising by 75 per cent.

FIGURE 2.11

Food insecurity and the proportion of the population unable to afford food

Sub-Saharan Africa has the highest percentage of the population that has not had enough money to buy food.



Source: Gallup; FAO; IEP

The inability to afford food is highest among the world's least peaceful countries. This is in line with the elevated levels of food insecurity and undernourishment in such countries. More than half of the population in low-peace countries report an inability to afford food, compared to 21 per cent in high-peace countries. Between 2010 and 2020, the rates of people reporting an inability to afford food rose across low-, medium- and high-peace countries. However, among very high peace countries, a subset of the high-peace category, food unaffordability fell by ten per cent.

Box 2.5 analyses the relationship between conflict and food prices in Syria.

BOX 2.5

Conflict, prices and food security in Syria

The civil war that began in Syria in 2011 has had devastating effects on the country's economy. While obtaining reliable socio-economic data has become difficult since the onset of the conflict, Syria's GDP in 2020 was estimated to be just US$18.8 billion, compared to US$60.5 billion in 2010.[42] The conflict has taken a significant toll on the country's physical capital, with conflict-inflicted damage of infrastructure amounting to US$117.7 billion by the end of 2018.[43] Analyses indicate that, by 2017, 6.5 per cent of Syria's homes had been destroyed and an additional 19.8 per cent had been damaged.[44]

Interconnected with the economic costs of the conflict, food security has also deteriorated significantly in Syria in the past decade. The World Food Programme estimates that 12.8 million Syrians were food insecure in 2021,[45] representing nearly 60 per cent of the country's population. Of these, 1.3 million are considered acutely food insecure and 1.7 million reside in camps and are therefore especially vulnerable and reliant on external assistance.[46] Amid soaring inflation, food prices have skyrocketed over the past decade. By 2016-2017, food staples were ten times more expensive than they were in 2011.

While prices declined slightly in 2018-2019, they again rose sharply with the onset of the COVID-19 pandemic. Although the global economic downturn caused by the pandemic has reduced global oil prices, Syria has been struggling with fuel shortages as a result of international sanctions and currency depreciation. High costs for transportation as well as domestic and imported agricultural inputs have also hampered farming activities in the country. In addition, as of late 2020, dry weather conditions prevailed in the most eastern part of Hassakeh, the governorate with the largest planted area and cereal production in Syria.[47]

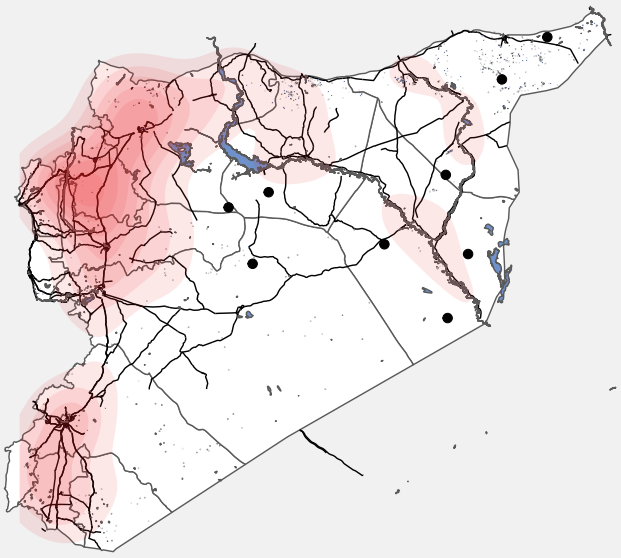
The role of violence in driving food insecurity in Syria can be seen more clearly by analysing the geographic distribution of food price increases against the geographic distribution of the conflict. The largest concentration of conflict has occurred in the urban areas to the west and bordering the Mediterranean. Since the onset of violence, the Governorate of Hama has recorded the largest number of battle-deaths per 100,000 people. However, the main arterial road passing through Dayr Az Zor, with its proximity to water and oil fields, also attracted violence.

Figure 2.12a shows these primary zones of conflict, while Figure 2.12b shows the changes in the retail price of bread since the start of the war. The figures demonstrate that the areas most acutely impacted by the conflict are among those that have also experienced the most significant increases in food prices.

FIGURE 2.12a

Geospatial distribution of conflict in Syria

Northwest Syria has had the highest number of battle-deaths per 100,000 people.

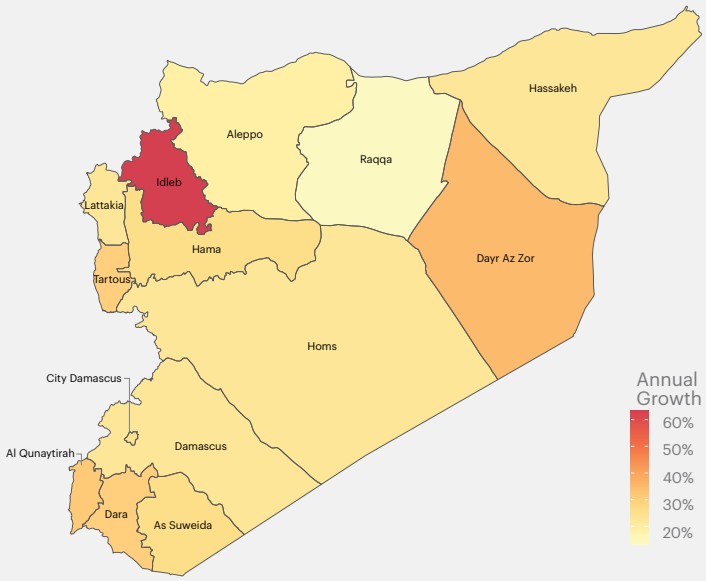


Source: UCDP; OpenStreetMaps; IEP

FIGURE 2.12b

Geospatial distribution of food price changes in Syria

The Governorate of Idelb experienced the greatest increase in the price of bread, followed by Dayr Az Zor in the east.



Source: WFP; IEP

Calculating the compound annual growth rate of retail bread prices shows that the highest has been in the governorates of Idleb and Dayr Az Zor. With a population of 1.2 million, Dayr Az Zor is in the bottom third of the 14 governorates for population density.

The case of Syria shows that conflict disrupts food systems in complex ways; it is not necessarily the areas most directly affected by violence that experience the greatest increases in food prices. Violence along major distribution routes or in areas of important natural resources, for example, may have flow-on effects that impact food prices – as well as food security – in unexpected ways.

3

Case Studies

Introduction

While ecological threats affect large areas of the world, certain regions are especially fragile. They combine high ETR exposures with low societal resilience. This section focuses on three such regions: Central America, the Sahel and South-East Asia. These regions face medium to extremely high risks as well as socio-economic fragilities that limit the capacity of local communities to respond to ecological shocks. Table 3.1 provides an overview of the regions and their ETR scores.

An analysis of ecological risks at the regional level is useful for two reasons. Firstly, most ecological threats cover vast areas and may cross many national borders. This means that resilience-building programs and interventions often need to be implemented multi-nationally to be effective. Secondly, ecological shocks may have a certain degree of contagion, and spread beyond national borders. For example, a nation's overuse of a river basin's resources can affect downstream countries, or rapid population growth may exacerbate resource scarcity resulting in population displacement into neighbouring countries.

Central America, the Sahel and South-East Asia are examples of areas where numerous and populous countries in close proximity share similar ecological profiles, where shocks can quickly develop ramifications beyond national borders.

The most common threat across all three of these regions relates to water. Parts of the Sahel are particularly dry, where conflict and ecological degradation are constant threats to water resources. Central America is subject to long dry spells interspersed by storms and floods. South-East Asia is also prone to flooding in addition to other types of natural disasters. The damming of the Mekong River has exacerbated volatilities in the river's water flow, further exacerbating food, water and energy insecurities in Myanmar, Laos, Thailand, Cambodia and Vietnam. The construction of upstream hydropower dams has hampered agricultural productivity, depleted fish stocks and threatened the livelihoods of tens of millions of people further downstream.[1]

Food risk also looms large as a key ecological threat for both the Sahel and South-East Asia. In these densely populated regions, food provision is constantly disrupted by conflict or natural events. Central America faces extremely high risk from *natural disasters*, while South-East Asia faces high risk, as these regions frequently grapple with flooding and storms. The case studies presented in this section discuss these exposures in detail and assess the fragilities unique to each region.

In the **Sahel**, resource scarcity threats, such as *food* and *water risk*, are compounded by high levels of population growth. In recent years, the Sahel recorded a significant rise in terrorist activity following the emergence of Islamic State affiliates and the re-emergence of Al-Qa'ida affiliates. Increasing terrorist activity and ongoing intercommunal tensions have contributed to the worsening security situation, leading to widespread displacement. Ongoing conflict and terrorism form a vicious cycle in the region, whereby ecological degradation, resource stress and population growth lead to additional stresses on resources and institutions, and in turn, increase the likelihood of instability and conflict.

South-East Asia is one of the most disaster prone regions globally, exposed to frequent floods, tropical cyclones, earthquakes and volcanic eruptions. The region is increasingly vulnerable to the impacts of climate change, with a large proportion of the population and economic activity concentrated along coastlines and heavy reliance on natural resources and agriculture for livelihoods. Natural disasters in the region typically converge in densely populated urban areas along coastlines, creating high population exposure to natural disasters. Numerous shocks also pose challenges for water scarcity and food security, which the recent COVID-19 pandemic has aggravated.

The case study of **Central America** demonstrates how ecological and human challenges can create compounding crises in some countries, while those facing less severe socio-economic and climatic threats can often withstand shocks. All of the countries of Central America suffer from poverty and gang-driven violence, but in some, these problems are much more acute. The countries most afflicted by such problems also tend to be the most vulnerable to ecological threats related to *natural disasters* and *water risk*. This is particularly the case in the area known as the Dry Corridor, which stretches across El Salvador, Guatemala, Honduras and Nicaragua. In this area, increasingly extreme and irregular rainfall – coming in the form of both droughts and torrential rains – has devastated food production and caused other disruptions. The combination of poverty, violence and ecological threats have created a general climate of social instability over the past decade. As a result, millions of people have been forced to flee their homes – sometimes seeking better conditions in other parts of their own countries and sometimes seeking asylum abroad.

The following sub-sections analyse the three sub-regions in detail with respect to their ecological threats.

TABLE 3.1

Overview of ETR scores, the Sahel, South-East Asia and Central America

Water risk is the most common ecological threat across the three regions.

Region	Number of Countries	Population (2021)	Average ETR Score	Most Common Threat	Percentage of administrative units at high or extremely high risk
Sahel	10	361 million	4 High	Water Risk	60%
South-East Asia	11	675 million	3 Medium	Water Risk	40%
Central America	8	182 million	3 Medium	Water Risk & Natural Disasters	37%

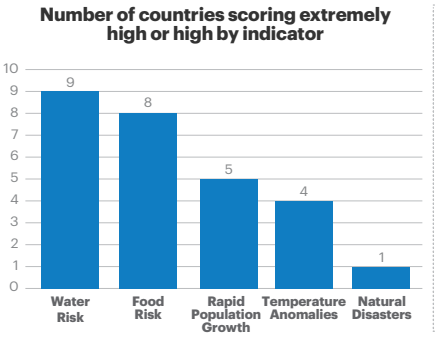
Source: IEP

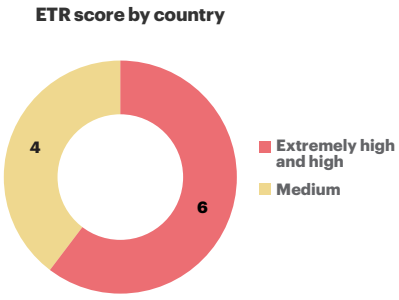
The Sahel

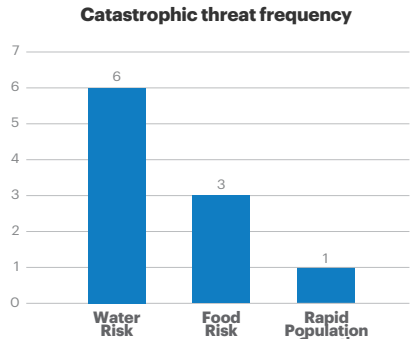
Average ETR Score
4 | High

Most Common Threat
Water Risk

10 Countries
132 Administrative Units







SUMMARY

The Sahel region faces many converging and complex challenges such as civil unrest, weak institutions, corruption, high population growth and lack of adequate food and water. These issues have formed a vicious cycle whereby ecological degradation and population growth have increased the likelihood of conflict, and facilitated the rise of many Islamist insurgencies in the region. Poor governance has resulted in the inability of many of the governments in the region to address these problems. These issues are only going to be amplified by climate change. Figure 3.1 displays the map of the countries included by their sub-national ETR score.

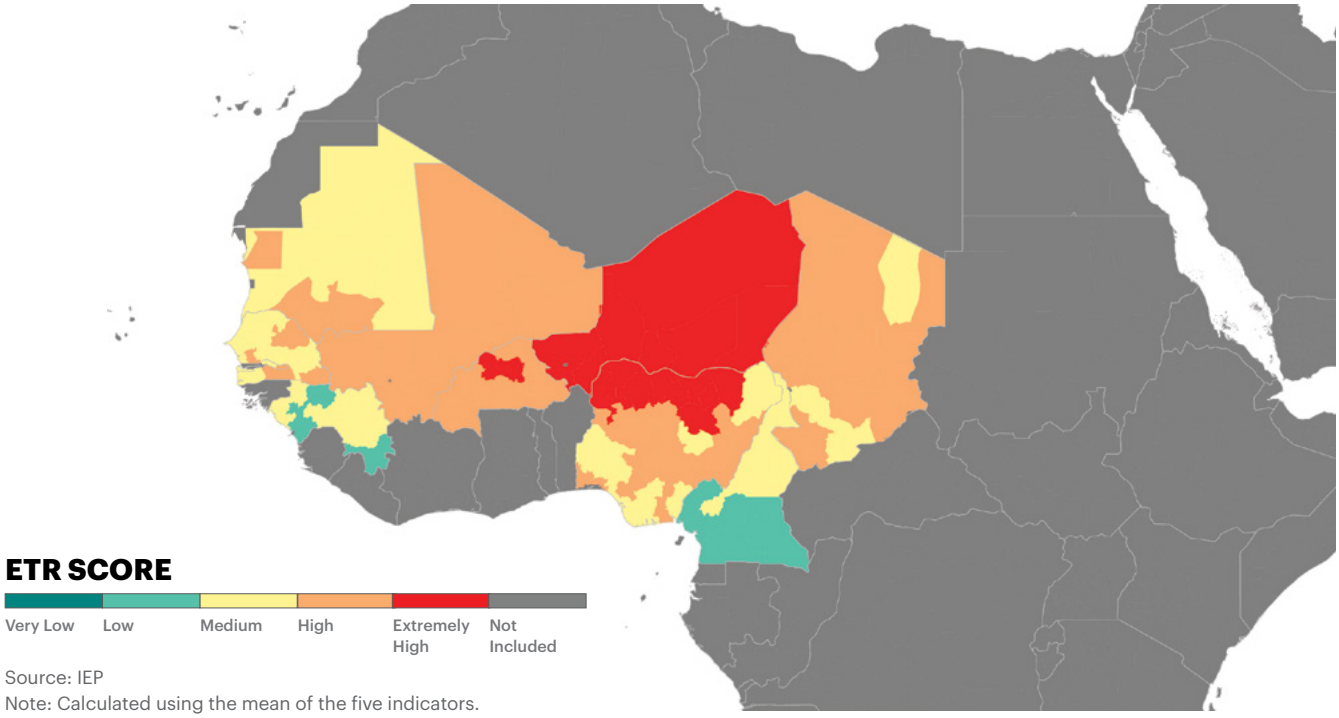
Water risk is the most severe catastrophic threat for six countries, followed by *food risk* for three countries. *Rapid population growth* is a threat multiplier for all countries in the region. In particular, Niger has the highest projected population growth with an increase of 161 per cent by 2050, or an increase from 25.1 million people to 65.5 million. All three of these ETR threats – *Water risk, Food risk* and *Rapid population growth* - form the Resource Scarcity domain of the ETR.

The Sahel holds the world's highest concentration of hotspot countries – these are the countries most likely to collapse when exposed to further shocks. Six of the ten countries within the Sahel — Chad, Cameroon, Guinea, Mauritania, Niger and Nigeria – are classified as "hotspots", meaning they have low levels of resilience and a medium to extremely high. Many of these areas are already experiencing armed conflict.

FIGURE 3.1

Sub-national ETR Score, Sahel region, 2021

The higher the ETR score, the higher the ecological threat.



Source: IEP
Note: Calculated using the mean of the five indicators.

Table 3.2 details the ETR scores of the countries in the Sahel region. The majority of countries in the region, six out of ten, receive an extremely high or high ETR score, while the remaining four have a medium threat score. The Sahel region denotes the semi-arid region of western and north-central Africa which comprises parts of 10 countries[2]: Burkina Faso, Cameroon, Chad, The Gambia, Guinea, Mali, Mauritania, Niger, Nigeria and Senegal.

TABLE 3.2

Overview of ETR scores, Sahel region, 2021

Eight out of the ten countries in the Sahel region rank in the bottom half of the ETR.

Country	ETR Score	ETR Rank	Projected population change (2021 – 2050)	Max Threat
Niger	5	177	161%	Rapid Population Growth
Burkina Faso	4	165	102%	Water Risk
Nigeria	4	156	90%	Water Risk
Mali	4	153	109%	Water Risk
Chad	4	148	101%	Food Risk
Mauritania	4	137	89%	Water Risk
Gambia	3	129	96%	Water Risk
Senegal	3	124	93%	Water Risk
Guinea	3	87	92%	Food Risk
Cameroon	3	85	86%	Food Risk

Source: IEP

Water risk is the most common threat in the region, with nine out of ten countries scoring extremely high or high on this indicator. *Food risk* and *rapid population growth* are the next common threats. Importantly, these risks are expected to converge, and water and food risk will be magnified by the large growth in population that the region is experiencing.

Temperatures in the region are rising 1.5 times faster than the global average.[3] The Sahel region is disproportionately affected by high variabilities in climate conditions, which consequently impacts food production and access to resources. Around 50 million people in the region are dependent on livestock as a means of livelihood.[4] However, land scarcity, over-population, and the overuse of resources have contributed to the degradation of land in the Sahel region, which groups such as the Fulani have historically used for grazing, driving many herders further south into states inhabited by farmers.[5] Frequent droughts and floods have also undermined food production in the region, destroying diverse human settlements and causing widespread displacement.[6]

The region's population is expected to grow by around 97 per cent between 2021 and 2050, this will place additional pressure on already scarce food and water resources. The region is also home to four countries projected to double their population by 2050: Niger, Burkina Faso, Mali and Chad. Globally, Niger is projected to have the largest population growth, increasing by 161 per cent by 2050. This equates to an increase in population from approximately 25.1 million people in 2021 to 65.6 million in 2050, highlighting the extent of the problem the region is facing.

CONFLICT, RESILIENCE AND ECOLOGICAL THREATS

In the Sahel, conflict spans national borders. These conflicts, in many ways, are the result of deteriorating living conditions, increasing poverty and weak governance. Table 3.3 provides an overview of conflict status and resilience, as measured by Positive Peace.

The Sahel operates with low levels of Positive Peace, with all countries ranking in the bottom half of the Positive Peace Index (PPI) rankings. In particular, countries in the Sahel hold especially low ranks in the Positive Peace Pillars *Low Levels of Corruption, Good Relations with Neighbours* and *Equitable Distribution of Resources*, highlighting important barriers for socio-economic development.

While the Sahel operates with low levels of Positive Peace, there has been a small improvement of 2.6 per cent in its overall PPI score in the last decade. Senegal recorded the largest

TABLE 3.3

Overview of PPI and GPI scores, Sahel region, 2021

The majority of countries in the Sahel region face ongoing conflict and also have low to medium levels of resilience, as measured by Positive Peace.

Country	Conflict Status[7]	GPI Rank (out of 163)	PPI Rank (out of 163)	Resilience*
Niger	Medium-Intensity	138	137	Very Low
Burkina Faso	Medium-Intensity	122	113	Low
Nigeria	Medium-Intensity	147	144	Very Low
Mali	Medium-Intensity	144	128	Low
Chad	Medium-Intensity	134	158	Very Low
Mauritania	-	117	141	Very Low
Senegal	-	47	85	Medium
Cameroon	Medium-Intensity	141	142	Very Low
The Gambia	-	53	102	Low
Guinea	-	92	142	Very Low

Source: IEP; World Bank

Note: *Uses ranking quintiles 'very high' (ranks from 1 to 33), 'high' (34 to 66), 'medium' (67 to 98), 'low' (99 to 131) and 'very low' (131 to 163).

TABLE 3.4

Country sub-national breakdown and score, Sahel region, 2021

All of the administrative units of Burkina Faso, Mali and Niger face high or extremely high ecological threat.

Country	2 (Low)	3 (Medium)	4 (High)	5 (Extremely High)	Total	% High or Extreme
Burkina Faso	-	-	11	2	13	100%
Mali	-	-	8	-	8	100%
Niger	-	-	-	7	7	100%
Chad	-	4	18	-	22	82%
Nigeria	-	14	14	8	36	61%
Mauritania	-	6	6	-	12	50%
The Gambia	-	2	1	-	3	33%
Senegal	-	10	4	-	14	29%
Cameroon	6	4	-	-	10	0%
Guinea	3	4	-	-	7	0%
Grand Total	**9**	**44**	**62**	**17**	**132**	**60%**

Source: IEP

improvement since 2009, at 7.4 per cent, followed by Guinea and The Gambia at 6.4 and 5.4 per cent, respectively. Eight of the ten countries deteriorated in *Low Levels of Corruption* between 2009 and 2021, with the largest deteriorations recorded by Niger, Senegal and Cameroon.

Improvements were recorded on the *Sound Business Environment, Free Flow of Information,* and *Equitable Distribution of Resources* Pillars due to multiple initiatives supporting micro-businesses and poverty alleviation in the area. Technology has been a driver of the improvement in the *Free Flow of Information* Pillar, with many programs by the Sahel Alliance and the Organisation Internationale de la Francophonie (OIF) promoting digital literacy among the region's youth.

However, eight of the ten countries in the Sahel deteriorated on the *attitudes* domain of Positive Peace, including the four countries with the worst ETR scores – Niger, Burkina Faso, Nigeria and Mali. These four countries also deteriorated on the GPI between 2009 and 2021.

Despite some improvements, the region's Positive Peace levels remain low by international standards. Without concerted efforts and substantial development in all Pillars of Positive Peace, it is difficult to see the Sahel's resilience levels improving enough to shield it from ecological threats in the future.

SUB-NATIONAL ANALYSIS

As shown in Table 3.4, the Sahel region is comprised of 132 administrative units across ten countries. The majority of these administrative units score 3, 4 or 5 on the ETR, indicating medium, high or extremely high threat, respectively. Notably, no administrative units in the Sahel score a one on the ETR, indicating a very low threat. In Burkina Faso, Mali and Niger, all administrative units score as extremely high or high on the ETR. All seven administrative units in Niger score extremely high.

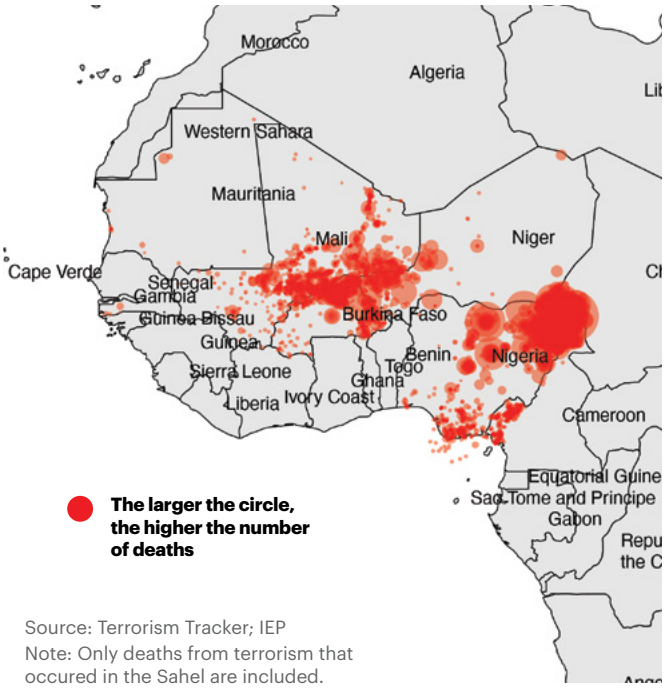
TERRORISM AND ARMED CONFLICT IN THE SAHEL

Since 2007, the Sahel region has recorded over 4,500 terrorist attacks, resulting in 17,536 deaths. Terrorist activity has been primarily concentrated in the Lake Chad Basin, comprising parts of Cameroon, Chad, Niger and Nigeria, and the Central Sahel area along the Burkina Faso, Mali and Niger border. Figure 3.2 shows the distribution of terrorist deaths in the Sahel between January 2007 and July 2021.

FIGURE 3.2

Total deaths from terrorism in the Sahel, 2007–2021

The Sahel region recorded over 17,500 deaths from terrorism between January 2007 and July 2021.

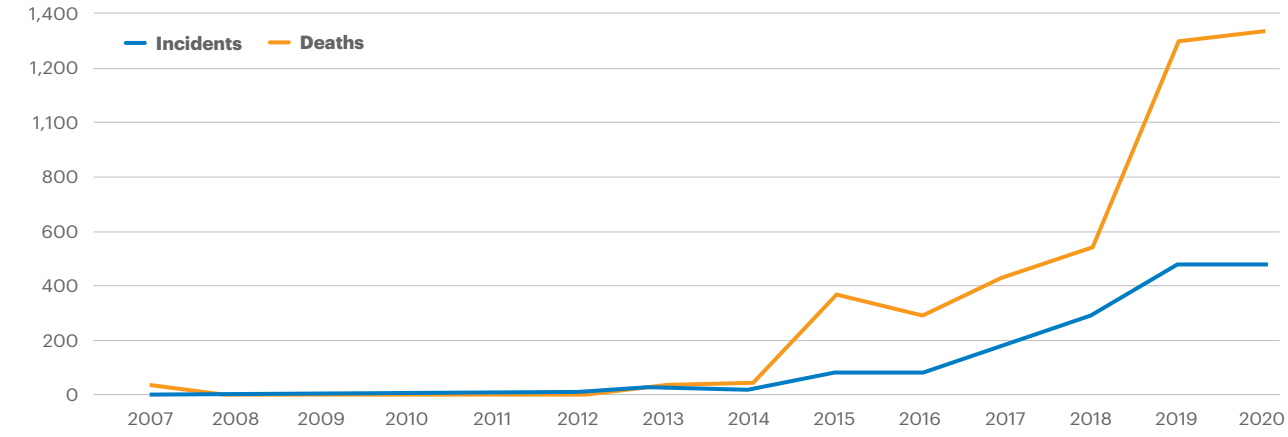


Source: Terrorism Tracker; IEP
Note: Only deaths from terrorism that occured in the Sahel are included.

FIGURE 3.3

Total incidents and deaths from terrorism in Burkina Faso, Mali and Niger, 2007–2020

Terrorist activity in Burkina Faso, Mali and Niger began to increase considerably after 2016.



Source: Terrorism Tracker; IEP

Terrorism is often used as a tactic within a conflict setting. However, the amount of recorded terrorism does not take into account deaths from other forms of conflict, namely conflict between communal militias, which are estimated to be approximately 50 per cent higher.[8] For example, the conflict between the Fulani and farmers has resulted in approximately 2,148 deaths over the last three years.[9]

The vast semi-arid regions of the Sahel are home to many radical Islamist militias. Following the 2012 Tuareg rebellion in Mali, the marginalisation of this population has provided al-Qa'ida in the Islamic Maghreb (AQIM) the opportunity to frame their struggles as part of a broader ideological movement.[10] In recent years, the emergence of Islamic State affiliates in the Sahel region, and the re-emergence of Al-Qa'ida affiliates, has increased terrorist activity throughout sub-Saharan Africa, and particularly in the Sahel.

Islamist militias in the Sahel appear to be gaining influence by leveraging existing ethnic tensions.[11] Farmer–herder conflicts frequently revolve around land use issues, particularly over access to water and livestock raiding.[12]

Burkina Faso, Mali and Niger border area

The last five years have seen a significant increase of terrorist attacks in the Central Sahel, predominantly at the intersection of the Burkina Faso, Mali, and Niger borders, with over 1,300 terrorist deaths recorded in the three countries in 2020 alone. Figure 3.3 displays the trend in the total incidents and deaths from terrorism in the three countries.

This increase has been driven by the incursion of militant Islamist groups, such as the Islamic State of the Greater Sahara (ISGS), an affiliate of the Islamic State of Iraq and Syria (ISIL), and Jamaat Nusrat al-Islam wal Muslimin (JNIM), an affiliate of AQIM. At the same time, terrorist groups have sought to exploit intercommunal tensions between agriculturalists and pastoralists, further exacerbating the fragile security situation. For instance, JNIM has sought to embed itself into local communities by portraying itself as a defender of ethnic groups, such as the Fulani in Mali.[13] Similarly, ISGS has sought to take advantage of intercommunal conflicts between the Fulani and Tuaregs in the Mali-Niger border area.[14] By exploiting existing tensions, both groups have been able to co-opt disaffected individuals into taking up arms against either rival groups, or government forces.

Burkina Faso, Mali, and Niger share many challenges, including weak institutions, corruption, lack of infrastructure, and difficulty controlling their vast borders.[15] In addition to growing insecurity, the region has also faced prolonged periods of drought and flooding, which has had a severe impact on fragile livelihoods and people's capacity to feed themselves in the region.[16] Moreover, these countries have some of the highest population growth rates in the world.

In November 2019, the World Food Programme reported a "three-country crisis" in Burkina Faso, Mali and Niger which has led to the displacement of one million people, while 2.4 million require food assistance.[17] In Burkina Faso, the most affected administrative units - Sahel and Centre-Nord - account for almost 900,000 internally displaced people (IDPs).[18] These administrative units are also facing the highest threats from *water risk* and *rapid population growth*.

Similarly, in Niger, the country's security challenges are compounded by rapid population growth. The administrative units facing the greatest threat from terrorism in the country - Tillabéry, Diffa and Tahoua – are also those with the highest population growth rates.

In Mali, the administrative units of Mopti and Gao account for the majority of terrorist activity in the country. *Water risk* is the greatest threat for the Mopti administrative unit and will be compounded by high population growth.

International and regional responses to persistent violence and instability in the central Sahel include the United Nations Multidimensional Integrated Stabilization Mission in Mali (MINUSMA) with 14,000 UN peacekeeping troops, in addition to the French-led counter-terrorism operation, named Operation Barkhane, involving 5,100 French troops.[19] In July 2021, President Macron announced that the number of French troops in Mali would be reduced to approximately 2,500-3,000 by early 2022.[20] Thus far, international and regional responses to the conflict have failed to prevent rising levels of terrorism or accompanying humanitarian crises, including significant increases in food insecurity and widespread displacement.

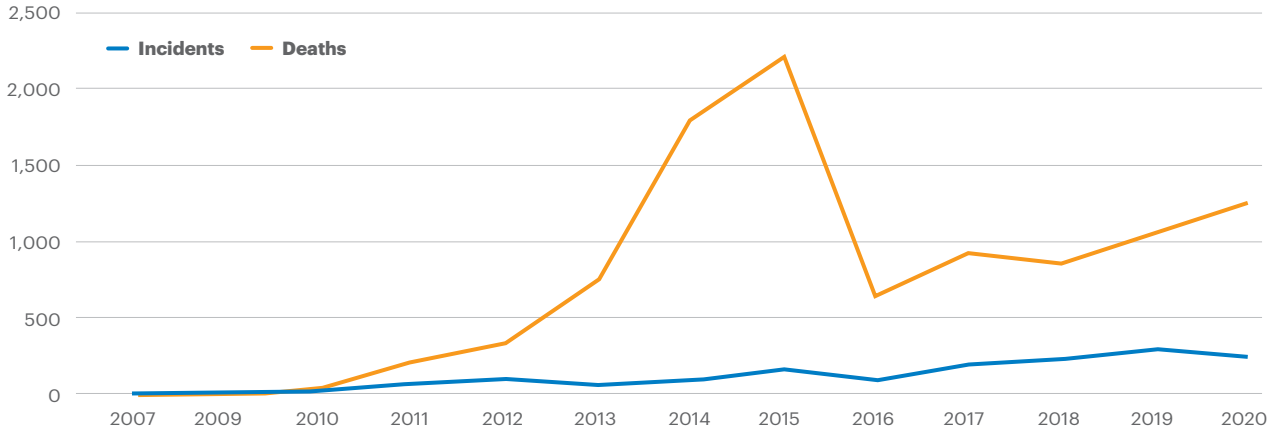
The Lake Chad region

In the Lake Chad region,[21] which comprises parts of Cameroon, Chad, Niger and Nigeria, conflict is complicated by several ecological threats, including water scarcity, high population

FIGURE 3.4

Total incidents and deaths from terrorism in the Lake Chad Basin, 2007–2020

Terrorism deaths in the Lake Chad region peaked in 2015, at over 2,200 deaths.



Source: Terrorism Tracker; IEP

growth, drought, desertification, land degradation and food insecurity.[22] Within the region, approximately 90 per cent of livelihoods rely on lake water and rainfall.[23]

Worsening droughts, erratic rainfall and desertification, have been confounded by an unprecedented security crisis driven by persistent terrorist and violent extremist attacks, as well as ethnic, religious, and farmer-herder conflicts over land use.[24] In Nigeria, this conflict is driven in part by population growth which has contributed to resource scarcity and desertification. Ambiguous land laws and a weak rule of law, especially in rural areas, have also played a part.

At the same time, the rise of Boko Haram has resulted in thousands of deaths throughout the Lake Chad Basin region of West Africa, as shown in Figure 3.4. Originally formed in Northeast Nigeria bordering the Lake Chad region, the terror group has spread into neighbouring Cameroon, Chad and Niger. In 2016, internal tensions led to the formation of a splinter faction: The Islamic State West Africa Province (ISWAP). ISWAP has claimed responsibility for a number of brutal attacks targeting civilians and military personnel. Both factions of Boko Haram are engaged in insurgencies against the Nigerian government with ongoing fighting spilling over into neighbouring countries.

Boko Haram and ISWAP have sought to exploit existing fragilities by taking control of large areas of territory around Lake Chad. The groups have also aligned with local communal conflicts and their leaders to gain recruits by siding on divisions between ethnic groups, such as the Peuhl and Fulani ethnic groups in Nigeria, as well as the long-standing farmer-herder violence over water and grazing areas.[25]

The dwindling resources in the Lake Chad Region, and associated disruption to agricultural production, along with mass youth unemployment and widespread poverty have enabled the spread of Boko Haram and ISWAP across the region.[26] Both groups have positioned themselves as alternative service providers and facilitated recruitment by offering employment to those whose livelihoods have been impacted by recurring ecological threats, particularly youths. Consequently, these groups have been able to expand their influence.[27] In particular, ISWAP has reportedly provided basic services and law enforcement in areas under its control, thereby building ties with local communities.[28]

Regional security forces have often struggled to contain the militias and regain territory taken by Boko Haram and ISWAP. In 2014, the African Union authorised a Multi-National Joint Task Force (MNJTF) comprising of soldiers from Benin, Cameroon, Chad and Niger to assist the Nigerian government in attacking territory held by Boko Haram. The United States has also provided military capacity-building assistance for national security forces and logistics and advisory support for the MNJTF.[29] However, governments in the Lake Chad Basin region face competing security priorities. For instance, in Cameroon, personnel have redeployed from fighting ISWAP in the north to the west of the country following the outbreak of a separate secessionist conflict in 2017. More broadly, governance deficits, lack of public trust and socio-economic fragilities across the Lake Chad Basin region may hinder lasting security gains.

Ongoing violence has taken a large toll on the civilian population, leading to widespread displacement, disruption of agricultural production, livelihoods and cross-border trade, and restricted affected populations from accessing basic services.[30]

As of 2020, there were an estimated 2.7 million IDPs in the Lake Chad Basin.[31] The majority were in Nigeria, with an estimated 1.9 million IDPs in Adamawa, Borno, and Yobe state.[32] The administrative units of Borno, Yobe, Adamawa and Kano in Nigeria, and Extrême-Nord in Cameroon have recorded the most deaths from terrorism since 2007. In particular, the state of Borno in Nigeria has recorded the most terrorist activity of any subnational area in the Sahel, with 867 attacks and 6,581 deaths from terrorism. The number of attacks peaked in 2019, but has remained fairly consistent in the last 18 months.

CONCLUSION

Within the Sahel, there is a nexus between violent conflict and resource degradation whereby the countries suffering from the worst ecological degradation are also among the most violent.

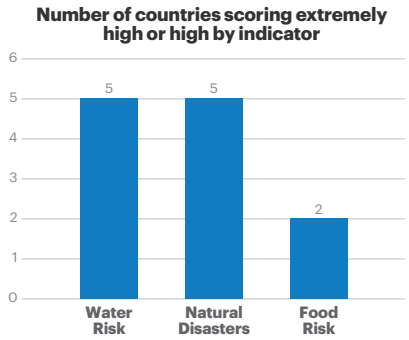
It is unlikely that the current actions taken by the international community will be enough to reverse the vicious cycles of conflict and resource degradation in the Sahel. In addition, climate change will have a multiplying effect on many of the existing issues in the region. Without major reductions in population growth rates, measures to address water and food security and ongoing conflict, the future for the Sahel looks bleak. The international community should prioritise initiatives to build the resilience necessary for the region to withstand shocks in the future.

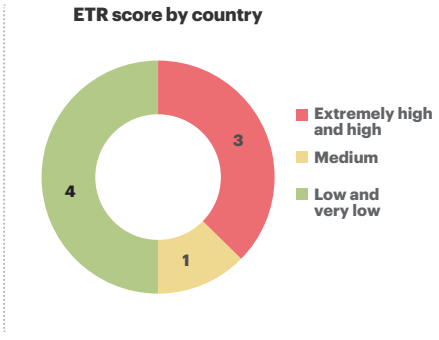
Central America

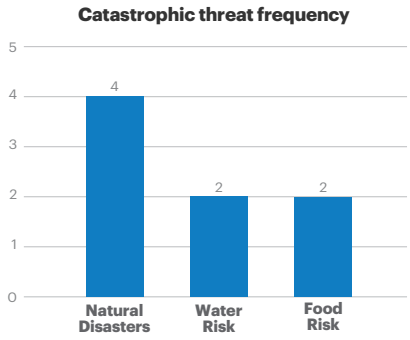
Average ETR Score
3 | Medium

Most Common Threat
Water Risk and Natural Disaster

8 Countries
109 Administrative Units







SUMMARY

The eight countries of Central America face a variety of mutually reinforcing human and ecological challenges. With a total population of 182 million, more than two-thirds of which live in Mexico, the region represents a diversity of socio-economic challenges. All of its countries suffer from poverty and gang-driven violence. However, the extent to which the countries are affected by these problems is not uniform across the region.

The countries most afflicted by such problems also tend to be the most vulnerable to ecological threats related to *natural disasters* and *water risk*. This is particularly the case in a climate sub-region known as the Dry Corridor, which stretches across large swaths of four countries – Guatemala, El Salvador, Honduras and Nicaragua. The increasing frequency of droughts in this sub-region has severely disrupted agricultural practices, undermining food production. This has raised food insecurity and undernourishment levels, especially in rural communities, which has driven poverty and led to migration and displacement.[33]

Figure 3.5 displays the ETR score for the countries in the region at the sub-national level.

Three countries along the Dry Corridor – El Salvador, Guatemala and Honduras – make up a grouping called the Northern Triangle of Central America, a designation based on their shared borders and social challenges. In these countries, transnational criminal organisations have taken root, building on weak public institutions and corruption to exert significant influence over citizens' day-to-day lives. These criminal organisations have also driven some of the highest homicide rates globally, as rival gangs battle with each other and state authorities for control of territory.[34]

In the Northern Triangle, the compounding issues of poverty, violence and ecological threats have created a general climate of social instability over the past decade, forcing millions of people to leave their homes. This takes the form of internal and external displacements, with one in two of those displaced at the end of 2020 in El Salvador, Guatemala and Honduras moving beyond their country's borders. Food insecurity, violence, natural disasters, and to seek better economic opportunities are the main factors driving displacements and migration.[35] More than two million people are estimated to have left the Northern Triangle since 2014.[36]

Located between North and South America, the region includes the seven countries typically considered part of Central America – Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama – as well as Mexico.[37] Table 3.5 details the ETR scores of the countries in Central America. Three of the eight countries in the region face high and extremely high levels of ecological threat, while one faces a medium level of threat and the remaining four face low levels of threat.

TABLE 3.5

Overview of ETR scores, Central America, 2021

Guatemala is among the lowest ranked countries in the ETR, facing an extreme threat from food risk.

Country	ETR Score	ETR Rank	Projected population change to 2050	Max Threat
Guatemala	5	172	48%	Food Risk
El Salvador	4	159	6%	Natural Disaster
Honduras	4	150	37%	Natural Disaster
Nicaragua	3	94	27%	Water Risk
Panama	2	72	34%	Food Risk
Mexico	2	69	19%	Water Risk
Belize	2	67	41%	Natural Disaster
Costa Rica	2	55	12%	Natural Disaster

Source: IEP

Natural disasters and *water risk* are the most common threats in Central America. Given that many of the natural disasters that most severely affect the region are water related (coming in the form of droughts and flooding), these two threats in some ways represent different facets of the same problem.

At first glance, it may seem counterintuitive that a region would be affected by both droughts and floods. This phenomenon is an example of the rising incidence of climatic variations associated with climate change. Droughts have become more frequent in the region, but the region has also increasingly been impacted by heavy rain – often from hurricanes from the Gulf of Mexico – leading to floods and landslides. Between 1980 and 1999, there were on average 10.2 named Atlantic storms per year, with an average of 5.8 categorised as hurricanes. In contrast, between 2000 and 2014, there was an average of 15.3 storms per year, with an average of 7.4 categorised as hurricanes.[38] 2020 was the most active year on record, with 30 named storms, 14 of which were hurricanes.[39] Given the abruptness and

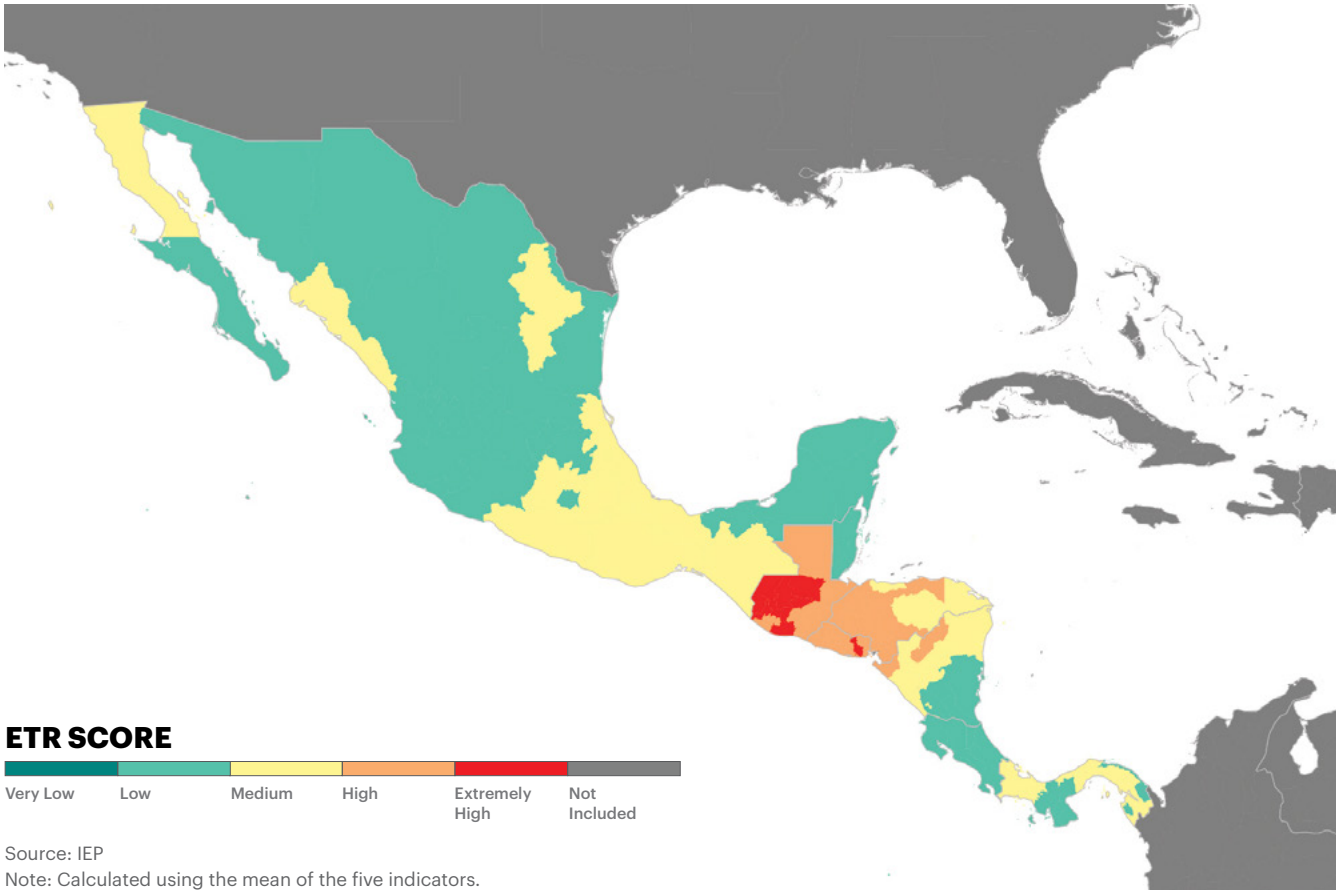
destructive nature of the storms, most of the rainfall runs off to the sea, doing little to alleviate water scarcity or improve farming conditions in the area.[40, 41]

As shown in Table 3.6, five countries face high or extremely high threats related to *natural disasters* and *water stress*, four of which face such threats in both categories.

FIGURE 3.5

Sub-national ETR Scores, Central America, 2021

Central America faces varying levels of ecological threat, both within and between its eight countries.



Source: IEP
Note: Calculated using the mean of the five indicators.

TABLE 3.6

Level of national threat by indicator, Central America, 2021

Four countries face high or extremely high threats related to both *natural disasters* and *water risk*.

Country	Natural Disasters	Water Risk	Food Risk (Stunting)	Temperature Anomalies	Rapid Population Growth
Guatemala	Extreme	Extreme	Extreme	Medium	Low
El Salvador	Extreme	Extreme	Medium	Medium	Very Low
Honduras	Extreme	Extreme	Extreme	Medium	Very Low
Nicaragua	High	Extreme	Low	Medium	Very Low
Panama	Medium	Medium	Medium	Low	Very Low
Mexico	Medium	High	Very Low	Medium	Very Low
Belize	Medium	Low	Low	Medium	Very Low
Costa Rica	Extreme	Low	Very Low	Medium	Very Low

Source: IEP

Food risk is the next most common threat in Central America. Two countries face extremely high levels of *food risk*, and both are extremely threatened by *natural disasters* and *water risk*. Reflecting the interconnected nature of these challenges, water-related natural disasters have played a decisive role in undercutting food production in parts of the region.

Prior to a series of severe droughts between 2015 and 2019, food security in Central America had been slowly improving. However, driven in part by the drought-induced shortages in food production, levels of food insecurity and undernourishment rose substantially in the subsequent years. Between 2005 and 2015, for example, the prevalence of undernourishment across the region's eight countries fell from eight to 7.5 per cent. However, this downward trend reversed and by 2020, there were 6.3 million more undernourished people in the region than in 2015. In 2020, the regional rate of undernourishment stood at 10.6 per cent.[42]

While the return of greater levels of rainfall in 2020 alleviated the crisis somewhat, the social and economic disruptions caused by the COVID-19 pandemic – combined with a series of powerful storms that struck the region – made the overall food security situation significantly worse. Consequently, the number of food-insecure people rose in 2020, increasing by 17.4 million from the previous year and is now estimated to total 67.4 million people. The prevalence of food insecurity is now equal to 37.5 per cent of the population.[43]

The situation of food insecurity is particularly acute in Guatemala. It has the worst ETR score in Central America and the highest population growth rate in the region. A country of about 18 million inhabitants, Guatemala has the largest proportion of indigenous people in the region, at 44 per cent,[44] and the second largest proportion of people living in rural settings, at 48 per cent.[45] It is estimated that one in two Guatemalans is food insecure and one in six is undernourished, with severe consequences for the health of the population.[46] Across Guatemala, the average stunting rate is 49 per cent, with rates above 75 per cent in some of the country's poorest areas. These areas are home to large proportions of the country's indigenous populations.

While none of the countries of Central America face high threat levels related to *temperature anomalies*, the vast majority face a moderate level of threat in this category. All of the countries of the region have either low or very low levels of risk related to *rapid population growth*.

The spectrum of ecological risk faced by Central America can be seen more clearly at the sub-national level. As shown in Table 3.7, the region comprises 109 sub-national administrative units, a third of which face high or extremely high threats.

THE DRY CORRIDOR – GUATEMALA, EL SALVADOR, HONDURAS AND NICARAGUA

Guatemala, El Salvador, Honduras and Nicaragua have the highest ecological risks in Central America. The vast majority of an area known as the Dry Corridor lies within their borders, a tropical dry forest region that stretches along the Pacific Ocean, as shown in Figure 3.6. Over the past decade, this term has been used with greater frequency to highlight the increasingly irregular rainfall in the sub-region and several associated challenges related to natural disasters, water availability, and food security. Across Guatemala, El Salvador, Honduras and Nicaragua, these ecological threats have exacerbated various social issues, including poverty, violence, internal displacement and international migration.

> “
>
> Across Guatemala, the average stunting rate is 49 per cent, with rates above 75 per cent in some of the country's poorest areas. These areas are home to large proportions of the country's indigenous populations.

TABLE 3.7

Country sub-national breakdown and score, 2021

Guatemala, El Salvador, Honduras and Nicaragua all have sub-national units scoring high or extremely high. These four countries contain the majority of the Dry Corridor.

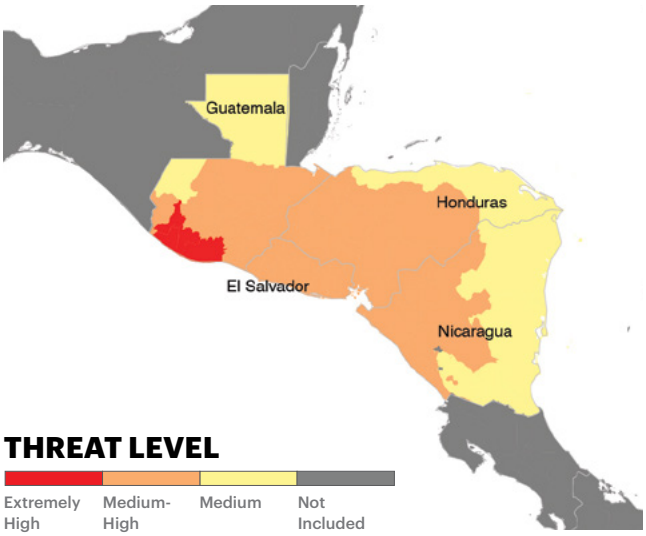
Country	1 (Very Low)	2 (Low)	3 (Medium)	4 (High)	5 (Extremely High)	Total	% High or Extreme
Guatemala	-	-	-	8	9	17	100%
El Salvador	-	-	-	6	1	7	100%
Honduras	-	-	3	11	-	14	79%
Nicaragua	-	4	9	2	-	15	13%
Mexico	-	21	11	-	-	32	0%
Panama	-	6	6	-	-	12	0%
Belize	-	5	-	-	-	5	0%
Costa Rica	-	7	-	-	-	7	0%
Grand Total	**0**	**31**	**29**	**27**	**10**	**109**	**34%**

Source: IEP

FIGURE 3.6

Subnational water risk, countries of the Dry Corridor, 2021

Recurrent droughts have heightened the water risks along the Pacific sides of Guatemala, El Salvador, Honduras and Nicaragua.



Source: WRI; IEP

Drought and food security in the Dry Corridor

The Dry Corridor, whose population totals approximately 10.5 million, has been affected by recurrent droughts as well as excessive rains and flooding due to changes in the El Niño-Southern Oscillation, an intermittent pattern of warming and cooling over the tropical Pacific Ocean.[47] El Niño events have become more frequent in recent decades, with six occurring since 2000.[48] The El Niño event of 2014-2016 ushered in a drought that lasted until 2019.[49] Figure 3.7 shows the combined annual rainfall in the four capital cities of the Dry Corridor countries between 2009 and 2020. These four metropolitan areas have a total population of over 6.5 million.

These declines in rainfall have had severe impacts on the communities in the Dry Corridor. Estimated to be home to more than a million families that engage in subsistence farming, most of these communities lack irrigation and adequate water catchment systems. They are thus highly dependent on the rain to grow their crops, which are primarily maize and beans, the region's two main staples.[50]

Not only has the total annual rainfall decreased in recent years, but the crucial mid-summer dry period has been drier and longer than usual, disrupting planting seasons. Because of this, farmers in the Dry Corridor are estimated to have lost more than 60 per cent of their maize crops and 80 per cent of their bean crops over the past decade.[51] While drought is the principal cause of crop losses, flooding brought on by hurricanes have also been devastating for the region.[52] The development of better systems to capture, store, and distribute rainwater could help the region cope with the growing irregularity in its rainfall patterns.

The significant disruptions in food production have dire implications for food security in the Dry Corridor.[53] If farming households lose a season's crops, they typically do not have reserves to eat or sell in order to survive until the next season. They will often resort to emergency coping strategies such as selling some of their assets. Many are forced to skip meals or eat less nutritious foods. By the end of the 2014-2019 drought, it was estimated that up to 82 per cent of such families had sold their farming tools and animals to purchase food. In 2019, drought and excessive rainfall led 2.2 million people to lose their crops, leaving 1.4 million in urgent need of assistance to cover their basic food needs.[54]

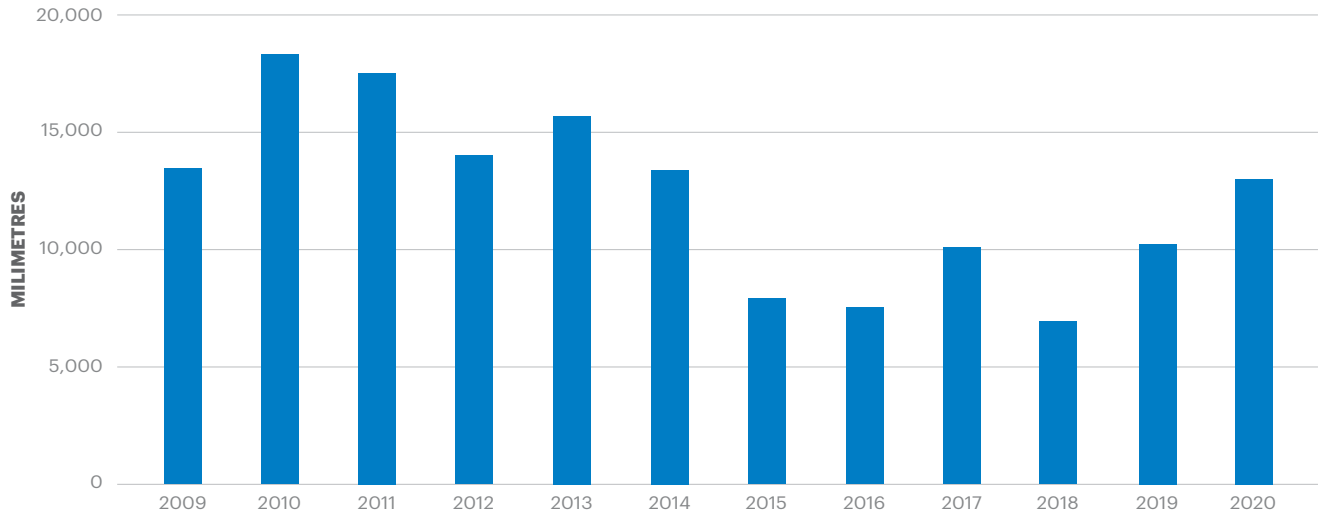
Within and beyond the borders of the Dry Corridor, Guatemala, El Salvador, Honduras and Nicaragua saw their average rates of food insecurity rise from 42.2 per cent in 2014-2016 to 47.5 per cent in 2018-2020,[55] with people in rural settings being the most at risk. More than 85 per cent of rural households across these four countries faced food insecurity in 2021.[56]

Box 3.1 outlines initiatives to build resilience as well as adaptation techniques in the Dry Corridor to assist with food insecurity and the agricultural sector.

FIGURE 3.7

Combined annual rainfall, four capital cities of the Dry Corridor, 2009–2020

The Dry Corridor experienced abnormally low levels of rainfall between 2015 and 2019.



Source: World Weather Online; IEP

BOX 3.1

Resilience and Adaptation Initiatives in the Dry Corridor

In the face of the growing unpredictability of rainfall and the consequent disruptions to longstanding agricultural practices, farmers in the Dry Corridor have been engaged in a variety of initiatives to adapt to the new conditions.

Initiative 1: Cooperative-based Agricultural Insurance in Guatemala

In Guatemala, the World Food Programme (WFP) has sponsored a project to provide insurance to indigenous women's farming cooperatives. The insurance is designed to provide families with the means to cope in the event that drought or flooding destroys a season's crops, a real threat amid the growing unpredictability of rainfall patterns in the region. The project allows indigenous women who do not have access to traditional financial services to collectively benefit from financial risk-management tools, ensuring a level of food security even if their sources of income fail.

A partnership with local insurance company Aseguradora Rural, the scheme entails an annual fee equivalent to US$23. In the case of a disaster, the company guarantees payouts up to about US$309. In 2021, the first year of the pilot project, the WFP covered the insurance premiums of the participating cooperatives. In future years, the premiums will be paid by cooperative members.[57]

The project comes in the context of growing concern about a lack of agricultural insurance coverage in Central America. In 2015, the Costa Rican government launched an agricultural insurance policy after disasters caused more than US$100 million in damages to the farm sector between 2001 and 2012, and the government ended up covering most of the costs. However, insurance uptake has remained slow, with just two per cent of the country's cropland covered.[58] There are similarly low rates of coverage in Guatemala, Honduras and Nicaragua, where just one to two per cent of agricultural lands are insured.[59]

Initiative 2: Agroforestry in Honduras

Agroforestry refers to the intentional combination of trees and shrubs with crops and livestock in order to take advantage of their interactive benefits, which can include improved soil structure and health over the long term, increased yields and greater biodiversity.[60] In Honduras, one community's longstanding agroforestry practices have gradually spread around the western and southern regions of the country, enhancing resilience in agro-ecosystems to respond to the shocks of increasing climate variability.

In the 1980s, agricultural extension agents from the Food and Agriculture Organisation (FAO) discovered that farmers in the village of Quesungual favoured cutting down vegetation and allowing it to decompose over the more common slash-and-burn technique. The zero-tillage, slash-and-mulch technique conserved soil moisture through the decomposing organic material ("green water"). The Quesungual farmers also practised intercropping their crops among trees, which significantly reduced soil erosion on the hillside agricultural lands of the area.

As a result of both the local sharing of knowledge and the facilitation of external extension agents, these practices gradually spread around south-western Honduras. By 2008, more than five thousand farmers of maize, sorghum and beans had adopted them. Farms that have adopted the technique have doubled their yields, with maize yields increasing by 1,300 kilograms per hectare and bean yields increasing by 475 kilograms per hectare.
The technique has also proven to be resilient to climate shocks. During the extended droughts and extreme flooding of recent decades, farms employing the Quesungual techniques reported significantly reduced crop losses compared to other farms. The trees offer permanent soil cover, which increases soil moisture retention during droughts, while also reducing soil erosion and other impacts of heavy rains on crops.[61]

In addition to promoting the Quesungual practices, the FAO has promoted agroforestry activities for smallholders across the Dry Corridor. From 2014 to 2018, it carried out a project involving 460 families in Guatemala and 425 families in Honduras. The project led to 57 new hectares under agroforestry management and involved training farmers in integrated crop management, water harvesting, irrigation systems and the protection of watersheds. The project also provided 25 water harvesting tanks and irrigation systems to the engaged farmers.[62]

Ecological threats and social instability in the Northern Triangle

The three most climate-vulnerable countries along the Dry Corridor – Guatemala, El Salvador and Honduras – make up what is known as the Northern Triangle of Central America. The term is based on the three countries' shared borders, histories of civil war and contemporary challenges related to poverty, internal displacement and international migration. The Northern Triangle countries also rank as some of the most violent globally, with transnational criminal gangs dramatically increasing in size, influence and activity over the past two decades. This has resulted in soaring homicide rates and, in some cases, the loss of government control of certain areas within the countries' borders.[63] Across Guatemala, El Salvador and Honduras, ecological threats have aggravated these social challenges.

Poverty and violence in the Northern Triangle

With an average GDP per capita of $7,745 (purchasing power parity dollars, PPP), the Northern Triangle countries rank among the poorest in Latin America and the Caribbean, as shown in Figure 3.8. Recent estimates suggest that by 2030 the economic cost of climate change could reach 7.2 per cent of GDP in El Salvador, 5.8 per cent of GDP in Guatemala and nine per cent of GDP in Honduras.[64] In addition to these future costs, IEP estimates that in 2020, the economic cost of violence was 17 per cent of GDP in El Salvador, eight per cent of GDP in Guatemala and 14 per cent of GDP in Honduras.

Ecological disruptions have also contributed to the general environment of social instability in the Northern Triangle. El Salvador and Honduras suffer from widespread violence driven by transnational criminal networks, particularly the 18th Street (M-18) and Mara Salvatrucha (MS-13) gangs. El Salvador and Honduras have two of the highest homicide rates globally, respectively ranking first, at 52 homicides per 100,000 people, and fourth, at 38.9 homicides per 100,000 people. Guatemala also has major problems with common crime and has the 16th highest homicide rate globally, with 22.5 homicides per 100,000 people. The global average is 6.2 homicides per 100,000 people.

Internal displacement in the Northern Triangle

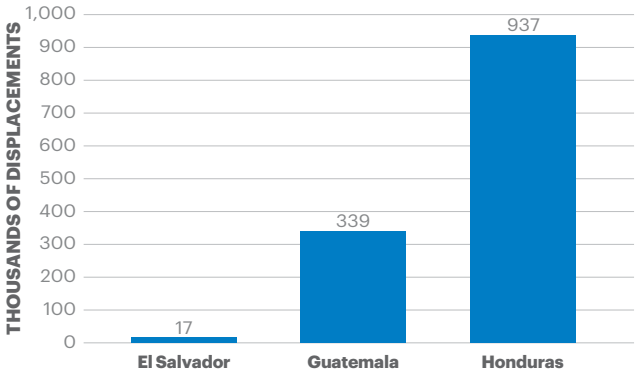
A major driver of the escalation of violence in these countries has been the large-scale human displacement that ecological threats have accelerated. As migration often saps communities of their working-age populations, the economic vitality of those communities suffers, creating a breeding ground for criminal activity and conflict.[67]

At the end of 2020, there were 247,000 people who were internally displaced as a result of violence and conflict in Honduras, 242,000 in Guatemala and 72,00 in El Salvador.[68, 69] In 2020, there were over one million displacements in these three countries due to natural disasters, as shown in Figure 3.9. The lower levels of internal displacement in El Salvador are likely tied to the lower proportion of its population that lives in rural areas; 74 per cent of Salvadorans live in urban areas, compared to 59 per cent of Hondurans and 52 per cent of Guatemalans.[70]

FIGURE 3.9

New internal displacements in 2020 as a result of natural disasters, Northern Triangle countries

There were more than 900,000 internal displacements in Honduras associated with natural disasters in 2020.

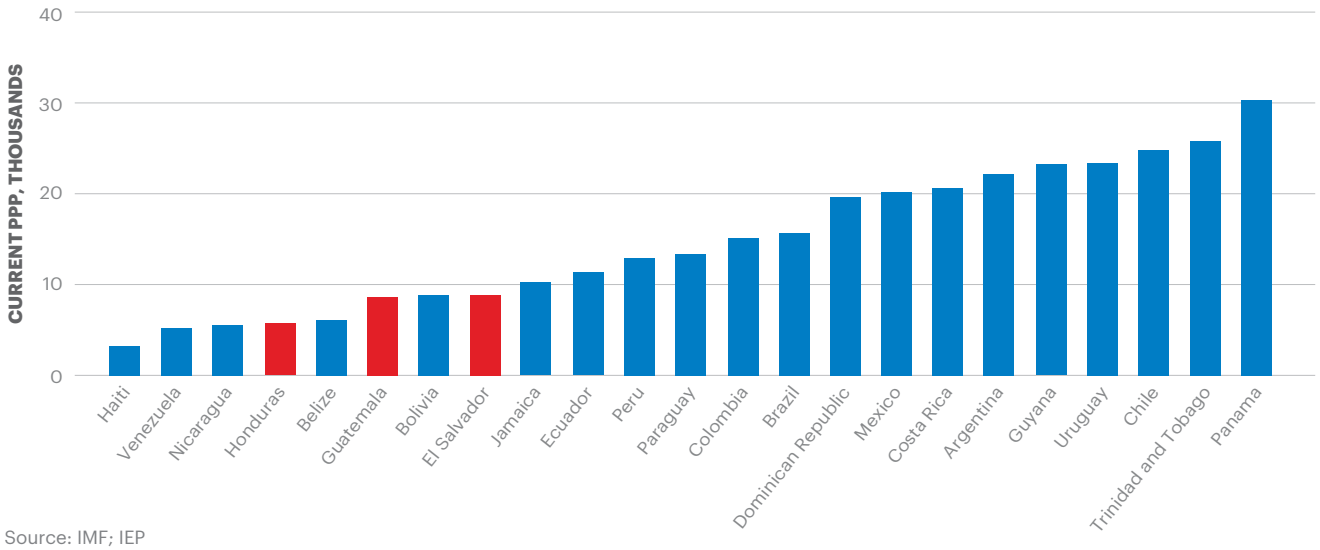


Source: IDMC; IEP

FIGURE 3.8

GDP per capita, countries of Latin America and the Caribbean, $PPP, 2021

Guatemala, El Salvador and Honduras are poorer than most of their neighbours.



Source: IMF; IEP
Note: Northern Triangle countries highlighted.

The World Bank estimates that, across Central America, there could be as many as 3.9 million internally displaced climate migrants by 2050, and that climate migrants as a proportion of all internal migrants will increase from about 7.6 per cent in 2020 to about 10.6 per cent by 2050.[71] In 2019, eight per cent of families in the Dry Corridor planned to migrate in response to the difficult circumstances.[72]

FORCED INTERNATIONAL MIGRATION FROM THE NORTHERN TRIANGLE

While many rural migrants in the Dry Corridor first move to urban areas within their countries, deteriorating national conditions have caused growing numbers to migrate internationally, most frequently to the United States. The factors driving international migration reflect the intertwined social, economic and environmental challenges in the region. In a 2018 survey of a large-scale migrant "caravan" from El Salvador, nearly 52 per cent of respondents cited economic opportunity as their main reason for leaving the country, while 18 per cent cited violence, two per cent cited family reunification and 28 per cent cited a combination of reasons. In contrast, in a 2014-2016 survey of migrants from the Dry Corridor, the most commonly cited reason was "no food".[73]

International migration from the Northern Triangle has increased substantially over the past two decades. In 2002, El Salvador had a rate of 351 per 100,000 people migrating out of the country, but by 2019 that number had increased to 1,272 per 100,000 people. Over the same period, the rate grew from 168 to 1,510 per 100,000 people in Guatemala, a nine-fold increase, and from 407 to 2,415 per 100,000 people in Honduras, a six-fold increase.[74] More than two million people are estimated to have left the Northern Triangle since 2014.[75]

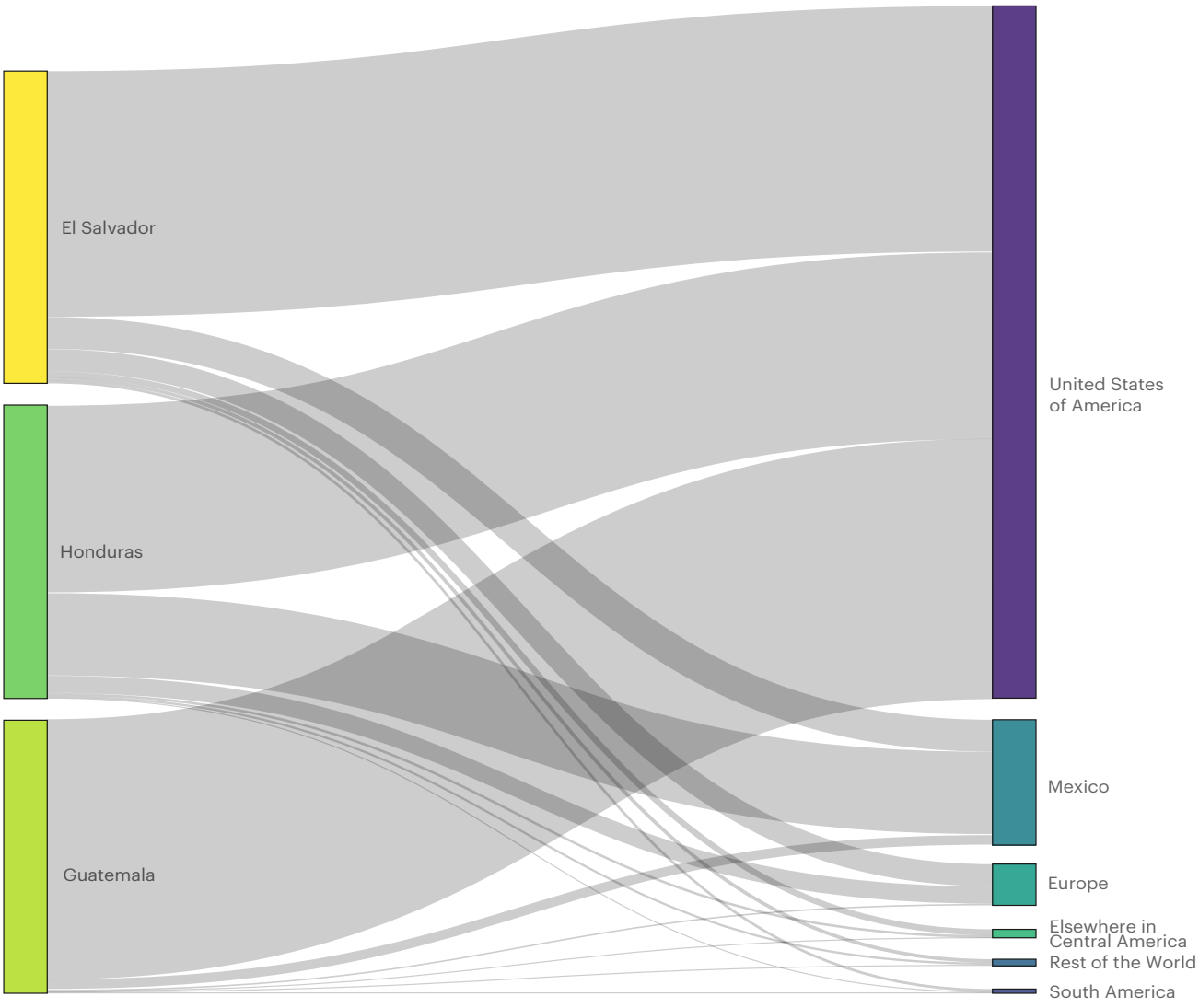
Figure 3.10 shows the number of people that were forcibly displaced by conflict and violence in Guatemala, El Salvador and Honduras and sought safety abroad in 2020. An estimated 549,000 people fled these countries and an additional 561,000 were internally displaced at the end of 2020 according to UNHCR and IDMC data.

Of those displaced abroad, the United States hosted over 430,000 people, the most of any country. More than 80,000 were hosted in other parts of Central America, the majority in Mexico, which Central American migrants must cross to reach the United States.

FIGURE 3.10

Forcibly displaced people by violence and conflict from El Salvador, Honduras and Guatemala, origin to destination country, 2020

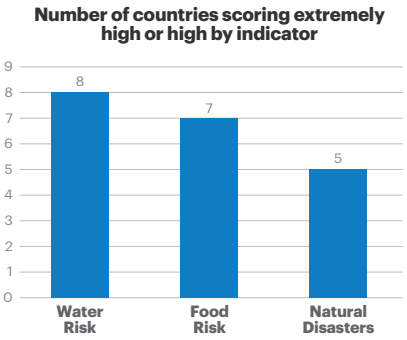
In 2020, an estimated 549,000 people from El Salvador, Honduras and Guatemala sought asylum abroad amid the deteriorating conditions in their home countries.

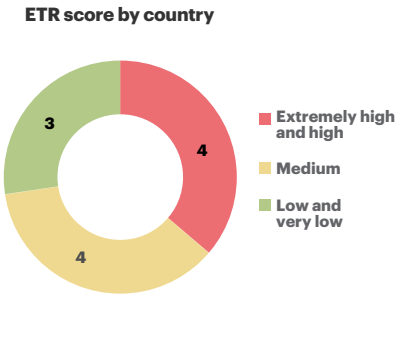


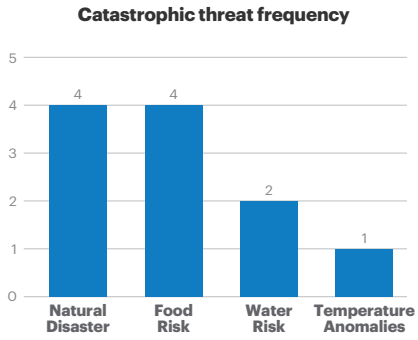
Source: UNCHR; IEP
Note: Figure does not include internal displacements.

South-East Asia

Average ETR Score	Most Common Threat	
3 Medium	**Water Risk**	**11** Countries **285** Administrative Units







SUMMARY

South-East Asia is the area to the south of China and south-east of the Indian subcontinent, which includes 11 countries [76]: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand, Timor-Leste and Vietnam. Figure 3.11 displays the ETR score at the sub-national level for these 11 countries.

South-East Asia is one of the most disaster prone regions in the world, exposed to frequent floods, tropical cyclones, earthquakes and volcanic eruptions. Many cities in the region are growing rapidly due to population growth and industrialisation as the countries shift from a rural economy to a market economy. South-East Asia's population is expected to grow by 17.6 per cent, from approximately 675 million in 2021 to 794 million by 2050.

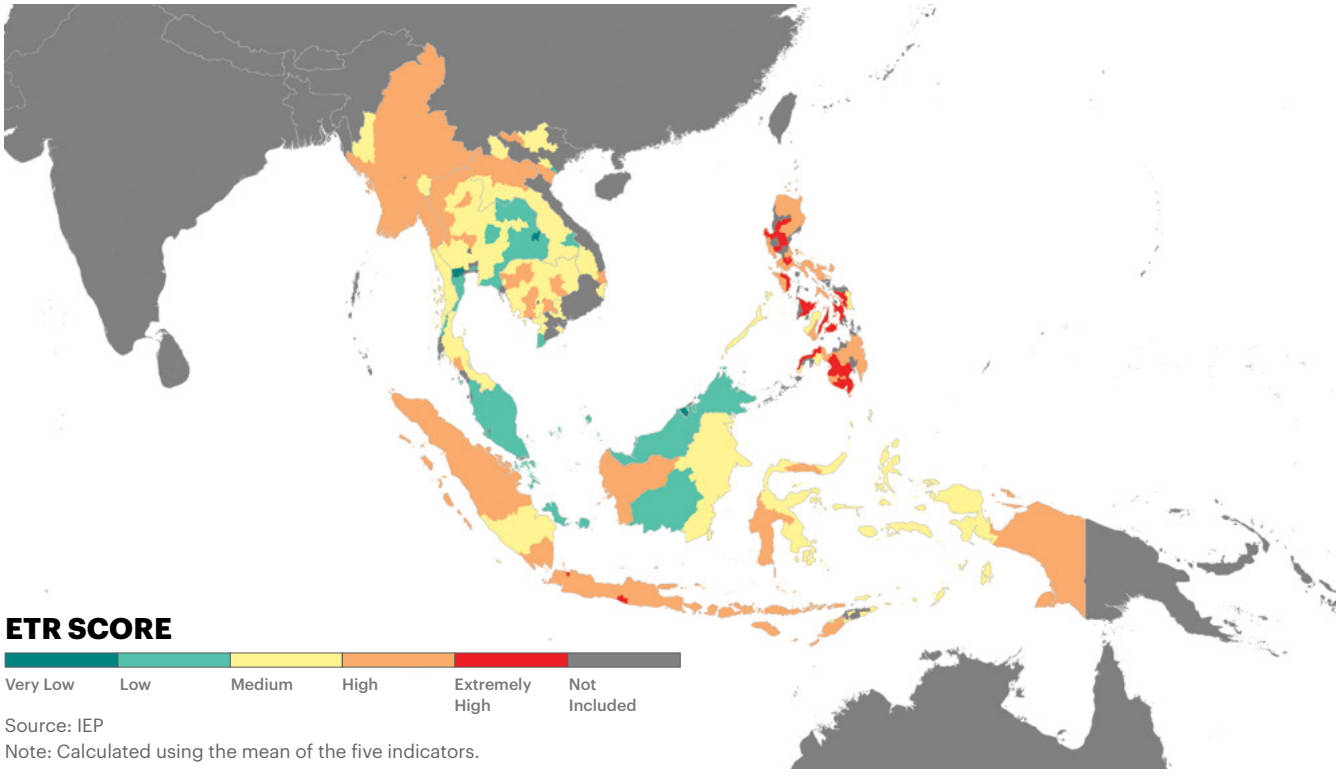
Adding to the pressure will be the increasing intensity of natural disasters due to climate change, particularly cyclones and flooding, with a large proportion of the population and economic activity concentrated along coastlines and a heavy reliance on natural resources and agriculture for livelihoods. These shocks will also place additional pressure on disaster risk reduction (DRR) strategies and complicate efforts to build resilience.[77]

Table 3.8 details the ETR scores of the countries in the region. Four of the 11 countries in the region face high or extremely high risk from ecological threats, a further four face medium risk, while the remaining three face low or very low risk.

FIGURE 3.11

Subnational ETR Score, South-East Asia region, 2021

The higher the ETR score, the higher the ecological threat.



Source: IEP

Note: Calculated using the mean of the five indicators.

TABLE 3.8

Overview of ETR scores, South-East Asia region, 2021

Seven countries in South-East Asia rank in the bottom half of the ETR.

Country	ETR Score	ETR Rank	Max Threat
Philippines	5	166	Food Risk
Myanmar	4	145	Natural Disaster
Indonesia	4	139	Natural Disaster
Cambodia	4	133	Water Risk
Timor-Leste	3	127	Food Risk
Laos	3	126	Water Risk
Vietnam	3	109	Natural Disaster
Thailand	3	88	Natural Disaster
Malaysia	2	50	Food Risk
Brunei	1	35	Water Risk
Singapore	1	2	Natural Disaster

Source: IEP

Water risk is the most common threat in the region, with eight of the 11 countries scoring extremely high or high on this indicator, followed by *food risk* and *natural disasters* with four countries each. These risks are expected to combine and reinforce one another, especially as climate change is projected to intensify the threat of natural disasters.

Natural disasters, such as floods and tropical cyclones, have caused extensive damage to property, displacements and led to substantial loss of life in the region.[78] Since 2000, the region has recorded over 368,000 deaths from natural disasters, with the majority attributed to the Indian Ocean Tsunami in 2004 and Cyclone Nargis which hit Myanmar in 2008.[79]

FOOD SECURITY

In 2020, the prevalence of food insecurity in South-East Asia rose to 18.8 per cent, increasing from 15.4 per cent in 2014. The recent COVID-19 pandemic has aggravated the situation of food insecurity in the region and exacerbated inequalities.[80]

For the countries that have data in the region, six out of seven have a higher prevalence of food insecurity in the period 2018 to 2020 compared to the period 2014 to 2016, as shown in Figure 3.12. Cambodia had the highest prevalence of food insecurity in the region, with 44.8 per cent of its population without reliable access to a sufficient quantity of affordable food.[81] This was followed by the Philippines, Thailand and Laos at 42.7, 29.8 and 29.4 per cent, respectively. In contrast, Singapore recorded the lowest prevalence of food insecurity, at 4.5 per cent of its population.

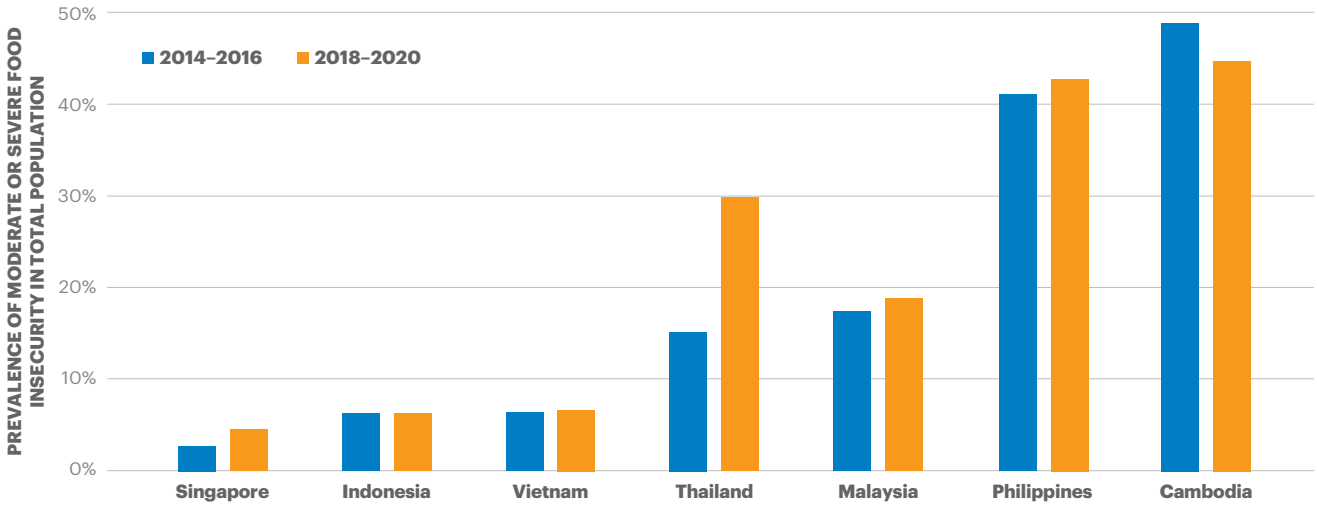
Thailand recorded the largest deterioration, increasing from 15.1 per cent of the population to 29.8 per cent over the same period.[82] The sharp uptick in food insecurity was primarily driven by the economic impacts of the COVID-19 pandemic, namely steep declines in tourism and manufacturing revenue along with increases in food prices. Approximately one-third of Thai households were reliant on income from sectors directly affected by the pandemic.[83] Due to the high risk of community transmission, many local markets were closed, raising concerns about access to affordable food sources.[84]

The construction of dams along the Mekong River Basin also poses challenges to food and water security in South-East Asia. The Mekong basin produces 2.6 million tonnes of freshwater fish annually and supplies food and energy security for 70 million people.[85] However, the construction of hydropower dams upstream has exacerbated volatilities in the river's water flow, leading to depletion of fish stocks and reduced agricultural production threatening the livelihoods of millions of people downstream. In addition, the increasing severity of major drought and water stress events in the Lower Mekong Basin has been attributed to the restriction of water in dams further upstream.[86]

FIGURE 3.12

Prevalence of food insecurity, South-East Asia, 2014–2020

Six countries in South-East Asia recorded increases in the prevalence of food insecurity between 2014 and 2020.



Source: FAO
Note: Data available for 7 of the 11 South-East Asian countries.

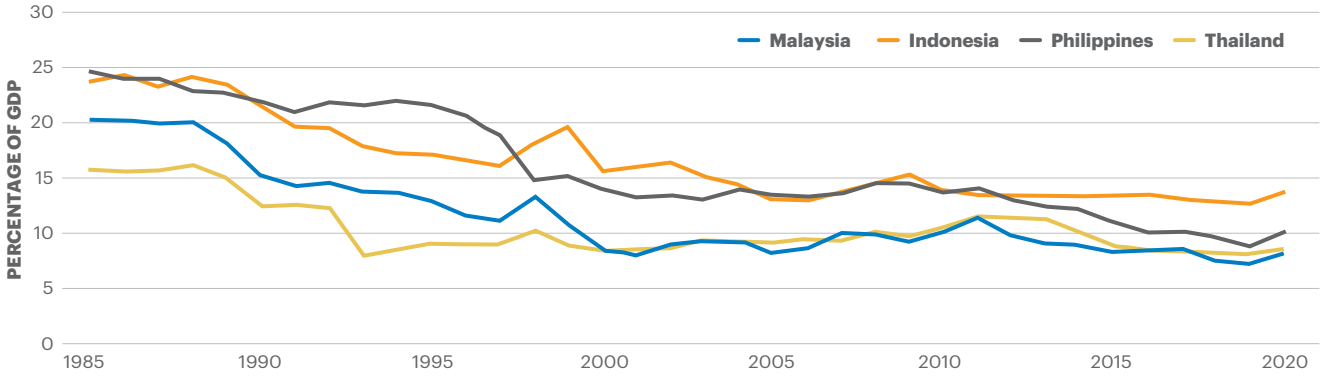
Historically, agriculture has been a major contributor to GDP in South-East Asian countries. However, the average share of agriculture in GDP in the region has reduced over the past few decades, from approximately 27.7 per cent in 1985 to 11.9 per cent in 2020. At the same time, food habits have also changed significantly.[87] In particular, agriculture has contributed to a declining share of GDP, employment and international trade in Malaysia, Thailand, the Philippines and Indonesia, as shown in Figure 3.13.

Given the various challenges facing the region, the ten country Association of South-East Asian Nations (ASEAN) - which comprises Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Vietnam - have established regional initiatives and frameworks to address ecological threats and build resilience, as outlined in Box 3.2.

FIGURE 3.13

Agriculture as a percentage of GDP, Indonesia, Malaysia, the Philippines and Thailand, 1985–2020

Agriculture as a share of the Philippines' GDP has fallen by more than 14 percentage points since 1985.



Source: World Bank
Note: Share of GDP includes the categories of agriculture, forestry and fishing.

BOX 3.2

Regional initiatives to address ecological threats in South-East Asia

Issues of food insecurity, water stress and natural disasters are largely addressed by individual states in South-East Asia. However, the impacts often transcend national borders and require cooperation to build resilience at the regional level.

In the aftermath of the 2007/2008 food price crisis in South-East Asia, rice prices increased dramatically, resulting in large increases in poverty. In response, ASEAN member states formulated the *ASEAN Integrated Food Security Framework (AIFS)* with a strategic plan to designate food security as a high policy priority. The key components of this framework were to establish a regional emergency rice reserve, focus on developing an ASEAN food security information system, and to pursue innovations through research and development, focusing on developing an ASEAN food security information system, and pursuing innovations through research and development.[88] Throughout the COVID-19 pandemic, supplies from the regional emergency rice reserve have been given to Cambodia and Myanmar to alleviate food shortages during a rapid surge in COVID-19 cases.[89]

Similarly, ASEAN has established numerous initiatives to address water stress in the region, including the Integrated Water Resource Management projects and the ASEAN Working Group on Water Resource Management (AWGWRM) which provides a forum to manage common issues affecting freshwater supply, demand, conservation and quality.[90] Water security is also a major concern in the immediate aftermath of natural disasters. In particular, large scale floods can deprive people of access to water sources while also destroying or polluting existing sources, making them unusable.[91] As such, ASEAN provides a regional forum on the issue of water-related natural disasters, and a platform for member states, partners and relevant stakeholders to identify and address the gaps in terms of flood and drought management, share information on best practices, and identify necessary actions to improve flood and drought management in the region.

In addition to ASEAN initiatives, other regional initiatives also aim to improve flood and drought management in the region, namely the Mekong River Commission (MRC). The MKC was established in 1995 based on the Mekong Agreement between Cambodia, Laos, Thailand, and Vietnam to manage the river's shared natural resources.[92] In October 2020, China agreed to provide the MRC with year-round data on its dams and water flows, where this had previously only been provided for limited stations during the flood season.[93]

TABLE 3.9

Country sub-national breakdown and score, South-East Asia region, 2021

The majority of administrative units in Indonesia, Myanmar and the Philippines face high or extremely high risk.

Region	1 (Very Low)	2 (Low)	3 (Medium)	4 (High)	5 (Extremely High)	Total	% High or Extreme
Philippines	-	-	4	30	21	55	93%
Myanmar	-	-	3	11	-	14	79%
Indonesia	-	3	10	18	2	33	61%
Cambodia	-	-	15	8	-	23	35%
Laos	-	2	10	6	-	18	33%
Vietnam	-	9	35	10	-	54	19%
Thailand	2	22	36	7	-	67	10%
Timor-Leste	-	-	6	-	-	6	0%
Brunei	1	2	-	-	-	3	0%
Malaysia	-	11	-	-	-	11	0%
Singapore	1	-	-	-	-	1	0%
Grand Total	**4**	**49**	**119**	**90**	**23**	**285**	**40%**

Source: IEP

SUB-NATIONAL ANALYSIS

As shown in Table 3.9, the majority of administrative units in the region score either 3, 4 or 5 on the ETR, indicating medium, high or extremely high threat, respectively. Notably, no administrative units in Myanmar, the Philippines, Timor-Leste or Cambodia are classed as low or very low risk. In the Philippines, most administrative units are at high or very high risk, primarily due to their high exposure to cyclones and flooding.

NATURAL DISASTERS

In 2020, South-East Asia recorded 68 natural disasters which caused 983 deaths and led to almost 6.5 million displacements across the region.[94] The Philippines accounted for the vast majority of the displacements in 2020, representing 67 per cent of the region's total. From 2009 to 2020, natural disasters in South-East Asia resulted in 64.2 million displacements, compared to nearly 3.8 million displacements due to conflict.

Natural disasters in the region typically converge in densely populated urban areas along coastlines. Approximately 546 million people in the region, or 81.7 per cent of the population, live in areas at high or extremely high risk of natural disasters.[95]

Figure 3.14 shows the distribution of natural disasters in South-East Asia since 1990. During this period, 1,360 reported disasters have caused nearly 398,000 deaths. Floods are the most common disaster in the region, accounting for 44.7 per cent of the total, followed by storms and earthquakes at 30 and 9.4 per cent, respectively. However, earthquakes and storms were responsible for the vast majority of deaths in the region, at 49.1 and 44.5 per cent, respectively. Floods accounted for 4.5 per cent of total deaths.

Natural disasters have historically been concentrated in the Philippines, Indonesia, Malaysia and the Lower Mekong River Basin, which comprises parts of Vietnam, Thailand, Cambodia and Laos.

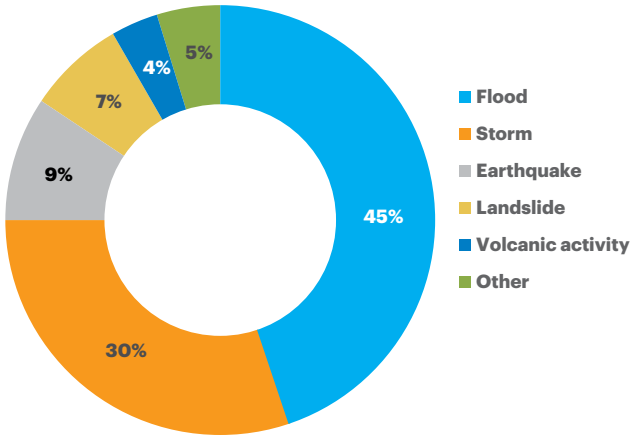
Figure 3.15 displays the frequency and deaths from natural disasters within South-East Asia. Since 1990, the Philippines has recorded the most natural disasters in the region. Storms are the most common disaster in the Philippines, accounting for over half and causing 29,630 deaths.

Over the same period, Indonesia recorded the most deaths from natural disasters, accounting for 48.4 per cent of the region's total. Most of the deaths from natural disasters in Indonesia resulted from earthquakes, with the majority attributed to the 2004 Indian Ocean earthquake and tsunami.

FIGURE 3.14

Distribution of Natural Disasters, South-East Asia, 1990–2021

In South-East Asia, floods and storms accounted for nearly 75 per cent of the natural disasters that occurred between 1990 and July 2021.

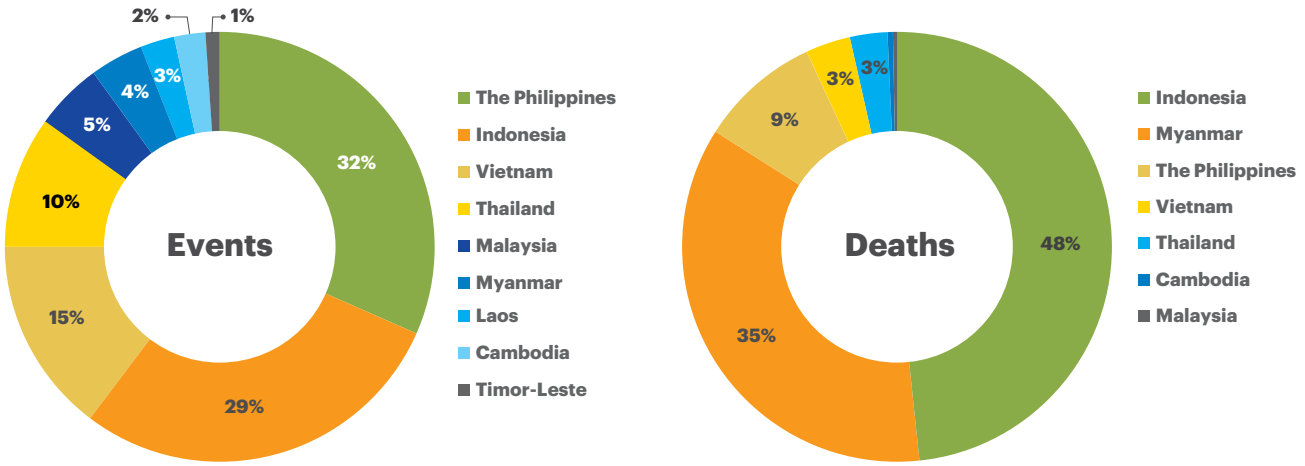


Source: EM-DAT
Note: Other includes drought, wildfire, mass movement (dry) and extreme temperature.

FIGURE 3.15

Distribution of natural disasters and deaths from natural disasters by country, 1990–2021

While natural disasters were more frequent in the Philippines, Indonesia accounts for the majority of deaths from natural disasters in South-East Asia since 1990.



Source: EM-DAT
Note: Totals may not add to 100 due to rounding.

THE PHILIPPINES

The Philippines is one of the most disaster-prone countries in the world.[96] Consisting of over 7,000 islands in the western Pacific Ocean, the Philippines is located along the boundary of major tectonic plates – termed the Pacific Ring of Fire - and along the Pacific typhoon belt, meaning its islands are regularly impacted by a wide range of natural disasters. Natural disasters have a significant economic impact on the country, estimated to have caused US$23 billion in losses and damages since 1990.[97] All 55 administrative units of the Philippines face extremely high risk from natural disasters. Figure 3.16 displays the trend in the number of natural disasters in the Philippines.

The Philippines has recorded a 3.9 per cent improvement in Positive Peace since 2009, indicating the potential to build resilience and improve peacefulness in the future. This improvement was largely driven by improvements in the *Sound Business Environment* and *Free Flow of Information* Pillars. The country recorded improvements in the *Structures* and *Institutions* domains over the decade, improving by 7.5 per cent and 2.7 per cent, respectively, while the *Attitudes* domain recorded a slight deterioration of 2.5 per cent.

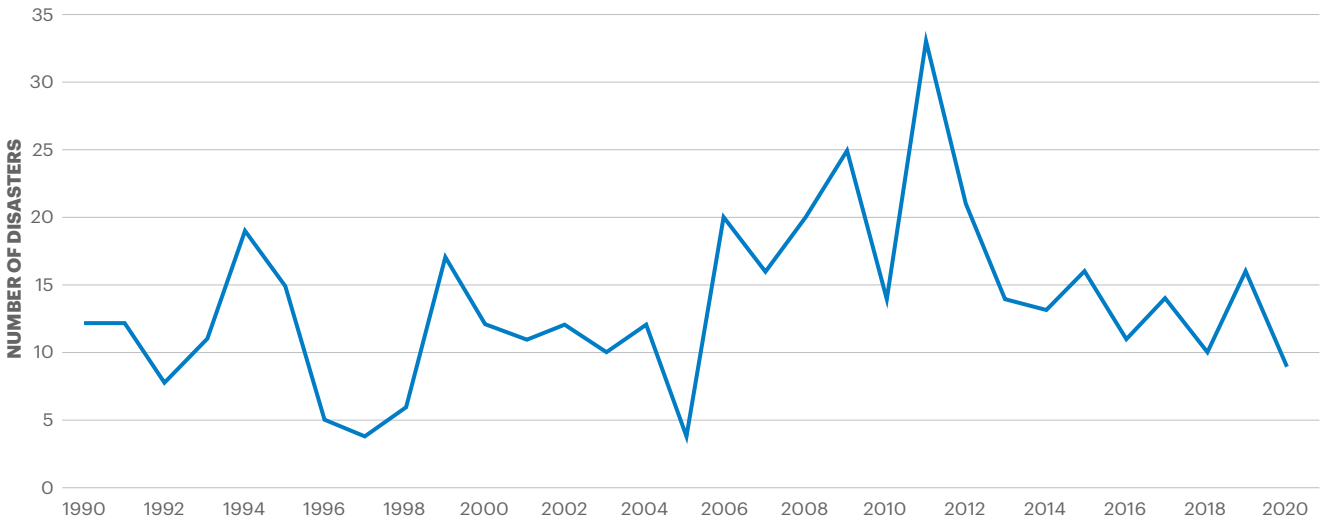
Conflict, terrorism and ecological threats in the Philippines

Ongoing armed conflict and terrorism in the Philippines has the potential to hamper efforts to build resilience to ecological threats. Armed conflict and terrorist threats facing the Philippines are distinct from those facing other countries in South-East Asia, with both communist and jihadist groups engaged in separate insurgencies against the Philippine government. The Philippines remains the only South-East Asian country to be ranked in the ten countries most impacted by terrorism on the 2020 Global Terrorism Index (GTI).

FIGURE 3.16

Trend in natural disasters in the Philippines, 1990–2020

The number of natural disasters in the Philippines peaked in 2011 at 33 disasters.



Source: EM-DAT

Since 2007, the Philippines has recorded over 1,200 terrorist attacks, resulting in 1,546 deaths. Terrorist activity has been primarily concentrated in the southern Philippines, as shown in Figure 3.17.

The majority of terrorist activity can be attributed to the communist New People's Army (NPA), which has been engaged in a guerrilla campaign against the Philippine government for the past five decades. The NPA has been responsible for the most terrorism deaths in the Philippines with nearly 2,500 fatalities since 1970. The NPA primarily operates in rural areas, relying on support from the rural poor who supply labour and logistics.[99] While the group operates across much of the Philippines, it has been most active in Bicol in Southern Luzon, various regions of the Visayan islands and parts of Mindanao.[100]

In addition, the Philippine government has been engaged in a decades-long insurgency with the Moro Islamic Liberation Front (MILF), an armed separatist movement on the southern island of Mindanao.[101] In 2018, a peace agreement was signed between the Duterte government and MILF, facilitating the establishment of the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM).[102] Despite this progress, the recent proliferation of ISIL-affiliated groups, including Abu Sayyaf group (ASG) and the Bangsamoro Islamic Freedom Fighters (BIFF), has further complicated the fragile security environment and sought to disrupt the ongoing peace process.[103]

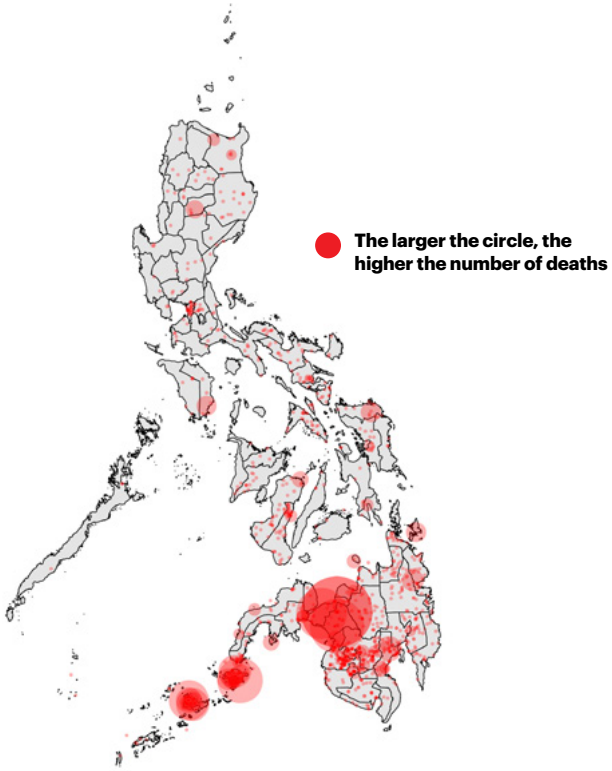
In the Philippines, the converging issues of conflict and ecological threats have led to social and economic disturbance, particularly in Mindanao. Recurrent storms and droughts threaten Mindanao's food production, which currently supplies 40 per cent of the Philippines' food requirement and 30 per cent of national food trade.[104] Where agricultural production is negatively impacted and there are fewer employment opportunities, this can increase the risk of alienation among youth and lead to a rise in support for insurgent groups due to ideological, political or financial reasons.[105]

Both conflict and natural disasters have also had significant impacts on population displacement in the Philippines. In 2020, natural disasters resulted in approximately 4.3 million displacements, whereas conflict led to approximately 111,000 new displacements. The majority of conflict displacements occurred on the island of Mindanao.[106]

FIGURE 3.17

Distribution of deaths from terrorism in the Philippines, 2007–2021

The Philippines recorded 1,546 deaths from terrorism between January 2007 and August 2021.



Source: Terrorism Tracker; IEP

Note: Terror incidents are included if the number of deaths per incident were five or more.

> Since 2007, the Philippines has recorded over 1,200 terrorist attacks, resulting in 1,546 deaths.

BOX 3.3

Building resilience to natural disasters in the wake of the 2004 Indian Ocean Earthquake and Tsunami

On 26 December 2004, a magnitude 9.3 earthquake struck off the coast of Sumatra Island, Indonesia causing a tsunami reaching up to 35 meters high which directly impacted eight countries along the coast of the Indian Ocean. The disaster caused approximately 230,000 fatalities, of which Indonesia was the country worst affected by the disaster, accounting for 73 per cent of the total deaths.[108] The 2004 disaster was estimated to have cost Indonesia more than US$4.5 billion.[109]

In the wake of the 2004 disaster, the Government of Indonesia, along with international stakeholders, established the country's first disaster management law which shifted focus from response to disaster preparedness and mitigation.[110] The new law also led to the development of a national and sub-national disaster coordination and command system. In addition, government science agencies have worked to develop capabilities to better model earthquakes, tsunamis and volcanoes and assess the potential impact of natural disasters.[111] This has allowed for better preparation and mitigation processes to improve community resilience to disasters.

Within education, the Indonesian government has also made concerted efforts to build risk knowledge among its youth by introducing Disaster Risk Reduction (DRR) into the curriculum.[112] The role of local civil society organisations has also been important to bridge the links between community and local government and build resilience. For instance, faith-based organisations have played a crucial role in communicating the risks posed by natural hazards to their followers.[113]

INDONESIA

Indonesia is the largest island country within South-East Asia, extending over an area of roughly 2 million square kilometres between the Indian and Pacific Oceans.[107] Due to Indonesia's location within the Pacific Ring of Fire, the country is susceptible to a multitude of natural disasters disasters, ranging from earthquakes and tsunamis to volcanic eruptions.

Since 1990, Indonesia has recorded 389 natural disasters causing over 192,900 deaths. Nearly half of the recorded natural disasters have been floods, at 49.9 per cent, followed by earthquakes at 22.6 per cent. The vast majority of deaths from natural disasters in Indonesia are the result of the 2004 Indian Ocean earthquake and tsunami. The catastrophic event was Indonesia's worst recorded natural disaster and marked a turning point for the country's approach to managing future disasters, as outlined in Box 3.3.

With a population of 276 million, Indonesia is the fourth most populous country in the world. Indonesia's population is expected to grow by roughly 19.7 per cent to 2050 — equating to an additional 54.5 million people.

Currently, 31 of Indonesia's 33 administrative units score high or extremely high threat on the *natural disasters indicator*. This equates to over 90 per cent of the population at high or extremely high risk. In particular, the island of Java faces a range of natural disasters. Approximately 56.1 per cent of Indonesia's population reside on the island of Java, which covers only 7 per cent of the country's total land area.[114] The six administrative units comprising the island of Java – Banten, Jawa Barat, Jakarta Raya, Jawa Tengah, Jawa Timur and Yogyakarta – are all at extremely high risk from natural disasters and are also among the areas facing the largest increases in population growth. Between 2020 and 2050, the population of Java is expected to grow by around 13 per cent, from 151.6 million to 171.3 million.

Indonesia is particularly exposed to sea-level rise, with the country ranked fifth highest in terms of the proportion of the population residing in low-lying coastal areas, at around 18 per cent.[115] A one-meter rise in sea levels could see the inundation of 405,000 hectares of coastal land and the disappearance of low-lying islands.[116]

Currently, 29 out of Indonesia's 33 administrative units face high or extremely high *food risk*, while 26 face high or extremely high *water risk*. After Singapore, Indonesia has the lowest prevalence of food insecurity in South-East Asia at 6.2 per cent of the population, recording only a minor deterioration during the COVID-19 pandemic of 0.2 per cent, unlike many of its neighbours.

Indonesia's capital city, Jakarta, which is located on the island of Java, faces an increasing threat from rising sea levels. Estimates suggest that the city is currently sinking at a rate of 6.7 inches annually.[117] Rapid urbanisation, excessive groundwater extraction and population growth have also exacerbated the problem. As a result, the Indonesian government has decided to relocate the country's capital to the Indonesian-controlled region of Kalimantan on the island of Borneo, a location deemed at lower risk from natural disasters.[118]

In the future, food security and water availability will be affected by temperature anomalies, unpredictable rainfall and salt-water intrusion on arable land.[119] These factors will alter the wet season's onset and length, posing concerns for agricultural production and national food security. Continued sea-level rise will lead to a decline in arable land and decrease freshwater availability in coastal zones.[120]

Indonesia is classed as a medium Positive Peace country, having recorded a strong improvement of nine per cent between 2009 and 2019. This is the second largest improvement in the region behind only Myanmar with Myanmar's improvement occurring prior to the military coup in 2020. Indonesia's performance was driven by significant improvements in the *Sound Business Environment, Free Flow of Information* and *Equitable Distribution of Resources* Pillars, which improved by 20.1, 15.2 and 13.9 per cent, respectively.

In recent decades, Indonesia's rapid economic growth has led to a reduction in the national poverty rate, which has more than halved from 19.1 per cent in 2000 to 9.4 per cent in 2020. While Indonesia's recent progress is promising, future population growth in hazard prone areas, combined with a strong dependence on natural resources, make Indonesia vulnerable to ecological threats, particularly the intensifying impacts of cyclones and floods.[121]

4 Forced Displacement

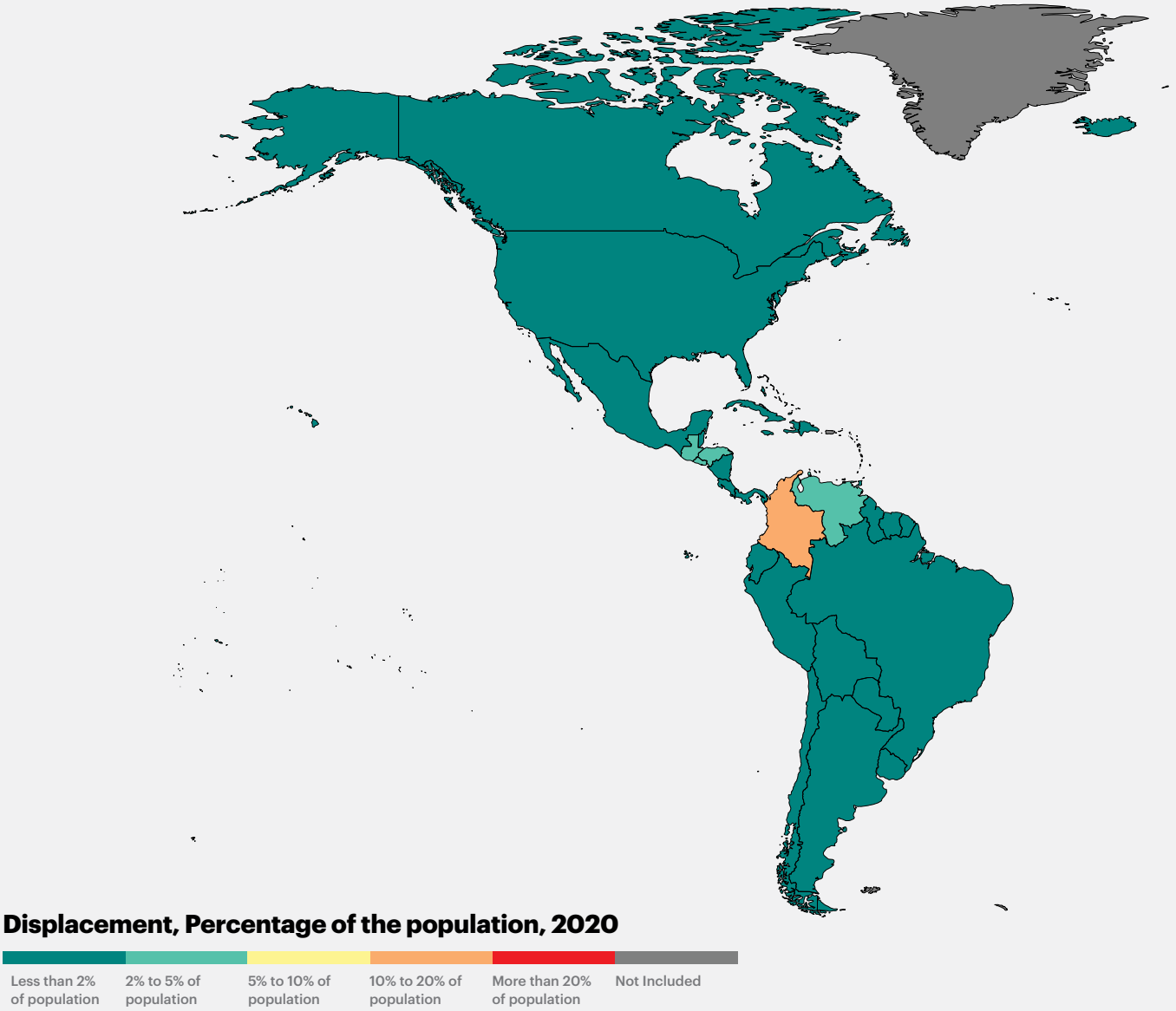
KEY FINDINGS

- At the end of 2020, 82.4 million people were forcibly displaced globally — the highest number on record.
- In 2020, approximately 1 in 94 people globally were forcibly displaced compared to 1 in 161 in 2000.
- Low and very low peace countries account for 91 per cent of the people forcibly displaced from conflict and violence worldwide.
- At the end of 2020, 68 per cent, or 23.1 million of the total forcibly displaced people living outside their home country came from hotspot countries – countries with catastrophic ecological threats and low societal resilience.
- The total number of forcibly displaced people has increased each year for the last nine years.
- At the end of 2020, approximately two in three people forcibly displaced by violence and conflict were displaced within their country.
- In 2020, the number of refugees resettled or naturalised was at the lowest on record.
- The three countries with the highest number of people displaced by conflict are Syria, Afghanistan and the Democratic Republic of the Congo.
- In May and June 2020, nearly 170 countries out of 195 closed their borders either partially or completely because of COVID. This severely affected refugee movement and resettlement.
- In 2020, only 251,000 refugees returned home compared to the pre-COVID average of 670,000 returnees.
- In 2020, 68,000 people resettled and naturalised, down from the 20-year average of 170,000 people.
- People internally displaced from conflict are often displaced for longer periods, sometimes decades. For people displaced by natural disasters, it is usually less than a year.
- In 2020, South Sudan had the largest number of refugees return home at 122,000, followed by Burundi at 40,800 refugees.
- The majority of disaster displacement events were concentrated in Asia-Pacific and South Asia. China, the Philippines, India and Bangladesh each recorded more than 3.9 million new displacements from disasters in 2020.
- As Syria's conflict entered its tenth year, 6.6 million people were internally displaced and an additional 6.8 million externally displaced. Of the 6.8 million Syrians displaced abroad, 4.7 million are hosted in Europe, two million in MENA, and 100,000 in other regions.
- At the end of 2020, Europe was hosting the largest number of people displaced abroad. Turkey hosted the largest number of refugees within the region at 3.9 million, followed by Germany at 1.5 million and France at 550,000.

FIGURE 4.1

Forcibly displaced people by origin country, percentage of the origin country's population, 2020

In 2020, four countries had over 20 per cent of their populations forcibly displaced – Syria, South Sudan, Central African Republic and Somalia.



Source: UNHCR; IEP

By the end of 2020, the number of forcibly displaced people worldwide was 82.4 million people — the highest number on record.[1] In 2020, four countries had more than 20 per cent of their population displaced — Syria, South Sudan, Central African Republic and Somalia. Figure 4.1 displays the forcibly displaced at the end of 2020 as a percentage of the country's population.

The scale of people forcibly displaced due to persecution, conflict, violence, and events seriously disturbing public order worldwide has increased at a concerning rate. Growing from one in 161 people globally in 2000 to approximately one in 94 people in 2020. Figure 4.2 displays the trend in the number of people forcibly displaced.

Since 2012, the number of displacements has increased annually. The sharpest increases came in 2013 and 2014, increasing by 20 and 16 per cent from the previous year, respectively. In 2020, the number of people forcibly displaced by violence increased 3.7 per cent from the previous year —an additional 2.9 million people.

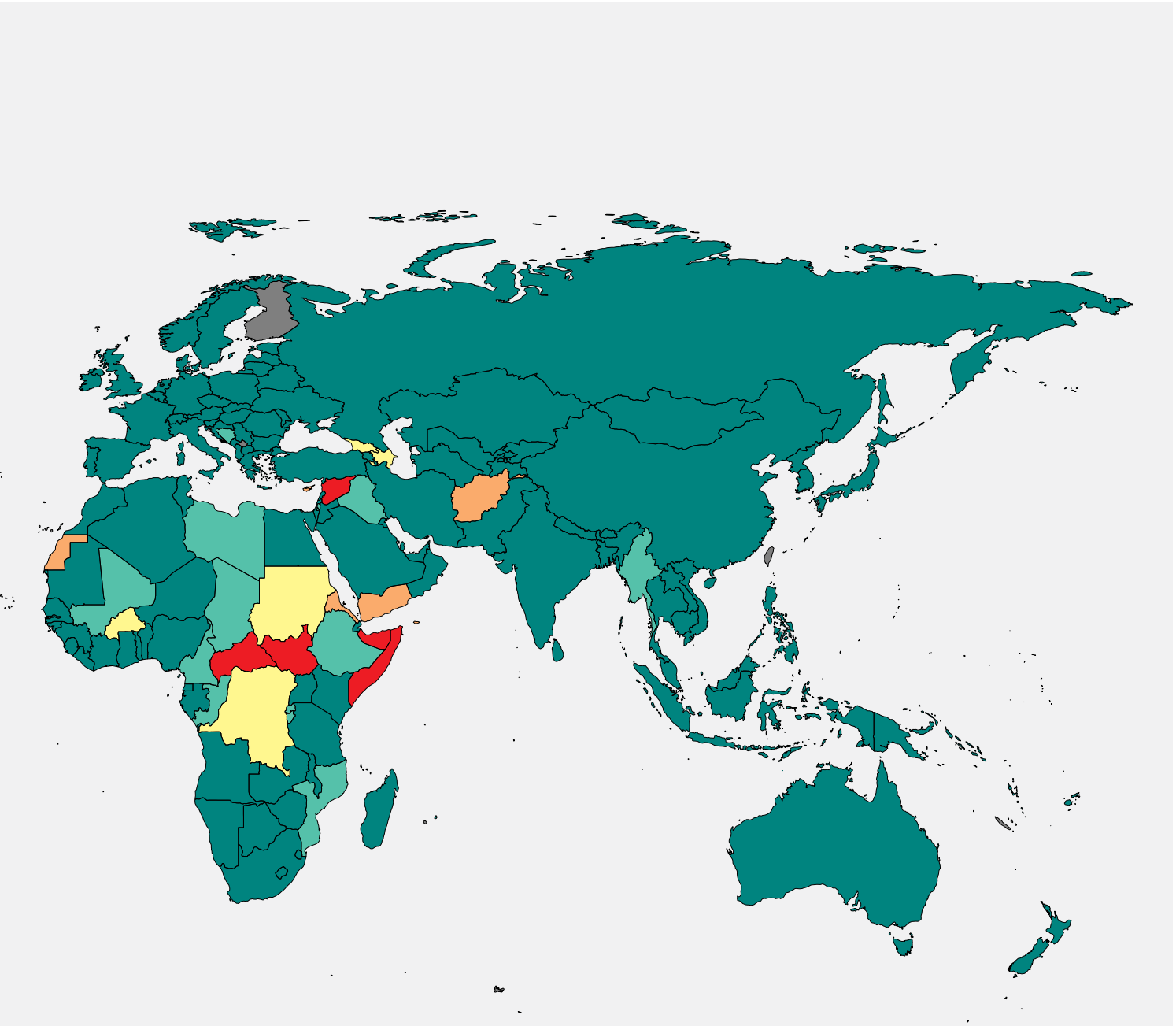
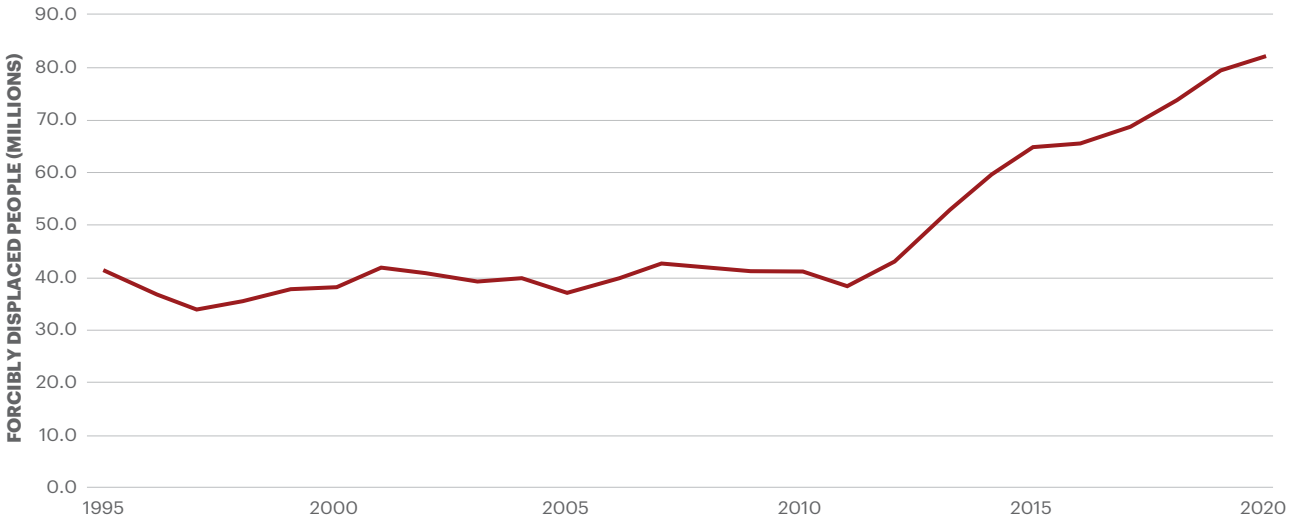


FIGURE 4.2

Trend in the number of forcibly displaced people globally, 1995–2020

The number of forcibly displaced people has increased consecutively over the last nine years.



Source: UNHCR, IDMC

The majority of displacements occurred internally within countries. Figure 4.3 shows the distance travelled for forced displacements and natural voluntary migration. Forced displacements equate to around 30 per cent of natural migration patterns.

For forced displacements, two out of three occur within country.[2] Of the third that extend beyond the person's country, 75 per cent occur within 2,500km of the origin country. This means that 25 per cent of people moving beyond their borders can be expected to travel more than 2,500 kilometres.

For natural migration, 75 per cent of the flows occur to countries within a 5,000 km radius of the origin country.

In 2020, the majority of forcibly displaced people were categorised as internally displaced as shown in Figure 4.4. The total forcibly displaced are categorised as follows:

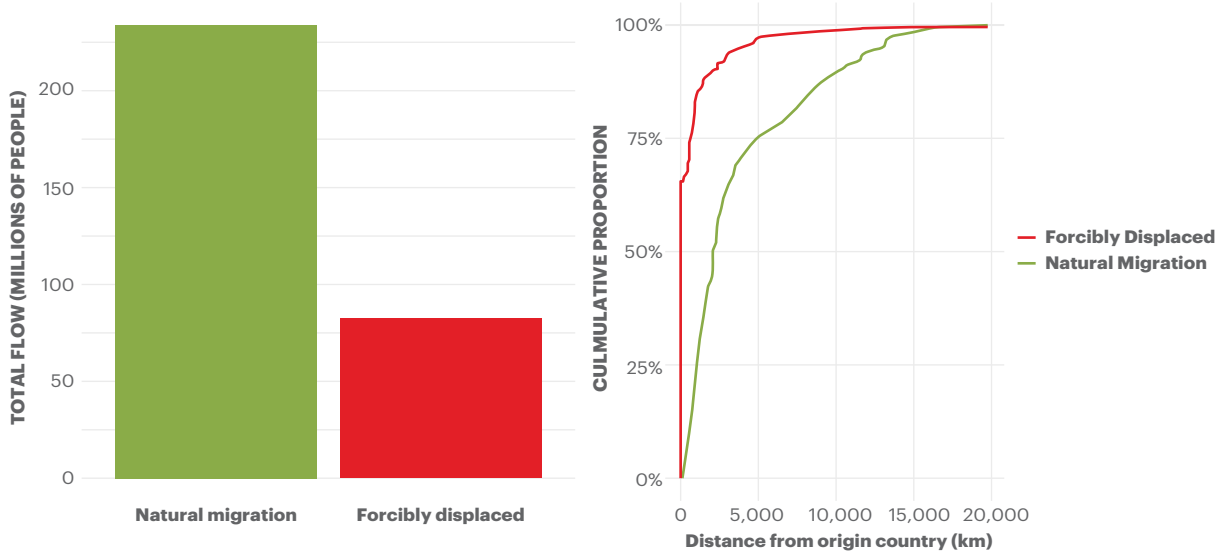
- 48 million people were displaced internally,[3]
- 5.7 million people were Palestine refugees under UNRWA's mandate,[4]
- 5.1 million were asylum seekers,
- 20.7 million were refugees under UNHCR's mandate,
- 3.9 million were Venezuelans displaced abroad.[5]

For more details on the categories and definitions of those forcibly displaced, see Box 4.1.

FIGURE 4.3

People forcibly displaced compared to natural migration, 2020

Forced displacements equate to around 30 per cent of natural migration patterns.

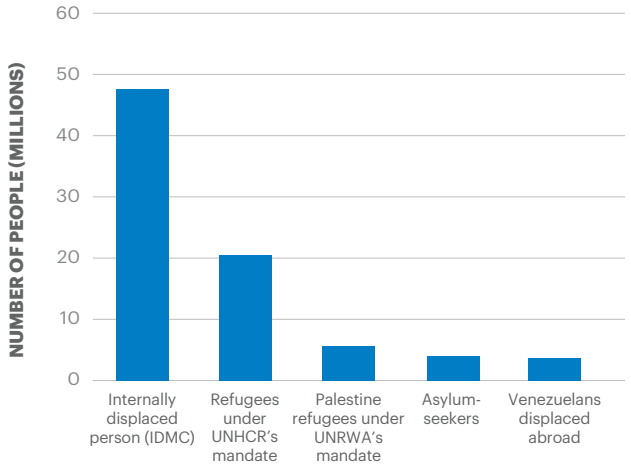


Source: UNHCR, IDMC, IOM, IEP

FIGURE 4.4

People forcibly displaced from conflict and violence by category at the end of 2020

The total number of people forcibly displaced internally is more than the other categories of forcible displacement combined.



Source: UNHCR, IDMC

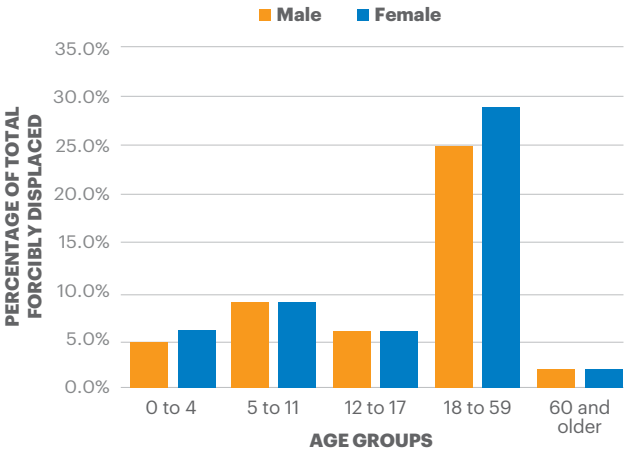
Many of the new conflict and violence displacements in 2020 occurred in sub-Saharan Africa and MENA. MENA has the largest number of people forcibly displaced by conflict and violence. Historically, political instability, enduring civil wars and localised conflict generated from the Arab Spring have led to the displacements. More than 29 million people in the region are currently displaced from these conflicts, equivalent to 5.1 per cent of the region's population. Prior to the Arab Spring, MENA was estimated to have 3.5 million internally displaced people.[6] Today this figure has more than tripled to exceed 14 million internally displaced people.

In sub-Saharan Africa, 27 million people were forcibly displaced at the conclusion of 2020 from conflict — the second highest of any region. Figure 4.5 displays the number of forcibly displaced people triggered by conflict and violence by region.

FIGURE 4.6

Estimated age and gender demographic composition of people forcibly displaced across national borders, end of 2020

Approximately 41 per cent of the forcibly displaced across borders at the end of 2020 were children below the age of 18.



Source: UNHCR

DEMOGRAPHICS OF THE FORCIBLY DISPLACED

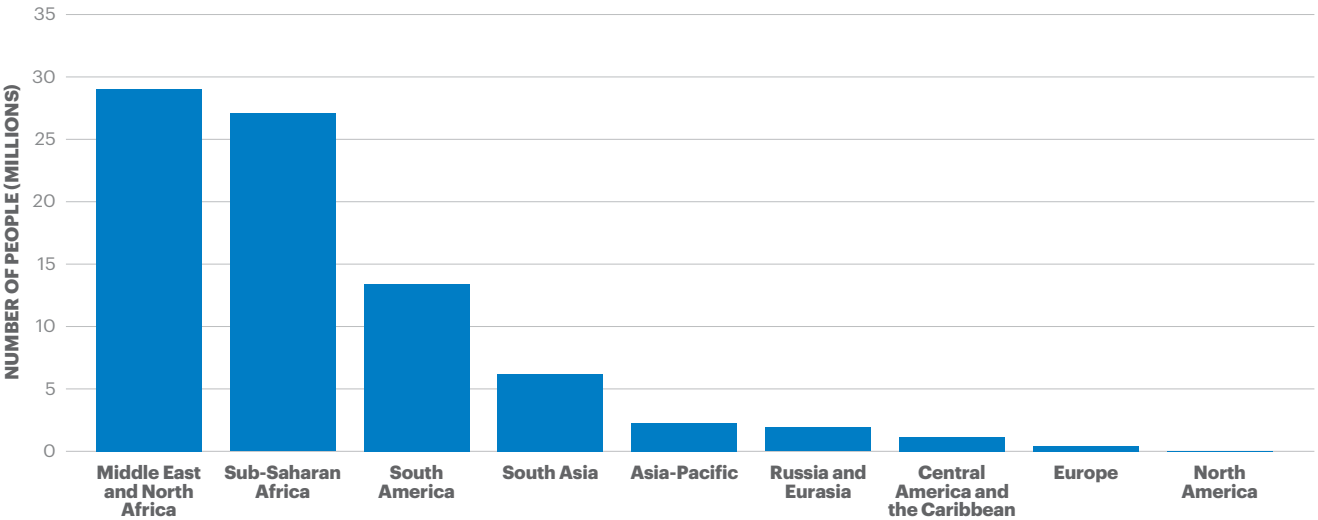
The UNHCR compiles data globally on the gender and age of the forcibly displaced populations. Between 2018 and 2020, one million children were born as refugees. Approximately 41 per cent of the people forcibly displaced today living beyond their country's borders are below the age of 18.[7] Just four per cent of the total were aged 60 and above.

At the end of 2020, slightly more males were displaced internationally, equal to 52 per cent of the total. The largest gender disparity came from the age group of 18 to 59, where females make up 25 per cent of the total forcibly displaced and males 29 per cent. Figure 4.6 displays the estimated demographic composition of those forcibly displaced internationally at the end of 2020.

FIGURE 4.5

Forcibly displaced people from conflict and violence, by region, 2020

Sub-Saharan Africa and MENA had the highest number of people displaced from violence and conflict in 2020.



Source: UNHCR, IDMC, IEP

The majority of internationally displaced people in the Americas, Asia-Pacific, Europe and MENA are adults. In comparison, all the sub-Saharan Africa sub-regions — Southern Africa, West and Central Africa, East and Horn of Africa and the Great Lakes — have a relatively higher proportion of the forcibly displaced population as children. In sub-Saharan Africa, people under 18 account for 53 to 56 per cent of the region's total displacements.

Both Asia-Pacific and Europe have relatively lower female refugees compared to male refugees, with 44 per cent of their total refugee populations female. Compared to other regions, there are relatively more female refugees in West and Central Africa, with an estimated 54 per cent compared to males.

REFUGEE SOLUTIONS DURING THE COVID-19 CRISIS

The COVID-19 crisis led to the closing of borders raising the barriers to resettlement for many people who are forcibly displaced. Peaking in May and June of 2020, nearly 170 countries out of 195 closed their borders either partially or completely.[9] The closure of borders, aimed at restricting the pandemic's spread, severely restricted the ability of people forcibly displaced to return to their countries of origin or seek safety and refuge in countries abroad. Consequently, in 2020, both the resettlement and naturalisation of refugees fell to their lowest levels on record, equal to 68,000 people compared to the 20-year average of 170,000 people, as shown in Figure 4.7. Syria had the highest number of people naturalised in 2020, with 13,870 of its citizens gaining nationality in other countries, followed by Eritrea at 3,200 people and Iraq at 1,500. The Netherlands naturalised the largest number of people overall at 25,000. Syrians accounted for 13,400 of the total people naturalised in The Netherlands.

The number of refugees returning to their countries of origin was at its lowest levels since 2015, with just 250,000 refugees able to return home compared to the pre-COVID average of 670,000 returnee refugees annually.[10] This reduction in refugees that were either able to be resettled, naturalised or return home coincided with a year in which there was an unpreceded number of people forcibly displaced. In 2020, South Sudan had the largest number of refugees return home at 122,000, followed by Burundi at 40,800 refugees. Uganda and Tanzania saw the exit of 74,200 and 30,600 refugees that they were previously hosting. Table 4.1 displays the ten countries with the highest number of refugees return home in 2020.[11]

> “
> The reduction in refugees that were either able to be resettled, naturalised or return home coincided with a year in which there was an unpreceded number of people forcibly displaced.

BOX 4.1

Who are the forcibly displaced?

IEP uses UNHCR's definition of forcibly displaced people. This encompasses refugees, asylum-seekers, internally displaced people, Palestine refugees under the United Nations Relief and Works Agency for Palestine Refugees' (UNRWA) mandate and Venezuelans displaced abroad. The following defines each category:

Refugees under UNHCR's mandate: A refugee has been recognised under the 1951 Convention relating to the status of refugees to be a refugee.

Asylum-seekers: An asylum seeker is seeking international protection, but whose claim for refugee status has not yet been determined. Not every asylum-seeker will ultimately be recognised as a refugee, but every refugee was initially an asylum-seeker.

Venezuelans displaced abroad: People are leaving Venezuela for many reasons: violence, insecurity, fear of being targeted for their political opinions (whether real or perceived), shortages of food and medicine, lack of access to social services, and being unable to support themselves and their families. By the end of 2020, almost 4.9 million Venezuelans had left their homes, travelling mainly towards Latin America and the Caribbean. It is the biggest exodus in the region's recent history and one of the biggest displacement crises in the world. They stay in their host countries under a wide range of legal statuses inside and outside the asylum systems.

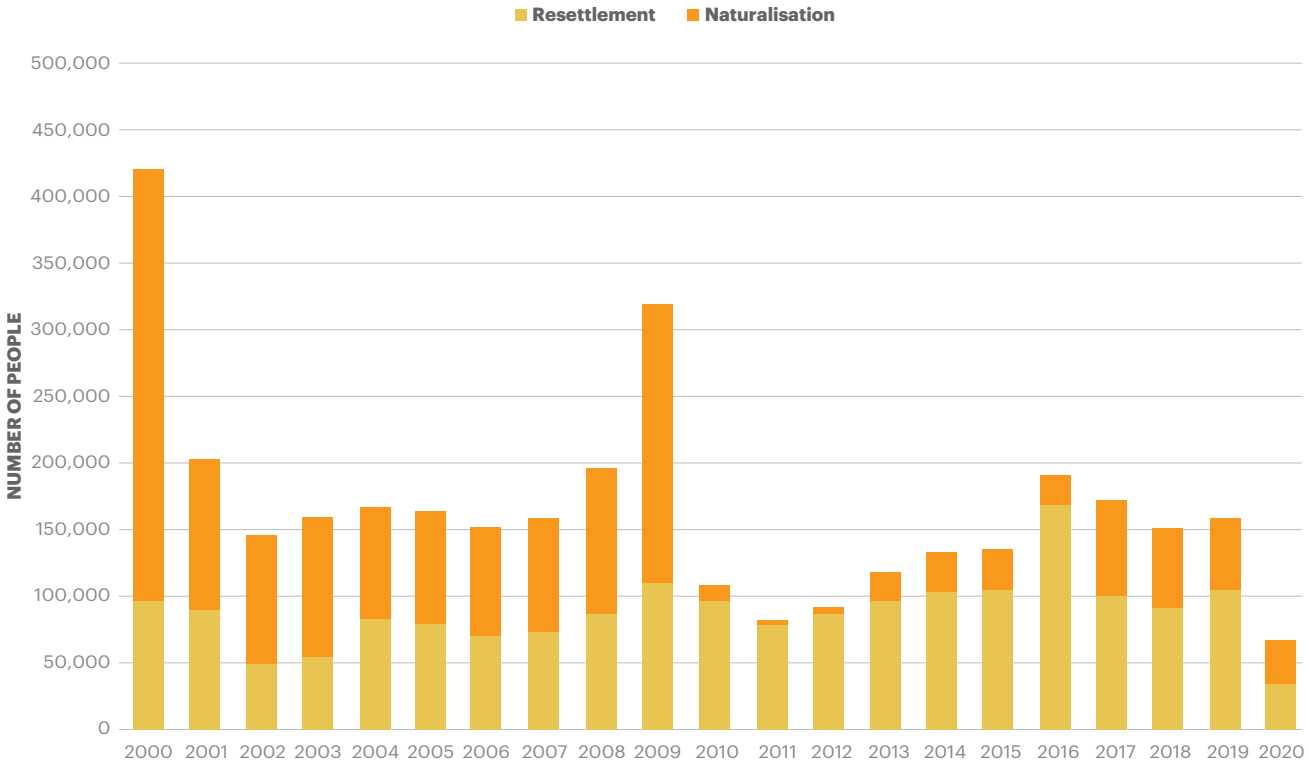
Palestine refugees under UNRWA's mandate: Anyone whose normal place of residence was in Mandate Palestine during the period from 1 June 1946 to 15 May 1948 and who lost both home and means of livelihood due to the 1948 Arab-Israeli war qualifies as a Palestine refugee. This includes their children who are living in the camps.

Internally Displaced People (IDPs): IDPs have been forced to leave or abandon their homes and have not crossed an internationally recognised border.[8]

FIGURE 4.7

Resettlement and naturalisation of refugees, 2000–2020

In 2020, the number of refugees resettled or naturalised was at the lowest levels on record.



Source: UNHCR

As of August 2021, 49 countries have closed their borders to those seeking refuge or asylum, with a further 76 countries enforcing restrictions on access and exceptions required for asylum seekers.[12] This may have implications for those seeking safety abroad or looking to return to their country of origin throughout 2021. For definitions on refugee resettlement and naturalisation, see Box 4.2.

TABLE 4.1

The ten countries with the largest number of refugees who returned in 2020

In 2020, an estimated 251,000 refugees returned to their countries. Ten countries accounted for 99 per cent of the returnees.

Country	Number of refugees
South Sudan	122,000
Burundi	40,852
Syria	38,563
Cameroon	18,279
Nigeria	12,335
Mali	6,232
Central African Republic	4,978
Afghanistan	2,311
Somalia	1,560
Iraq	1,505

Source: UNHCR

BOX 4.2

Refugee returnee, naturalisation and resettlement.

Returnee: A person who was of concern to UNHCR when outside their country of origin and who has returned home to their country of origin. It also applies to internally displaced persons who return home to their prior place of residence.

Naturalisation: the legal act or process by which a non-citizen in a country may acquire citizenship or nationality of that country – is therefore used as a proxy measure of local integration.

Resettlement: The transfer of refugees from the country in which they have sought asylum to another State that has agreed to admit them. The refugees will usually be granted asylum or some form of resident rights and, in many cases, will have the opportunity to become naturalised citizens.[13]

DISPLACEMENT BY PEACE LEVEL

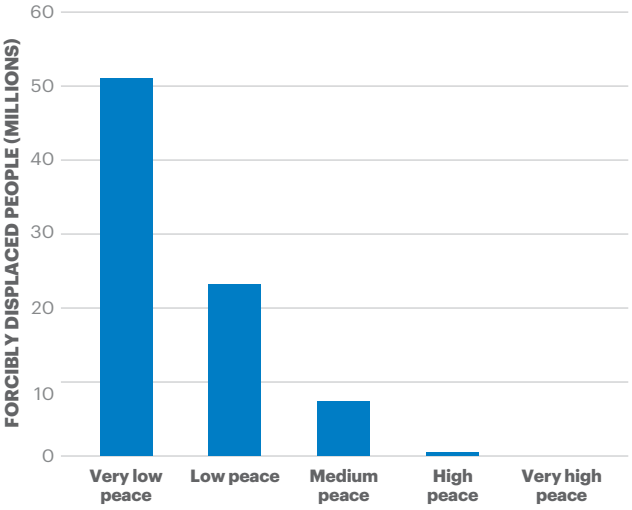
Conflict displaces tens of millions of people each year. Conflict and violence undermine humanitarian responses creating cyclical displacement where resilience and coping strategies erode over time. The result enormously burdens logistical and humanitarian efforts, threatens international security, and risks the lives of those displaced and those working to uphold peace. As to be expected, as peacefulness deteriorates, the number of people forcibly displaced increases. Countries with low and very low levels of peacefulness, as measured by the GPI, have suffered significantly more displacements from violence and armed conflict than countries of high peace and very high peace. At the end of 2020, very high peace countries had 2,000 displacements from conflict and violence compared to the 51 million in very low peace countries.[14] Figure 4.8 displays the number of displacements from armed conflict and violence by peace level.

At the end of 2020, two out of three people classified as forcibly displaced resided within their country of origin. The other third reside beyond their country's borders. As shown in Figure 4.9, most of those displaced outside of their country of origin are being hosted in extremely low, low or medium peace countries as measured by the GPI. Given that many of these countries have existing fragilities, they are less likely to have the capacity to absorb shocks. This may put further pressure on the hosting countries and those displaced within them in a vicious cycle of vulnerability.

FIGURE 4.8

Forcibly displaced people by conflict and violence, by peace level, 2020

Low and very low peace countries account for 91 per cent of the people forcibly displaced from conflict and violence.

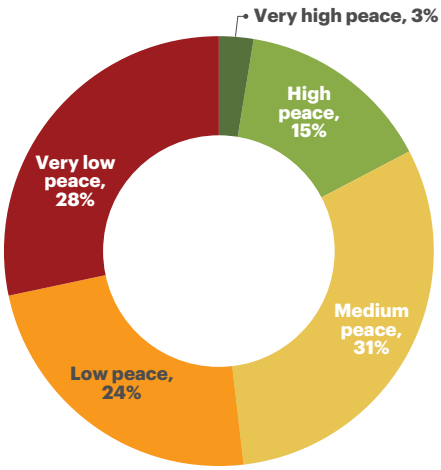


Source: UNCHR, IDMC, IEP

FIGURE 4.9

Countries hosting people who were forcibly displaced outside their country of origin, by peace level, percentage of the total, 2020

Approximately 83 per cent of people forcibly displaced and living outside their country of origin reside in very low to medium peace countries.



Source: UNHCR, IDMC, IEP

Internal Displacement – Conflict and Natural Disasters

In 2020, around 40 million new internal displacements were recorded from conflict, violence, and natural disasters — the highest number in ten years. The vast majority of these was from natural disasters. Over 75 per cent of these resulted from extreme weather events and natural disasters, more than three times the internal displacements caused by conflict and violence.
By the conclusion of 2020, 48 million people were internally displaced as a result of conflict and violence, and 6.9 million from disasters.[15] These figures include new displacements in 2020 and displacements from previous years where the people were unable to return home. The availability of data on how long people remain displaced remains scarce and preliminary, and therefore it is difficult to determine the average length of time someone is displaced.[16]

However, given the number of new internal disaster displacements in 2020 is greater than the number at the conclusion of the year, it can be assumed that many of those uprooted from disasters are displaced less than a year. In comparison, internal conflict displacement shows a different relationship where the number of internal displacements from conflict throughout the year was less than the total at the end of the year. This indicates that the majority of those internally displaced by conflict are displaced for longer than a year. Table 4.2 shows the number of new internal

displacements in 2020 and the number of people displaced at the end of the year. This table does not account for external displacements.

In Asia-Pacific, many of the displacements in 2020 from cyclones and monsoons were pre-emptive evacuations. For example, Japan evacuated and sheltered more than 174,000 people in the wake of typhoon Haishen.[17] Once the disaster risk subsided, many people return to their homes and the displacement was short. However, in situations where the destruction of disasters is significant, people may face prolonged displacement. For example, California experienced its most severe wildfires in 2018. After two years, only 728 of the 9,000 homes destroyed had been rebuilt and estimates indicate that it may take up to ten years to recover fully.[18]

IDMC estimates that providing every IDP with support for housing, education, health and security, and loss of income would have an average cost of $390 per person displaced for each year of displacement.[19] Given the current number of internal displacements, it would cost $21.5 billion to provide each IDP with housing, education, health and security, and compensation for loss of income. However, this figure is highly conservative and does not include longer term economic consequences or the financial impacts on host communities or communities of origin. If these costs are accounted for, the financial requirement would be significantly higher than that currently budgeted by government and United Nations agencies that assist IDPs.[20]

Since 2009, environmental disasters displace an average of 24 million people per year, with an additional eight million internal displacements from armed conflict. This reinforces the significance that natural disasters have on the movement of the global population. In 2020, more than 30 million new displacements occurred from natural disasters and approximately another ten million from conflict and violence — far exceeding the 12-year average. Figure 4.10 displays the number of new displacements each year due to conflict and natural disasters.

In 2020, most disaster displacements resulted from weather-related events such as floods and storms. The Atlantic hurricane season was the most active on record with 30 named cyclones, including Hurricane Eta, which caused $8.3 billion in damages and caused over 170 fatalities.[21] The United States recorded approximately 1.7 million new displacements in 2020 from natural disasters. Europe recorded approximately 129,000 internal displacements from disasters.

TABLE 4.2

Changes in the number of internal displacements by conflict and natural disasters, 2019 and 2020

At the end of 2020, 48 million people were internally displaced by conflict and a further 6.9 million by disasters. This does not include people who have moved to another country.

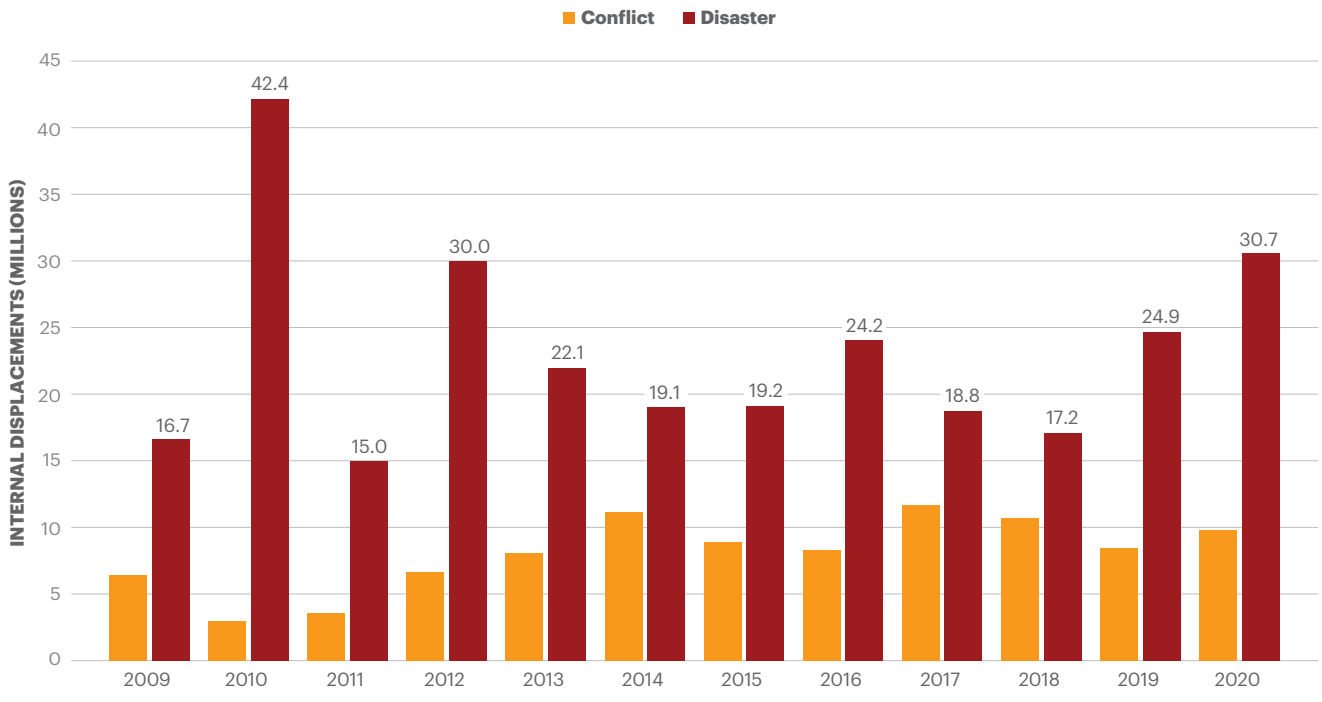
Year	Conflict New Displacements	Disaster New Displacements	Number Displaced by Conflict - End of Year	Number Displaced by Disasters - End of Year
2019	8,554,826	24,854,410	45,905,505	5,072,248
2020	9,774,973	30,688,349	48,027,950	6,973,419

Source: IDMC

FIGURE 4.10

New annual displacements due to conflict and natural disasters, 2008–2020

New disaster displacements reached 30.7 million in 2020, while armed conflict accounted for 9.8 million displacements.



Source: IDMC

TABLE 4.3

New annual displacements due to conflict and natural disasters, 2008–2020

In 2020, storms and floods led to 28.6 million internal displacements, accounting for 93 per cent of the global internal disaster displacements.

Disaster Type	Asia-Pacific	South Asia	sub-Saharan Africa	Central America and the Caribbean	North America	Middle East and North Africa	South America	Europe	Russia and Eurasia	Grand Total
Storm	5,891,695	5,487,576	66,399	2,260,133	626,826	1,085	240,717	6,179	-	14,580,610
Flood	5,489,378	3,716,691	3,729,440	35,743	36,199	721,512	205,073	16,140	104,209	14,054,385
Wildfire	74,309	-	4,809	2,647	1,075,789	35,368	1,986	21,748	1,360	1,218,016
Volcanic eruption	517,684	-	-	-	-	-	-	-	-	517,684
Earthquake	16,631	1,805	-	690	11,347	24,053	208	82,110	-	136,844
Drought	-	-	32,096	-	-	-	83	-	-	32,179
Other	63,640	35,226	2,969	24,234	772	12,773	6,022	2,343	0	147,979
Totals	**12,053,337**	**9,241,298**	**3,835,713**	**2,323,447**	**1,750,933**	**794,791**	**454,089**	**128,520**	**105,569**	**30,687,697**

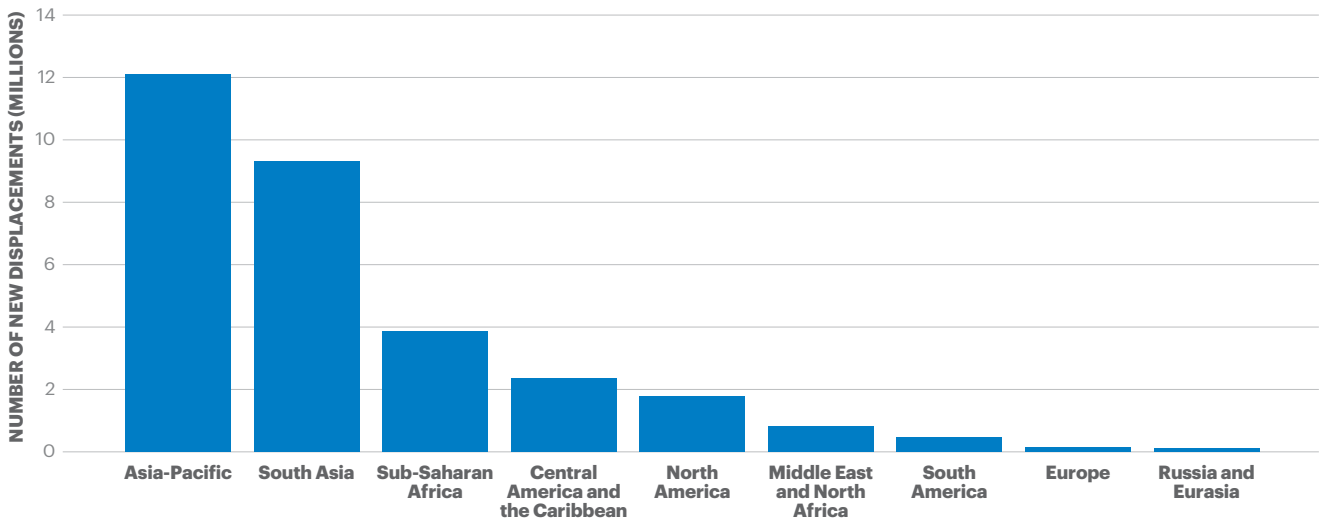
Source: IDMC, IEP

Note: Other includes wet mass movement, extreme temperatures and landmass movements; Totals does not equal the total new displacements due to regional aggregation.

FIGURE 4.11

Internal displacements by natural disasters, by region, 2020

South Asia and Asia-Pacific had the highest number of displacements from disasters in 2020.



Source: IDMC, IEP

The majority of Europe's displacements occurred in Croatia and Turkey and were caused by earthquakes. Unlike conflict, many natural disasters, such as floods or hurricanes, are short-lived, with the inhabitants returning after a short period. Table 4.3 displays the number of new displacements in 2020 by disaster type.

Natural disasters have a substantially larger impact in countries with larger population densities and weaker systems for adaptation and recovery. Further, the largest displacements from natural disasters occurred in the worlds most populated countries. The majority of disaster displacement events were concentrated in Asia-Pacific and South Asia with China, the Philippines, India and Bangladesh each recording more than 3.9 million new displacements in 2020. In total, these two regions recorded 69 per cent of the total new internal displacements from natural disasters last year, as shown in Figure 4.11. According to the IDMC, many of these displacements were pre-emptive evacuations.[22] Sub-Saharan Africa recorded 12.5 per cent of the total internal displacements from disasters and 69 per cent of the total internal displacements from conflict globally.

> “
>
> Sub-Saharan Africa recorded 12.5 per cent of the total internal displacements from disasters and 69 per cent of the total internal displacements from conflict globally.

Displacement by Country

In 2020, several crises and natural disasters caused people to flee their homes. Table 4.4 displays the 15 countries with the largest population displaced at the end of 2020. At the conclusion of 2020, Syria recorded the highest number of displacements globally. As Syria's conflict entered its tenth year, 6.6 million people were internally displaced and an additional 6.8 million externally displaced.[23] The full-scale civil war led to millions of Syrians leaving the country seeking refuge in neighbouring nations and Europe. Of the 6.8 million Syrians displaced abroad, 4.7 million are hosted in Europe and two million in MENA. Afghanistan had 7.5 million people displaced at the end of 2020, with approximately 62 per cent of these displacements occurring within the country. It is the worst-ranked country in the ETR, indicating an extremely high exposure to resource scarcity, population growth and natural disasters. Furthermore, Afghanistan is ranked the least peaceful country globally, with more than 30,000 conflict deaths in 2019. Natural disasters, resource scarcity and degradation and decades of fighting between the Taliban and government forces has led to Afghanistan being one of the world's most severe internal displacement crises. Afghans were the second-largest group of asylum seekers in Europe after Syrians during the 2015 migration crisis.

TABLE 4.4

The countries with the largest number of forcibly displaced people from conflict and natural disasters, 2020

In 2020, 78.4 per cent of the total displacements worldwide were from 15 countries.

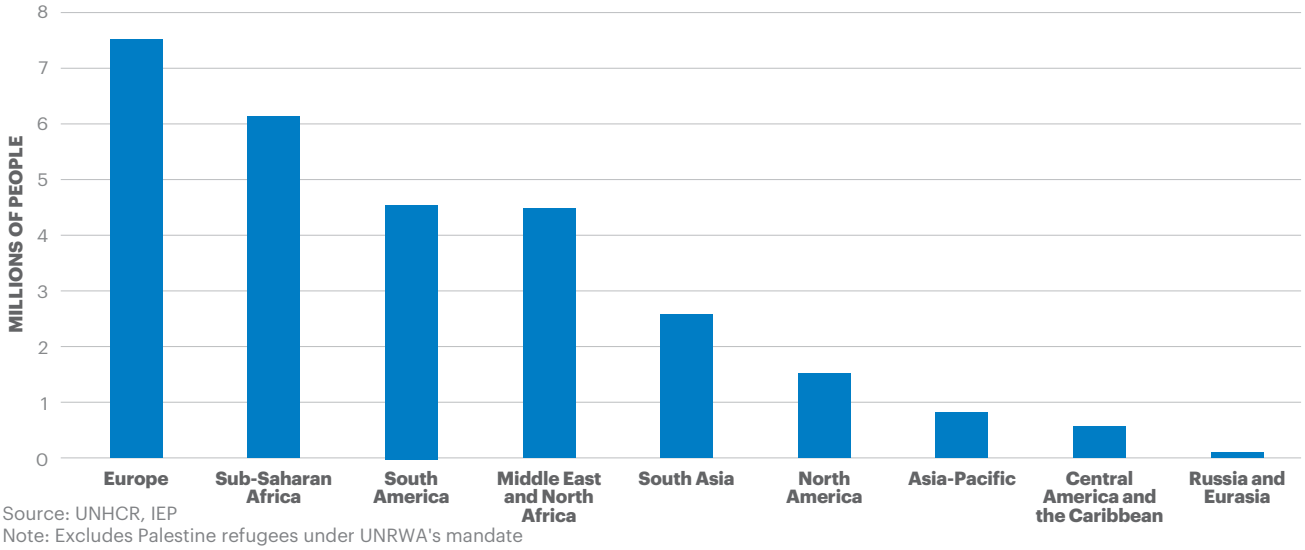
Country	Displaced Internally	Displaced Abroad	Total Displaced	Percentage Displaced Internally
Syria	6,568,000	6,796,720	13,364,720	49%
Afghanistan	4,664,000	2,833,565	7,497,565	62%
Dem. Rep. of the Congo	5,332,000	985,799	6,317,799	84%
Palestine*	131,010	5,816,140	5,947,150	2%
Colombia	4,943,000	260,770	5,203,770	95%
Venezuela	-	4,878,573	4,878,573	-
Yemen	3,858,000	54,906	3,912,906	99%
Somalia	2,968,000	868,365	3,836,365	77%
South Sudan	1,542,000	2,193,678	3,735,678	41%
Sudan	2,730,000	857,426	3,587,426	76%
Nigeria	2,873,000	426,013	3,299,013	87%
Ethiopia	2,693,000	276,402	2,969,402	91%
Iraq	1,224,000	574,113	1,798,113	68%
Myanmar	509,600	1,143,506	1,653,106	31%
India	1,402,000	82,369	1,484,369	94%
Totals	**41,437,610**	**28,048,345**	**69,485,955**	**60%**

Source: UNHCR, IDMC, IEP
Note: *UNHCR and UNRWA

FIGURE 4.12

The number of forcibly displaced by host region, 2020

Europe hosts 27 per cent of the people forcibly displaced outside of their country of origin.



Source: UNHCR, IEP
Note: Excludes Palestine refugees under UNRWA's mandate

At the end of 2020, Europe was hosting the largest number of people displaced abroad with Turkey hosting the largest number of refugees at 3.9 million, followed by Germany at 1.5 million and France at 550,000. Outside of Europe, Colombia hosted over 1.7 million displaced Venezuelans and Pakistan and Uganda hosted approximately 1.4 million people each. Figure 4.12 displays the number of forcibly displaced hosted by region at the conclusion of 2020, and Table 4.5 displays the ten countries hosting the largest numbers of displaced people.

TABLE 4.5

The ten countries hosting the largest number of forcibly displaced people, 2020

Turkey hosted the largest number of forcibly displaced people in 2020 at 3.9 million people, or 4.7 per cent of their population. As a percentage of the population, Lebanon hosted 880,000 people, equivalent to 13 per cent of their population.

Country	Number of People Hosted	Percentage of host country's population
Turkey	3,964,011	4.70%
Colombia	1,750,333	3.40%
Pakistan	1,448,749	0.60%
Uganda	1,446,369	3.10%
Germany	1,400,669	1.70%
United States	1,328,953	0.40%
Peru	1,056,898	3.20%
Sudan	1,056,240	2.40%
Lebanon	880,696	13.00%
Bangladesh	866,552	0.50%

Source: UNHCR, IEP

Displacement in Hotspot Countries

The majority of the population displacement happens within a country or into neighbouring countries. Estimates show that 30 per cent of all displacements move more than 500 kilometres beyond their country.[24] By 2050, climate change is estimated to create up to 86 million additional migrants in sub-Saharan Africa, 40 million in South Asia and 17 million in Latin America as agricultural conditions and water availability deteriorate across these regions.[25] The effects of ecological degradation may make these numbers higher.

Empirical evidence suggests that people living in less developed countries with limited coping capacity to deal with natural disasters are those most likely to migrate. These unplanned flows can exacerbate socioeconomic fragilities in their destination places. In Ethiopia, droughts in the mid-1970s and 1980s, followed by famine, led to waves of voluntary and government-forced migration from drought-stressed areas.[26] In this case, both climatic and political factors impacted displacement and international migration. As a result of this instability, violence and insecurity increased in neighbouring countries, further impacting Ethiopia. Protracted mass population displacement results from the impact of natural disasters in which certain regions become uninhabitable. For example, sea level rise and storm tides, which lead to coastal flooding and erosion, can make previously populated areas uninhabitable by destroying agriculture and infrastructure. Recent projections show a rise in sea levels of up to 2.1 meters by 2100, which could potentially permanently drown land that is currently home to 200 million people around the world.[27]

ETR Hotspots

Many hotspot countries have low levels of resilience as gauged by the PPI. This suggests that even moderate shocks may engender disorderly re-arrangements in the structure of the economy and the fabric of society. As the effects of climate change become more pronounced, these countries with low levels of resilience may see their populations displaced to cope with the shocks. Consequently, those most exposed in these countries may be forced to flee their homes and look for safety both within and outside of their country.

The ETR uses the PPI and the catastrophic ETR score to identify countries where resilience is unlikely to be strong enough to adapt or cope with ecological threats. The 30 countries that combine the lowest PPI scores with catastrophic ETR scores of high or extremely high are considered hotspots. For more details on the details of the hotspot countries, see Section 1.

At the end of 2020, 23.1 million people were displaced externally from the hotspot countries accounting for 68 per cent of the total forcibly displaced globally living outside of their country of origin. Table 4.6 displays the hotspot countries and their internal and external displacements.

TABLE 4.6

Number of people displaced from hotspot countries, 2020

Syria, Afghanistan and the Democratic Republic of the Congo had the highest number of displacements in 2020 from hotspot countries.

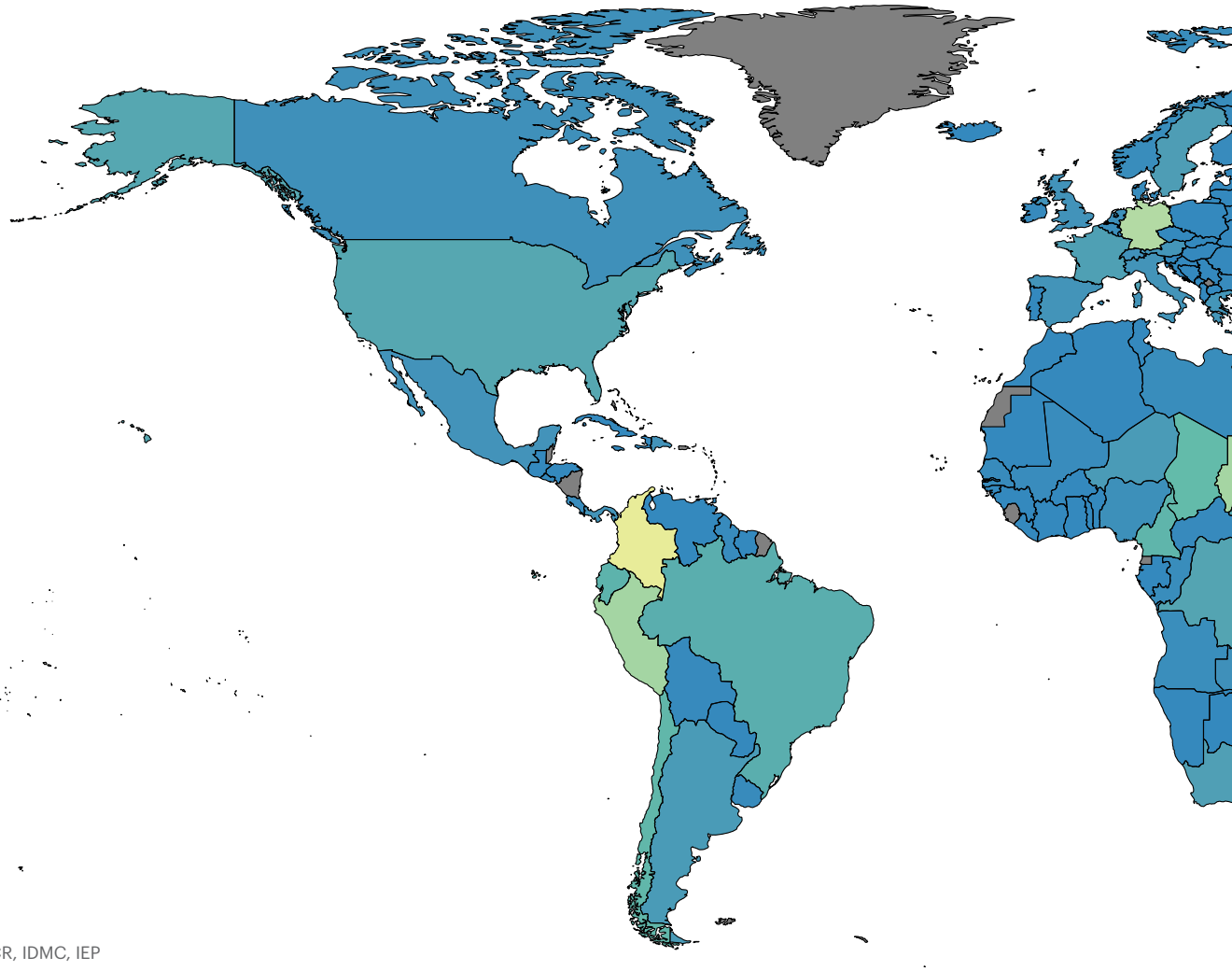
Country	Displaced Externally	Displaced Internally	Total Displaced
Syria	6,796,720	6,568,000	13,364,720
Afghanistan	2,833,565	4,664,000	7,497,565
Dem. Rep. of the Congo	985,799	5,332,000	6,317,799
Venezuela	4,878,573	-	4,878,573
Yemen	54,906	3,858,000	3,912,906
Somalia	868,365	2,968,000	3,836,365
South Sudan	2,193,678	1,542,000	3,735,678
Sudan	857,426	2,730,000	3,587,426
Nigeria	426,013	2,873,000	3,299,013
Ethiopia	276,402	2,693,000	2,969,402
Iraq	574,113	1,224,000	1,798,113
Central African Rep.	655,697	686,200	1,341,897
Cameroon	101,551	1,033,000	1,134,551
Pakistan	194,535	910,000	1,104,535
Bangladesh	83,608	772,000	855,608
Eritrea	594,884	-	594,884
Niger	22,977	524,000	546,977
Burundi	423,261	98,000	521,261
Chad	16,704	342,680	359,384
Congo	25,443	241,000	266,443
Haiti	106,927	41,900	148,827
Guinea	58,376	-	58,376
Mauritania	47,172	-	47,172
Zimbabwe	23,225	-	23,225
Angola	20,607	-	20,607
Tajikistan	4,683	-	4,683
Guinea-Bissau	4,301	-	4,301
Turkmenistan	1,100	-	1,100
North Korea	782	-	782
Equatorial Guinea	363	-	363
Total	**23,131,756**	**39,100,780**	**62,232,536**

Source: UNHCR, IDMC, IEP

FIGURE 4.13

Countries hosting the forcibly displaced from ETR hotspots, millions of people, 2020

Turkey, Colombia, Pakistan, Peru and Uganda are hosting the largest number of displacements from the ETR hotspots.



Source: UNHCR, IDMC, IEP

Figure 4.13 shows the host countries of forcibly displaced people from ETR hotspot countries in 2020. In 2020, 166 countries hosted 23.1 million people from the hotspot countries. In total, seven countries hosted over a million people each — Turkey, Colombia, Pakistan, Germany, Sudan, Peru and Uganda. Turkey, Colombia, Pakistan and Uganda housed the largest proportion, equivalent to 11.8 million people.

Figure 4.14 displays the percentage of total hotspot displacements by origin and destination region. At the conclusion of 2020, 35.8 per cent of the total displacements originated from MENA, followed by 29.2 per cent in sub-Saharan Africa and 21.1 per cent in South America. At 28.4 per cent of the total, Europe hosted the largest number of displacements from the hotspot countries, followed by sub-Saharan Africa at 24.1 per cent of the total.

In the next 30 years, there will be many more drivers of mass population displacement. More than two billion people globally face uncertain access to a sufficient quantity of food necessary for a healthy life. Another one billion people live in countries that do not have the current resilience to deal with the ecological changes they are expected to face in the future. Last year, 768 million people worldwide were undernourished due to severe food shortages.[28] In such circumstances, even small events could spiral into instability and violence, leading to mass population displacement and affect regional and global security.

National societal systems have different levels of capacity to respond to ecological threats and prevent mass and prolonged displacement. These national systems may be capable of absorbing adverse ecological threats with minimal disruption to their internal structures. This is due to the strong societal resilience mechanisms in the form of high levels of Positive Peace, making them better equipped for future threats.

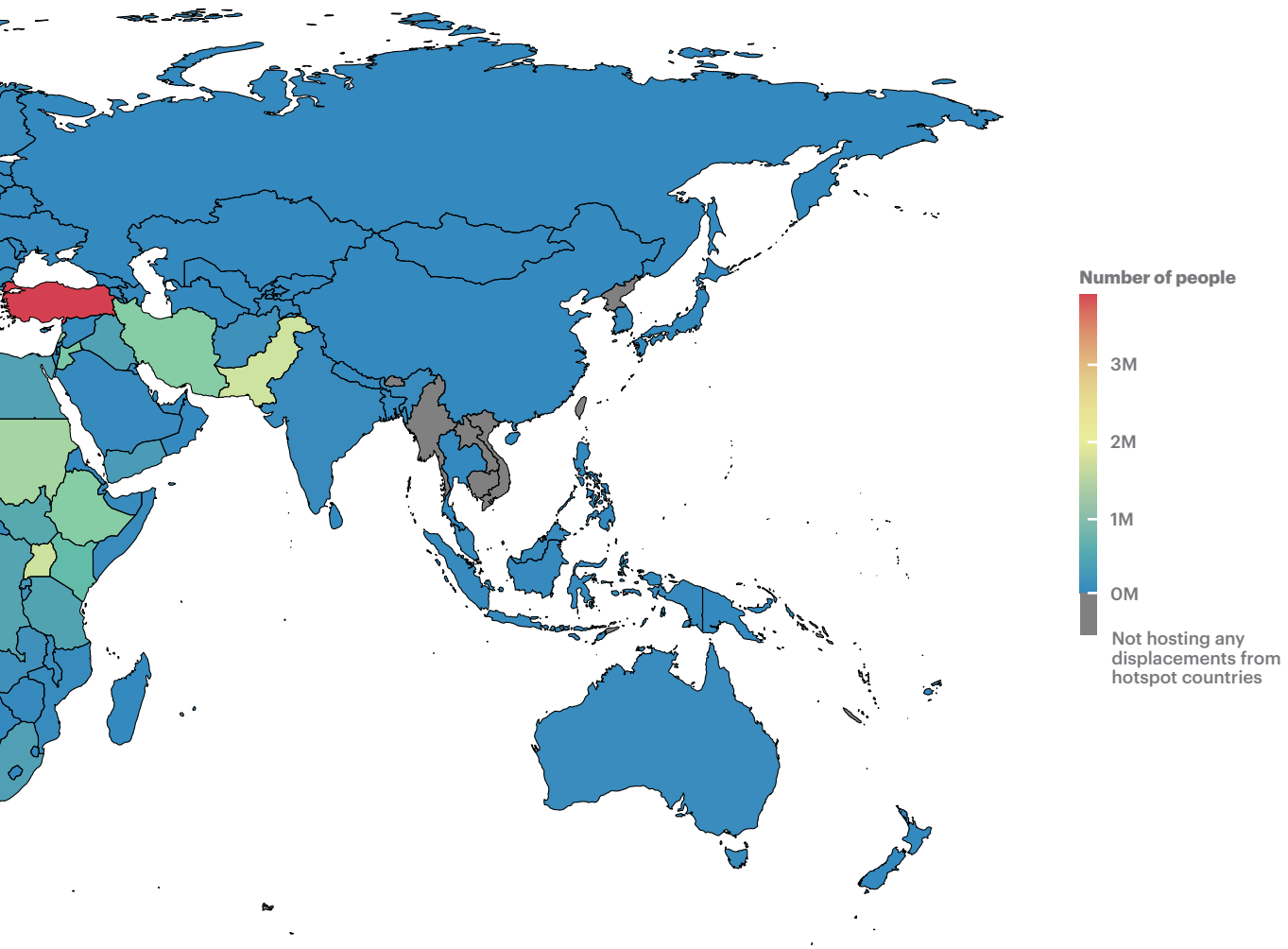
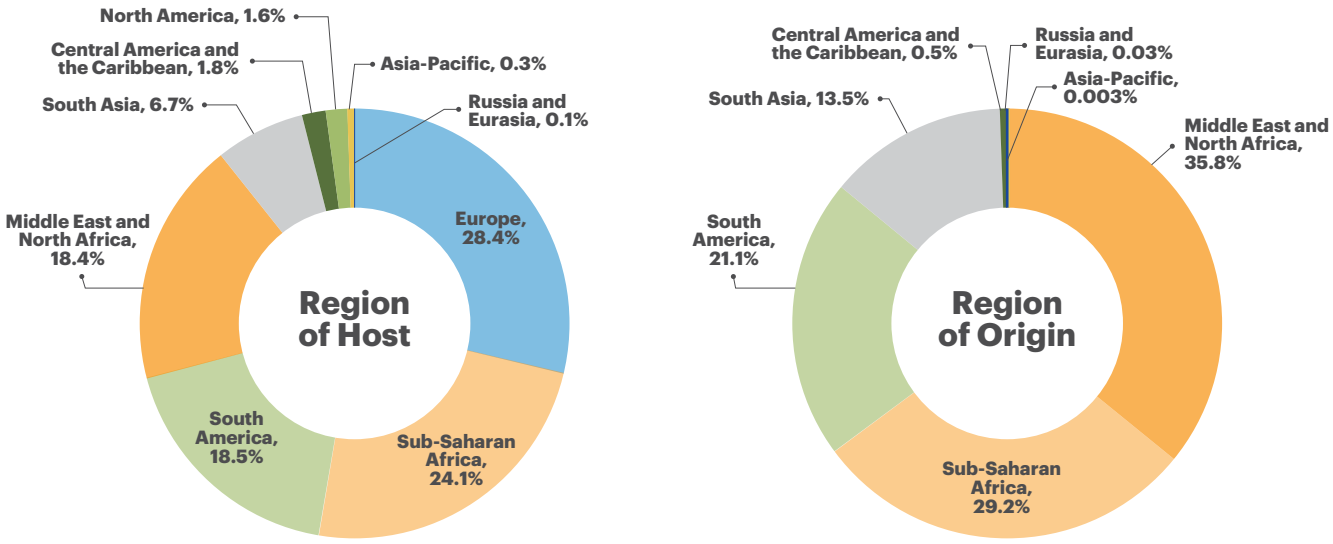


FIGURE 4.14

Regional distribution of displacements in hotspot countries, origin and destination, by region, 2020

The largest number of displacements from the hotspot countries originated from MENA and sub-Saharan Africa.



Source: UNHCR, IEP

5 Policy Recommendations

BACKGROUND

In 2020, IEP held a series of six policy seminars with 60 leading experts from governments, think tanks, military institutions and development organisations to explore policy options based on the 2020 Ecological Threat Report. The key contribution of that report was the identification and analysis of the vicious cycle that exists between violent conflict and resource degradation. Countries suffering the worst ecological degradation also tend to be some of the most violent.

This section combines the outcome of these policy seminars, the results of the 2021 Ecological Threat Report and IEP's work on Positive Peace to produce high-level policy recommendations for resilience-building programmes.

A recurring message from the policy seminars was that it is unlikely that the international community will reverse the vicious cycles in some parts of the world. This is especially the case in the Sahel and Horn of Africa, with its high levels of resource degradation, population growth and ongoing conflicts.

The Sahel and Horn of Africa region is home to 300 million people. It experiences some of the highest rates of resource degradation and population growth on the planet. It is also subject to multiple insurgencies, and has some of the fastest growing terrorist organisations globally, some of which have affiliations to the Islamic State. The number of conflicts and their intensity have been slowly increasing over the last decade. With tensions already escalating, it can only be expected that climate change will have an amplifying effect on many of these issues.

The recent fall of Afghanistan to the Taliban highlighted the inability of the major western democracies to implement a development agenda for the country. Brown University's Costs of War study says US federal expenditure on the war in Afghanistan was $2.261 trillion. This does not include expenditures of coalition forces or the American expenditures in neighbouring Pakistan. Based on the Brown University study, the per-capita cost of the war is more than 100 times the annual per-capita income of Afghanistan, and given the conservatism of the study, the real cost could have been much higher.

The Afghan example demonstrates that the template for development and resilience-building programs need to be revisited to develop a closer alignment to the needs of local communities.

Amplified by climate change, resource degradation is likely to increase the number and intensity of future conflicts. To avoid this scenario, holistic solutions have to be adopted. Solutions that foster effective governance create more harmonious societal systems, improve resource development and minimise the need for military force.

RECOMMENDATIONS

The following recommendations draw on the 2020 ETR Policy seminars, combined with the findings of the 2021 report. These have been summarised into main priority areas.

This section concludes with the presentation of successful projects which are cost effective, use low technology approaches and can be implemented by people with basic education. They also have a history of positive payback. Some are examples from IEP's sister organisation The Charitable Foundation (TCF), which has implemented over 220 developmental programs mainly in Africa and North East Asia.

INTERNATIONAL AGENCIES

Building Resilience. Resilience building is holistic, involving all aspects of a social system. Part of this approach is recognising the multilayered links between ecological change, sustainable development, human security and global action. Faced with such complexity, international agencies need to develop a common understanding on what resilience means.

However, arriving at a definition of resilience that is suitable for all situations is difficult, if not impossible, and any definition would likely be too general to be useable. Rather, definitions should be tailored to different situations, such as food insecurity, water stress, or low societal resilience, to name some. These definitions are important as they allow international organisations to measure empirically both risk and resilience, and determine the areas requiring the most attention.

Some examples of possible definitions are:

- Water resilience could be defined as the percentage of the population that has access to 20 litres of clean water every day.
- Food resilience could be expressed as the ability of 90 per cent of a nation's population having access to enough food to lead a healthy life.
- Societal resilience can be defined through frameworks such as IEP's Positive Peace framework.

Further, resilience is systemic and requires many factors to work in a mutually reinforcing way. For example, societal resilience can lead to water resilience, as social cohesion and effective governance reduce wastage and improve distribution. However, the converse is also true, water stress can lead to a depletion of societal resilience.

Although international agencies recognise the systemic nature of resilience, their operational structures make systemic actions difficult. New integrated structures can be developed that combine, health, food, water, refugee relief, finance, agricultural and business development and other functions. This would create an integrated agency that would be agile in specific contexts while also providing a simplified chain of command, better allocation of resources and faster decision making.

Different areas will have a different range of problems. By creating interdisciplinary agencies responsible for specific geographical areas and empowered to make decisions quickly and collaboratively, a clearer focus can be brought to be bear to the unique challenges faced.

Security and Development. It is important to recognise that the traditional security solutions based almost exclusively on intelligence and armed interventions are ineffective in addressing today's complex security threats. To be successful, intervention policies also need to build socio-economic resilience and reduce societal pressures. Examples of these may be family planning and education programmes to reduce population pressures, implementing more efficient water capture techniques, or improving community governance processes. Prioritisation should be given to states that are facing ecological threats that could lead to conflict, especially in highly populous nations, which may be the source of region-destabilising population displacements. Prioritisation should also be given to areas where *ongoing conflicts* are likely to further stress existing ecological resources, thereby leading to more unrest which could spill into the surrounding region.

Successful military and peacekeeping solutions have to be sensitive to the local context, taking into account the social and cultural structures within communities, including the existing tensions. They need to work within these dynamics, guided by the local structures and norms to ensure that they do not exacerbate tensions and indirectly contribute to violence.

Frameworks for migration. Today, there are many legal interpretations and decentralised legal frameworks that address the movement of people.

For the safe movement of people displaced or migrating due to ecological threats, consistent legal frameworks, policies and procedures need to be developed and adopted by international organisations. This is vital as over the next 30 years, hundreds of millions of people are at risk of displacement.

While people displacement is sometimes seen with reserve and apprehension, it is important to create a safe framework for such dislocations before they inevitably occur. Imposing barriers to movement only exacerbates the problem, adding a humanitarian component to what could have originally been just an ecological crisis. In addition to the intrinsic suffering, humanitarian emergencies can be breeding grounds for insurgent groups and terrorist organisations.

The establishment of safe migration practices and regulations should be viewed as a resilience building and conflict mitigation strategy. In the future, it will be crucial to facilitate safe and orderly migration in anticipation of ecological threats before populations are forcibly displaced.

It is equally important to strengthen mechanisms for national or internal migration, so that internal displacement can be anticipated and mitigated without requiring international migration.

Broaden the range of actors involved. Stronger multilateral cooperation with a wider group of actors is also required for interventions based on systems thinking to be successful.

In many cases, non-state actors form a large part of programme implementation. It is therefore important that proposed solutions should ensure their inclusion and input. For example, cities, which over the next 30 years are expected to host 70 per cent of the world's population, have relatively little access to the multilateral process. In fact, it is conceivable that, without the right actors being present, the multilateral system itself could hinder progress on ecological threat management. Businesses are also an important part of the solution. If solutions can be found that

generate profits, business and social incentives align allowing resilience building to become self-fulfilling.

FINANCE

The scope of the problem is beyond the budget capabilities of all the international agencies combined. Therefore, the most effective use of the available resources is imperative to maximize outcomes. Additionally, alternate sources of funding need to be found.

As existing institutional funding is predicted to decrease, there is an urgency to develop new funding approaches. These can include better local business engagement, wider use of carbon offset programs and improving coordination between NGO's to avoid duplicating programs.

As institutional funding decreases, it is clear that private sources need to be leveraged to reduce reliance on taxpayer resources. The sum of all national governments' income is 15 per cent of world GDP.[1] Only a small proportion of government income can be directed towards ecological adaptation and development. It is unrealistic to think that these issues will be solved by government and NGO funding alone.

Global pension funds manage $51 trillion in assets.[2] Through their equity and debt holdings, these funds are heavily exposed to the global private sector and the governments of many nation states. They have also been highly successful on behalf of their investors. Despite the global recession caused by the response to the COVID-19 pandemic, most pension funds in the OECD recorded a rate of return of at least 3 per cent above inflation in 2020.[3]

It is possible that widespread ecological shocks around the world could jeopardise this performance in the future. Companies and governments will have their valuations negatively impacted if the negative momentum of degradation and conflict in some parts of the world is not addressed. Conflicts, natural disasters and unwanted immigration flows can erode critical infrastructure and disrupt logistics around the world. Therefore, it is increasingly in the best interest of these funds to secure their future earnings with some form of ecological threat insurance.

This could entail the allocation of some of the total managed balances towards resilience-building projects in vulnerable areas. Business cases need to be developed to articulate the costs of such interventions and the impact on global equities if there was systemic collapse in some areas of the world.

The liabilities of pension funds are usually of very long duration, as most people save for thirty years or more before they retire and draw on their balances. Pension funds are usually moderately to heavily invested in government debt or corporate debt, public stock markets and asset-backed paper with implicit government guarantees. This means that the sector is already exposed to long-term economic growth risk.

If global pension funds were to allocate just one per cent of their assets to ecological threat resilience building programs, the investment would constitute around $500 billion. This is more than three times the OECD's annual allocation in official development assistance (ODA), and would go a long way towards averting more serious humanitarian crises and economic disruptions.[4]

In addition, a growing number of individual savers and investment agencies are dedicating resources to ethical and impact investments. These investors seek the opportunity to generate a positive societal impact with their asset allocations. Many of these are already engaged with humanitarian and ecological causes.

Many of the solutions to the ecological problems can generate income, such as the provision of water that can then be used to grow food. If business can clearly see how to garner a profitable return from ecologically positive investments, funds will naturally flow towards ecological solutions.

Large scale projects usually exclude small landholders. Small projects can work directly with local communities and improve their capacity to generate economic activity and repay the original investment. These can include economically viable small scale water capture, such as sand dams or large ponds, earthen dams or small scale value add manufacturing for agricultural products. Small projects that prove economically viable could be aggregated into cooperatives, providing capital and improving efficiency.

Funding is often only available for limited time. For this reason, the priority should be given to those projects that require less time to mature and whose returns can provide independent, internal funding. This galvanises local communities to continue financing their own development and frees up donor resources to be employed in new programmes.

Many of the development projects currently undertaken have limited sustainability due to the lack of a viable long-term self-funding program.

There is scope to improve the use of carbon offsets to empower local communities to manage ecological threats and reduce global greenhouse emissions. If the value from the carbon abatement programs can be directed to local communities, rather than to governments or NGOs, these communities will see the direct benefit of preservation and reforestation. One successful example is the use of chlorine pill dispensers to make dirty water potable that saves the firewood that would otherwise be used for boiling. Another success story is Farmer Managed Natural Regeneration (FMNR) techniques whereby pastoralists restore the local vegetation and reap the benefits of increased fodder for their herds.

EMPOWER COMMUNITIES

Empowering local communities. Community led approaches to development and human security lead to better programme design, easier implementation and more accurate evaluation. Local communities nearly always understand their needs and capabilities more comprehensively than outsiders. Although this is generally accepted, the true application of this philosophy remains limited at best. Funding should be prioritised towards the needs and realities of the local context, rather than the fulfilment of donor wishes.

Corruption and inefficiency decrease when the local community is empowered with resource management. This occurs because they are directly affected by any losses.

Develop community cooperatives. Due to the strong bonds within communities, cooperatives can work well. This provides a mechanism for the pooling of resources and the sharing of costs. Many examples exist, including shared water resources, seed and fertiliser banks and micro manufacturing plants.

Bottom-up interventions can work in tandem with programmes that begin at a higher entry point, such as a government or a multi-lateral organisation. However, avoiding one-approach-fits-all scenarios is critical for efficiency, local acceptance, and the long-term viability of the programmes.

Often donors have preconceived ideas of what should be the components of programmes. These may be related to values that should be implemented as part of the programme, or the application of sophisticated technology. In many cases these approaches, despite their merits, do not easily fit with the local customs or knowledge, thereby creating less efficient or unsustainable programs.

Local initiatives often reduce overall costs. Initiatives that are led by locals usually benefit from more accurate local knowledge, deeper awareness of local sensitivities and usually enjoy greater community buy-in. Thus, such initiatives tend to run more smoothly and at low research and implementation costs than others.

RETHINKING THE MILITARY AND THE DEVELOPMENT COMPONENTS IN THE SAHEL

Frequently in the countries of the Sahel, entire portions of territory escape the control of state authorities. This can provide the fertile ground for radicalization and violent extremism, especially in youth. Military interventions alone will not suffice to restore stability and address grievances in the Sahel. Leveraging the humanitarian-security-development nexus in the region is the only way to ensure a lasting peace.

About 15,000 soldiers are currently deployed in the Sahel. Since 2013, it has been one of the main theatre of operations for the French army and for the UN peacekeepers. The United Nations granted a budget of one billion dollars between June 2018 and June 2019 to perpetuate the action of the peacekeepers while waiting for the five G5 Sahel countries – Burkina Faso, Chad, Mali, Mauritania and Niger – to take over with their respective armed forces.

However, the G5 Sahel Joint Force is yet to become effective. These countries remain dependent on foreign aid.

The way in which security is conceptualised in the region places a strong emphasis on the training and equipment of local armed forces. However, recent failures to adequately equip and train local forces in Afghanistan, Iraq and Syria raise the question of why the Sahel would be any different. ***The role of the military is to ensure a safe and secure environment in which civilian activities can prosper***. Whilst military responses are effective in dealing with terrorism and violence, their coordination with humanitarian and development aid will improve the prospects of long-term successful military interventions.

The main focus of counterterrorism efforts should be on creating the conditions hospitable to socio-economic and environmental stability.

An improved approach would be the integration of military, humanitarian and developmental responses. Improving programs that involve societal dialogue, de-radicalization, and fiscal reforms in the region is a must.

Approaches based on Positive Peace focus on the root causes of the crisis, such as access to education, employment, agricultural development, health care and drinking water.

Success can be achieved by combining development and security. This will be the only way to achieve stability. Both aspects should be coordinated in the early planning stages of an intervention and should be supported by regular monitoring sessions that can enable the assessments of the various strategies in place.

POSITIVE PEACE

The theory of Positive Peace and the way it is conceptualised has already been covered in other sections of the report. This section focuses on two examples of how to implement Positive Peace at the national and community levels to build societal resilience and societal advancement.

Positive Peace is defined as the *attitudes, institutions and structures that create and sustain peaceful societies*, underscoring the basic conditions leading to social harmony and economic development. It is comprised of eight Pillars which can be further divided into at least 400 measurements of a country's high level performance. Through analysing these measures it is possible to determine the unique combination of strengths and weaknesses each context faces. This gives a clear indication of which of the Pillars are the strongest as well as a more granular understanding of the strengths and weaknesses.

Measurement is important to understand the societal dynamics. Also understanding the velocity of the system and its direction gives further insight – what factors are improving, stagnating or deteriorating gives insight into how a system is evolving. It is best analysed over a longer period of time and ten years is generally a good time frame. Analysing how the Pillars of Peace have changed over the past decade provides a strong evidence base for the development of focused and informed interventions.

Societies act as a system, and it is the dynamics of this system that have led to the 'on the ground' realities of today. Interventions should therefore attempt to understand the relationships and flows within the system in order to 'nudge' it toward desired outcomes. It is also critical to acknowledge that a national system does not exist on its own, but interfaces with many other national, supranational and subnational systems. Additionally, understanding the regional context is important. This can be done by measuring the Positive Peace of the neighbouring countries and how each has changed over time.

Once the system dynamics have been mapped, appropriate groups can be formed to propose the best actions to stimulate the system. Such groups should represent a culturally sensitive cross section of the people needed to instigate change. These people should also be knowledgeable on the context in which the changes need to be made. For, example if a desired outcome is better efficiency and community support within the police, then people from the criminal justice system need to be involved. This would include police, judges, correctional institutions, defence lawyers and some civil society organisations.

Positive Peace can also be applied in a community setting. This is usually best done as a community development project, rather than as a training exercise in peace. Examples could be water harvesting, improving literacy in a school or family planning.

The eight pillars of peace can provide a framework through which to assess project interventions. For example, the project could be to install a sand dam and then to irrigate 40 hectares to provide three crops per annum, rather than one. The Positive Peace framework is designed as a holistic set of lenses to view a system. In this case a micro-agricultural system. Therefore, because of the structure of the framework many considerations would naturally arise, including education, relations with individuals or neighbouring communities who are not getting water, corruption, sharing of the workload, marketing the produce, and the use of local labour.

The starting point is asking how each of the eight Pillars of Peace is addressed within the project. It is also important that the community decides on what the interventions should be for each of the Pillars.

Not only can the framework be used for the overall project, but also for components of the project. For example, if the sand dam project were to be part of a revolving fund, then the Positive Peace framework can be applied to determine how the fund would be structured and how the repayment mechanisms would work.

One of the other advantages of using the Positive Peace framework is it instils the concepts of peace into projects and provides training on what creates peaceful societies. This also imbues in the participants a better understanding of what they should expect from their governments as the principles for a well-run country are similar.

EXAMPLES OF INNOVATIVE DEVELOPMENT

There are many good examples of successful developmental programs, but often they are implemented in isolation. Although any one program on its own may be deemed a success, a better outcome can be achieved when a well-planned set of interventions developed from a systems perspective is implemented.

Programs will yield better outcomes if the successes of each are designed to underpin the success of the others. The resulting system of projects will yield results greater than the sum of each of the projects.

This section does not attempt to give a generalised holistic assessment of what is required for successful development. That will depend on the individual circumstances facing different societies.

The six examples below are chosen because of their applicability to the Sahel. For a successful fully systemic approach many other aspects would need to be considered, which could include security responses, governance initiatives and community engagement.

The projects chosen below would address ecological rehabilitation, improving water sources, managing population growth and building local industry. Some of these projects have been implemented by IEP's sister organisation The Charitable Foundation (TCF).

Farmer Managed Natural Regeneration (FMNR)

Farmer Managed Natural Regeneration (FMNR) is a low-cost land restoration technique developed by Tony Rinaudo from World Vision. Rinaudo pioneered FMNR in Niger during the 1983 famine, and is regarded as the leading expert in the technique worldwide.

In practice, FMNR involves the systematic regrowth and management of trees and shrubs from felled tree stumps, sprouting root systems or seeds. The regrown trees and shrubs help restore soil structure and fertility, inhibit erosion and soil moisture evaporation, rehabilitate springs and water tables, and increase biodiversity. Some tree species also impart nutrients such as nitrogen into the soil.

Since early 1990's Southern Niger has experienced perhaps the most rapid, farmer-managed re-greening in human history. Over five million hectares of mosaic have been restored through the regrowth of 'underground' trees.[5] Niger that is now greener than northern Nigeria – although it has less rainfall.

The success of the World Vision project in Humbo, Ethiopia has led to the Government of Ethiopia calling for a 15-million-hectare scale-up. The Global Ever Greening Alliance is now promoting the FMNR and related re-generation mechanisms across the Sahel and drylands in other parts of the world.

TCF is implementing a FMNR project among pastoralists in Longido in Northern Tanzania to complement the land use planning and pasture regeneration projects it has been running there.

SAND DAMS

Abstraction of water from sandy seasonal riverbeds is an ancient practice where natural dikes capture the water stored in the sand. Subsurface Dams and Sand dams are a man-made enhancement of the natural dikes, which if constructed carefully last for a very long time – 50 to 100 years.

FIGURE 5.1

A Sand Dam in Kenya

For the cost of $50,000, a Sand Dam can produce water to the value of $180,000.

A sand dam is a dam built in a seasonal dry riverbed onto bedrock or an impermeable layer. It is constructed across the river channel to block the subsurface flow of water through the sand. The upstream reservoir of such a dam can be composed of 40 per cent water when made up of coarse sand. The water can then be retrieved for multiple uses, including domestic, livestock and irrigation. The captured water also seeps into the banks of the river increasing the vegetation and biodiversity.

The cost to build one of these dams is approximately $50,000.

A very large sand dam can hold 71,000 cubic meters of water (71 million litres) which when amortised over 10 years will yield water for 29c per thousand litres.

Large dams, can yield 400 tonnes of produce. Based on World Health Organisation (WHO) estimates, this is enough for 2,790 people's fruit and vegetable requirements. A study done on sand dams in Kenya estimates the value of 400 tons of produce to be around 20 million shillings ($180,000).

The return on investment will vary depending on the crops and price of staples at the time. TCF has conducted a detailed feasibility study which is available publicly.[6]

In many locations of TCF projects, little or no agriculture was being undertaken before the installation of the sand dam. Subsequent agricultural activity has been central to uplifting the regions.

TCF has built 30 sand dams in Kenya and are exploring ways of scaling the benefits through establishing the business case for investing in the construction of more dams.

Development of Cooperatives & Small Businesses
Developing a Cooperative in Kangalumira to upgrade its value added processes and equipment to assist the farmers gain a higher income from their small scale farms and has developed into a revolving fund approach. The funds are leveraged into other cooperatives to develop value added products for their crops.

In Kangalumira, 28 farmer groups with a total of 3,250 farmers associated with the cooperative, were supported with training around pineapple growing and collective marketing. The cooperative was assisted with equipment in the form of solar driers to produce pineapple chips and juice. It also received wine processing equipment which allowed the members to add value through the cooperative to the pineapples, that had until then been exclusively sold fresh.

The cooperative and its member farmers paid 10 per cent of the equipment up front and paid back the remaining 90 per cent over three years at 2.5 per cent interest per month to a revolving fund established by CESA-Uganda.

The returned funding was then reinvested in a similar project in Nazigo, where a maize and rice mill and processing facility was established as a cooperative. This allowed 450 farmers and their families to realise higher profits from communally owned value addition facilities. They received training on the production and marketing of the produce, given ongoing management support and a loan towards the equipment. Farmers pay back the loan into the revolving fund.

A TCF project in Buusana will install a tomato processing unit. This will include a cooler and the ability to produce juice, puree, paste, ketchup/sauce, and canned whole products. The project will train 1,000 farmers in tomato processing (post harvesting storage, grading and packing) and construction of water harvesting technologies. The farmers will repay the money into the revolving fund.

Improving food yields in Kisii, Kenya
The absence of volcanic rejuvenation, cycles of weathering, erosion and leaching on the continent over the years have left soils in sub-Saharan Africa inherently low in nutrients. It has also resulted in wide diversity of soil types, differing dramatically in their ability to retain and supply nutrients to plants, hold or drain water, withstand erosion/ compaction or allow root penetration.

A project funded by TCF focuses on crop yields and implemented by One Acre Fund (OAF) in Kisii in Western Kenya. The model is simple and provides high quality seeds and fertilizer on credit along with high quality extension advice on planting, weeding and harvesting. After harvest the farmers are assisted to market their produce. With the realised yield and productivity increase, the farmers are able to repay the input and the training, while realising a higher profit than before. The seed and fertilizer bank is maintained by a cooperative.

One Acre Fund now serves more than a million farmers in the Sahel who all realise a higher profit.

Dispensers for Safe Water in Zomba, Malawi
This project was developed by Evidence Action to install chlorination dispensers at water collection points to make the water so safe that it reduces the need for boiling the water. This was then recognised as a carbon emission reduction program and monetised to help finance the maintenance of dispensers and refilling them with chlorine.

As such, they have succeeded in obtaining carbon credits. Evidence Action has now managed to secure carbon credits for its dispensers in Uganda, Kenya and for TCF funded dispensers in Malawi.

The aim is to expand the program to reach an additional one million people. While carbon credits provide an important revenue source, it has become clear this alone will not make the program self-sustaining. The revenue from the sale of 720,000 carbon credits accounted for 39 per cent of Dispensers for Safe Water's budget. Therefore, a service for fee approach covers the remaining costs of the project.

Family planning
The demographic development in Sub Saharan Africa means the region has one of the largest unmet need for family planning services. This is despite efforts and economic developments over the last decade that have succeeded in making family planning services more available than in the past.

MSI Reproductive Choices remain the premier organisation working to improve women and girls access to family planning services globally and in Sub-Saharan Africa in particular.[7] TCF at the moment is supporting MSI in East Timor.

MSI's comprehensive programmes work through the operation of family planning centres where women can access services. These centres also provide facilities to allow MSI to outreach to communities. They do this through education and with mobile midwives that visit clients at home, ensuring women and girls have access to discreet and flexible services.

MSI also works to strengthen government policies. With the public sector they build capacity and embed quality assurance mechanisms. This fosters national ownership of comprehensive sexual and reproductive healthcare.

MSI distribute their own brand of high quality and affordable condoms, contraceptive pills and other contraceptive products through pharmacies, community-based distributors and other private providers. They also partner with existing private health providers who can deliver high quality contraception and safe abortion services with MSI support.

6 Appendices

APPENDIX A

The Ecological Threat Report Methodology

The concept of the Ecological Threat Register (ETR) was developed to identify the overall level of ecological risk that countries face. Ecological threats included in the ETR are *water risk, food insecurity, natural disasters, temperature anomalies* and *rapid population growth*. The ETR is produced by the Institute for Economics and Peace, a global think tank dedicated to developing metrics to analyse peace and to quantify its economic benefits.

The ETR score is a composite index of five indicators combined into one overall score. Each indicator is given an equal weight representing the equal importance of each indicator to the overall aim of the measure, in the ETR score's case, ecological threats. Calculations are conducted at the subnational level for 178 countries. Over 2,500 subnational administrative units are included in the ETR.

Analysis from the ETR score allows for the identification of administrative units, countries and regions where ecological crises are more likely to occur. The ETR focuses on the impacts of resource scarcity and natural disaster threats on peacefulness as well as the role of resilience in limiting the impact of such shocks.

The five threats included in the ETR score can be clustered into two major domains: 'Resource Scarcity' and 'Natural Disasters and Temperature Change'. The Resource Scarcity domain highlights the vulnerability of countries and regions to increasing environmental stress. The Natural Disasters and Temperature Change domain indicates the likelihood of exposure to or vulnerability to the impacts of natural disasters.

The Indicators

The ETR comprises five indicators of ecological threats. All scores for each indicator are normalised on a scale of 1-5, whereby indicators are banded into five groupings ranging from very low threat to extremely high. The following is the five indicator's sources.

Natural Disaster and Temperature Change	Resource Scarcity
Weighted Disaster Score Geocoded Disasters (GDIS) Dataset, v1 (1960 – 2018) EM-DAT | The international Disasters Database Global Burden of Disease (GBD) — Mortality from exposure to forces of nature dataset	**Food Risk** Institute for Health Metrics and Evaluation; Global Under-5 Child Growth Failure Geospatial Estimates 2000-2019 Dataset GeoTIFF raster files for pixel-level estimates at the 5x5 km-level; Indicator used: Mean prevalence of stunting 2019 World Bank – Prevalence of stunting
Temperature Anomaly WorldClim — Average temperature (°C), 1970-2000 at 2.5 minutes. WorldClim — Average future temperature (°C), 2021-2040 at 2.5 minutes. General circulation model GFDL-ESM4 by the National Oceanic and Atmospheric Administration (NOAA). Estimate uses the Shared Socio-economic Pathway (SPP) 370	**Water Risk** World Resource Institute (WRI) – Water Risk Index **Rapid Population Growth** Global 1-km Downscaled Population Base Year and Projection Grids Based on the Shared Socioeconomic Pathway SSP2 (Middle of the road) for 2020 and 2050

METHODOLOGICAL NOTES

The ETR comprises five indicators of ecological threat. Each indicator is normalised on a scale of 1 to 5, where 1 represents a lower threat and 5 higher threat. Calculations are completed at the subnational administration unit one level using the GADM ADMIN1 version 3.6.

The Ecological Threat Report uses the scores to develop two measurements of ecological threat:

1. The overall ETR score,
2. The catastrophic threat score

The ETR Score

The ETR score presents a holistic view of the ecological threat facing countries using the five indicators. The ETR is a multi-indicator composite index of risk, which is calculated in two steps:

1. All indicators are normalised on a one to five scale, with a higher score representing a higher threat level. This calculation is conducted at the sub-national ADMIN1 level.
2. The overall ETR score is calculated as the average of the individual ecological threats. This is the sub-national administrative unit ETR score.

The average of the sub-national ETR scores aggregated to the country level represents the overall threat a country faces.

Catastrophic Threat Score

In reality, any one of the five threats could prove catastrophic to a country if they occurred to its full effect. The sub-national data allows the largest threat of the five indicators facing a country or sub-national area to be identified. The catastrophic threat is the highest scoring indicator facing each country. In other words, the catastrophic threat indicates the most severe threat faced by a country by examining each threat. A country's highest scoring indicator that is medium, high or extremely high threat it is considered to be the country's catastrophic threat. The assessment is made at the sub-national administrative unit but applied at the national level.

The catastrophic threat differs from the overall ETR score as the catastrophic threat score is calculated using the maximum score of any one indicator for a sub-national unit. In contrast, the overall score is calculated as the average of the five indicators. Note that these threats do not account for a country's capacity to address the threats. Nor is it suggesting that one threat is generally more threatening than another. Rather, the catastrophic threat score is the indicator with the highest score for each administration unit.

HOTSPOT IDENTIFICATION

National societal systems have different levels of capacity to respond to ecological threats. Many countries have strong societal resilience mechanisms in the form of high levels of Positive Peace and are better prepared for future threats. These national systems may be capable of absorbing adverse ecological threats with minimal disruption to their internal structures.

Conversely, many countries have low levels of resilience as gauged by the PPI. This suggests that even moderate shocks may engender disorderly re-arrangements in the structure of the economy and the fabric of society.

The ETR uses the PPI and the country catastrophic ETR score to identify countries where resilience is unlikely to be strong enough to adapt or cope with ecological threats. The 30 countries that combine the lowest PPI scores with catastrophic ETR scores of medium, high or extremely high are identified to be the hotspots.

APPENDIX B

The ETR Indicator Sources, Definitions & Scoring Criteria

The information below details the sources, definitions, and scoring criteria of the five indicators that form the Ecological Threat Report. All scores for each indicator are banded or normalised on a scale of 1-5, whereby qualitative indicators are banded into five groupings from very low to extremely high.

NATURAL DISASTER AND TEMPERATURE CHANGE INDICATORS

Weighted Disaster Score	
Indicator type	Quantitative
Data Sources	The Geocoded Disasters (GDIS) Dataset Centre for Research on the Epidemiology of Disasters' Emergency Events Database (EM-DAT) Global Burden of Disease (GBD)
Measurement period	2000 - 2018

Definition: The aggregate of the number of disasters from 2000 to 2018 weighted by the mortality over the same period.

Calculation: The mortality of disasters is calculated using the average of the total deaths from EM-DAT and the GBD mortality from disasters from 2000 to 2018. This is then divided by the population to calculate the mortality for each country per 100,000 over the period. The rate is then normalised and scaled 0 to 1 where 0 is the lowest mortality from disasters and one is the highest mortality from disasters globally.

The country level mortality scale is multiplied by the total number of disasters at the ADMIN1 level to calculate the sub-national administration unit's weighted disaster variable.

The weighted disaster variable is then normalised on a scale of 1 to 5 to determine the overall weighted disaster score indicator.

Scoring Bands:

indicators	1 (Very Low)	2 (Low)	3 (Medium)	4 (High)	5 (Extremely High)
Average Number of Disasters	2.7	6.8	7.8	8.9	20
Average Mortality per 100,000	1.9	2.7	4.8	7.2	24
Weighted Disaster variable	< 1.1	1.1 – 1.8	1.8 – 2.8	2.8 – 3.9	> 3.9

Note: The scoring bands provide an estimate of the calculation of the weighted score. Given the range of possible outcomes to calculate the overall weighted score the above table provides a reference point using the averages of the disaster frequency and mortality for each band. This is however a reference and it is possible for a country to have a number of disasters and a level of mortality that fall outside the same band and therefore their weighted disaster score may differ. For example, it is entirely possible that an administrative unit with eight disasters (medium band) but a mortality rate of 1.9 (very low) may receive an overall weighted score of low (the middle of the two bands). Given the range of combinations to calculate the score, the average

mortality rate and number of disasters is an indication of the calculation. A country with no mortality from disasters but a high number of disasters may receive a very low score.

Temperature Anomaly	
Indicator type	Quantitative
Data Sources	WorldClim
Measurement period	Average temperature from 1970-2000 and the 20 year predicted average from 2021-2040 in degrees Celsius.
Additional note	Future projections based on IPCC fifth assessment report. The future projections used are the shared economic pathway 370. This is considered the middle of the range of baseline outcomes produced by energy system models. The model used is GFDL-ESM4 developed by the National Oceanic and Atmospheric Administration (NOAA).

Definition: The difference between the 1970-2000 historic average temperature and the projected average temperature from 2021 to 2040 in degrees Celsius.

Calculation: The temperature data is available at the 2.5 minutes' spatial resolution level. The average ADMIN1 temperature is calculated for both the historic and projected temperatures. The difference between the future and the historic temperatures are calculated as the temperature anomaly. A positive value indicates that the projected temperature is higher than the 1970-2000 historic average temperature.

The temperature anomaly variable is then normalised on a scale of 1 to 5 to determine the overall temperature anomaly score indicator.

Scoring Bands:

indicators	1 (Very Low)	2 (Low)	3 (Medium)	4 (High)	5 (Extremely High)
Temperature Anomaly ((degrees C)	< 0.9	0.9 – 1.1	1.1 – 1.3	1.3 – 1.5	> 1.5

RESOURCE SCARCITY INDICATORS

Population Growth	
Indicator type	Quantitative
Data Sources	Gao, J. 2020. Global 1-km Downscaled Population Base Year and Projection Grids Based on the Shared Socioeconomic Pathways, Socioeconomic Data and Applications Center (SEDAC).
Measurement period	2020 and 2050
Additional note	Future projections based on IPCC fifth assessment report. The future projections used are the shared economic pathway 370. This is considered the middle of the range of baseline outcomes.

Definition: The percentage difference between the 2020 population and the 2050 population for each subnational administrative unit.

Calculation: The population data is available at the 2.5 minutes' spatial resolution level. The total population of each ADMIN1 is aggregated for both 2020 and 2050. The percentage difference between the future and the current population is calculated as the population growth variable. A positive value indicates that the projected population is higher than the current population.

The population growth variable is then normalised on a scale of 1 to 5 to determine the overall population growth score indicator.

Scoring Bands:

indicators	1 (Very Low)	2 (Low)	3 (Medium)	4 (High)	5 (Extremely High)
Population Growth	< 34%	34% – 47%	47% – 60%	60% – 74%	> 74%

Food Risk	
Indicator type	Quantitative
Data Sources	Institute for Health Metrics and Evaluation; Global Under-5 Child Growth Failure Geospatial Estimates 2000-2019 Dataset. UNICEF, World Health Organization (WHO), World Bank: Joint child malnutrition estimates.
Measurement period	2019
Additional note	GeoTIFF raster files for pixel-level estimates at the 5x5 km-level

Definition: Food risk is proxied by the prevalence of stunting.

The prevalence of stunting in children under five is the proportion of children with a height-for-age z-score that is more than two standard deviations below the World Health Organization's median growth reference standards for a healthy population.

Calculation: The estimate is the average prevalence of stunting at the ADMIN1 sub-national level. Where data was not available, values were imputed based on the average of a country's ADMIN1 prevalence of stunting. If values are still missing, the World Bank country estimates are used.

The prevalence of stunting is then normalised on a scale of 1 to 5 to determine the overall food risk indicator.

Scoring Bands:

indicators	1 (Very Low)	2 (Low)	3 (Medium)	4 (High)	5 (Extremely High)
Prevalence of Stunting	< 17%	17% – 23%	23% – 29%	29% – 35%	> 35%

Water Risk	
Indicator type	Quantitative
Data Sources	World Resources Institute (WRI)
Measurement period	Current Baseline Estimate

Definition: Overall water risk measures all water-related risks, by aggregating all selected indicators from the Physical Quantity, Quality and Regulatory & Reputational Risk categories.

Physical risks quantity measures risk related to too little or too much water, by aggregating all selected indicators from the Physical Risk Quantity category.

Physical risks quality measures risk related to water that is unfit for use, by aggregating all selected indicators from the Physical Risk Quality category.

Regulatory and reputational risks measures risk related to uncertainty in regulatory change, as well as conflicts with the public regarding water issues.

Calculation: The overall water risk is calculated as the average water risk score at the subnational administrative unit level. The Admin1 water risk average is then normalised on a scale of 1 to 5 to determine the overall water risk score indicator.

Scoring Bands:

Indicators	1	2	3	4	5
	(Very Low)	(Low)	(Medium)	(High)	(Extremely High)
Water Risk Score ADMIN1 Average	< 1.25	1.25 – 1.75	1.75 – 2.25	2.25 – 3	> 3

Note: GIS software is used to calculate the coordinates of each value. This is then averaged at the ADMIN1 level. Therefore, the national values may differ from WRI.

APPENDIX C

ETR Rank, Domain and Indicator Scores

Country	ETR Rank	ETR Score	Catastrophic Score	Resource Scarcity Score	Natural Disasters and Temperature Change Score	Rapid Population Growth Score	Water Risk Score	Food Risk Score	Natural Disasters Score	Temperature Anomaly Score
Afghanistan	178	5	5	5	5	5	5	5	5	5
Niger	177	5	5	5	4	5	5	5	5	4
Madagascar	176	5	5	5	5	4	4	5	5	2
Malawi	175	5	5	5	3	5	5	5	3	4
Rwanda	174	5	5	5	4	4	5	5	4	4
Burundi	173	5	5	5	3	3	5	5	3	3
Guatemala	172	5	5	5	5	2	5	5	5	3
Mozambique	171	5	5	5	5	3	5	5	5	3
Pakistan	170	5	5	4	5	1	4	5	5	3
Angola	169	5	5	5	4	5	3	5	3	5
Yemen	168	5	5	5	2	5	5	5	1	2
Nepal	167	5	5	4	5	2	5	5	5	2
Philippines	166	5	5	4	5	2	5	5	5	2
Burkina Faso	165	4	5	5	2	5	5	5	1	4
Somalia	164	4	5	4	5	2	5	4	5	2
Bangladesh	163	4	5	4	5	1	5	5	5	1
Uganda	162	4	5	5	2	5	5	5	1	4
Tajikistan	161	4	5	4	5	1	5	4	5	5
Zimbabwe	160	4	5	3	5	1	5	5	5	5
El Salvador	159	4	5	3	5	1	5	3	5	3
Haiti	158	4	5	3	5	1	5	4	5	2
Israel	157	4	5	5	2	4	5	5	1	4
Nigeria	156	4	5	5	2	5	5	5	1	3
Zambia	155	4	5	5	2	5	4	5	1	4
Benin	154	4	5	5	1	4	5	5	1	3
Mali	153	4	5	5	3	5	5	5	2	4
Eritrea	152	4	5	5	1	4	5	5	1	2
Djibouti	151	4	5	4	3	1	5	5	5	1
Honduras	150	4	5	4	5	1	5	5	5	3
Tanzania	149	4	5	5	1	5	5	5	1	2
Chad	148	4	5	5	2	5	5	5	1	3
Kenya	147	4	5	5	3	3	5	5	3	2
Sudan	146	4	5	5	3	3	5	5	3	2
Myanmar	145	4	5	3	5	1	5	5	5	2
India	144	4	5	4	4	1	5	5	5	1
Saudi Arabia	143	4	5	5	3	3	4	5	1	5
Ethiopia	142	4	5	5	2	3	5	5	3	2
Qatar	141	4	5	5	2	3	5	5	1	4
United Arab Emirates	140	4	5	5	2	3	5	5	1	4
Indonesia	139	4	5	3	5	1	4	5	5	2
Bolivia	138	4	5	2	5	1	2	4	5	4
Mauritania	137	4	5	4	3	3	5	3	2	5
Moldova	136	4	5	4	2	5	5	1	1	5
Liberia	135	4	5	5	1	5	4	5	1	3
Iraq	134	4	5	4	3	4	5	3	1	5

Country	ETR Rank	ETR Score	Catastrophic Score	Resource Scarcity Score	Natural Disasters and Temperature Change Score	Rapid Population Growth Score	Water Risk Score	Food Risk Score	Natural Disasters Score	Temperature Anomaly Score
Cambodia	133	4	5	4	2	1	5	5	3	2
Namibia	132	4	5	3	4	1	5	4	3	5
Iran	131	3	5	2	5	1	5	1	5	5
Lesotho	130	3	5	4	2	1	5	5	1	3
Gambia	129	3	5	5	2	3	5	4	1	3
Syria	128	3	5	4	2	2	5	4	1	5
Timor-Leste	127	3	5	5	1	3	5	5	1	1
Laos	126	3	5	4	2	1	4	5	2	2
Armenia	125	3	5	3	3	4	5	1	1	5
Senegal	124	3	5	4	2	3	5	3	1	3
Eswatini	123	3	5	4	3	1	5	4	2	3
Romania	122	3	5	3	4	3	5	1	2	5
Vanuatu	121	3	5	4	2	2	5	4	4	1
Sierra Leone	120	3	5	4	2	3	3	5	1	3
Ecuador	119	3	5	3	3	1	4	5	3	3
Papua New Guinea	118	3	5	4	2	2	4	5	2	2
Jordan	117	3	5	4	2	4	5	1	1	5
Democratic Republic of the Congo	116	3	5	4	2	5	2	5	1	3
Solomon Islands	115	3	5	4	3	3	3	5	4	1
Sri Lanka	114	3	5	2	4	1	5	2	5	1
Georgia	113	3	5	3	3	5	5	1	1	5
Japan	112	3	5	1	5	3	1	1	5	3
Botswana	111	3	5	4	2	1	5	5	1	5
Peru	110	3	5	2	5	1	3	4	5	4
Vietnam	109	3	5	3	3	1	5	5	4	2
China	108	3	5	2	5	1	3	1	5	2
Dominican Republic	107	3	5	3	4	1	5	1	5	2
Turkey	106	3	5	3	3	1	4	4	1	5
Guinea-Bissau	105	3	5	4	1	2	5	5	1	3
Algeria	104	3	5	3	4	1	5	2	2	5
Fiji	103	3	5	2	4	1	1	5	5	1
Comoros	102	3	5	4	2	3	4	5	2	1
Togo	101	3	5	4	1	2	5	4	1	3
Ukraine	100	3	5	3	3	2	3	3	1	5
Kuwait	99	3	5	3	2	4	5	1	1	5
Albania	98	3	5	2	4	1	5	1	3	5
Mauritius	97	3	5	5	1	1	5	5	1	1
Ghana	96	3	5	4	2	3	5	3	1	2
Morocco	95	3	5	3	3	1	5	2	2	5
Nicaragua	94	3	5	2	4	1	5	2	4	3
South Sudan	93	3	5	4	2	3	3	5	1	2
Mongolia	92	3	4	2	4	1	3	2	3	4
Equatorial Guinea	91	3	5	4	1	4	5	4	1	2
Lebanon	90	3	5	3	2	1	5	2	1	4
Central African Republic	89	3	5	4	1	2	3	5	1	3
Thailand	88	3	5	2	4	1	4	2	5	2

Country	ETR Rank	ETR Score	Catastrophic Score	Resource Scarcity Score	Natural Disasters and Temperature Change Score	Rapid Population Growth Score	Water Risk Score	Food Risk Score	Natural Disasters Score	Temperature Anomaly Score
Guinea	87	3	5	4	1	1	4	5	1	3
North Korea	86	3	5	2	4	1	4	2	5	3
Cameroon	85	3	5	4	1	2	3	5	1	3
South Africa	84	3	4	3	3	1	4	4	2	3
Bulgaria	83	3	5	2	4	2	4	1	2	5
Kyrgyzstan	82	3	5	2	3	1	5	2	2	4
Bhutan	81	2	5	3	1	1	5	4	1	3
Samoa	80	2	5	3	1	1	5	1	1	1
Côte d'Ivoire	79	2	5	3	1	2	4	5	1	3
Bosnia and Herzegovina	78	2	5	1	4	1	2	1	4	5
Uzbekistan	77	2	5	3	2	1	5	3	1	5
Bahamas	76	2	4	2	3	1	4	3	4	2
Republic of Congo	75	2	3	3	1	3	3	3	1	3
Taiwan	74	2	5	1	4	1	2	1	5	2
Kosovo	73	2	5	2	3	1	4	3	1	5
Panama	72	2	3	2	3	1	3	3	3	2
Egypt	71	2	5	3	2	1	5	2	1	5
Libya	70	2	5	3	2	1	4	3	1	5
Mexico	69	2	4	2	3	1	4	1	3	3
Colombia	68	2	5	1	4	1	2	2	5	3
Belize	67	2	3	2	3	1	3	2	3	3
Lithuania	66	2	5	2	3	3	3	1	1	5
United States	65	2	5	1	5	1	1	1	5	3
Italy	64	2	5	1	4	1	4	1	3	5
Oman	63	2	5	3	1	2	5	1	1	3
Russia	62	2	5	1	4	1	1	2	1	5
Macedonia	61	2	5	2	3	1	5	1	1	5
Palestina	60	2	5	2	2	1	5	1	1	4
Azerbaijan	59	2	5	2	3	1	5	1	1	5
Venezuela	58	2	3	2	2	1	3	3	1	3
Cuba	57	2	4	2	2	2	4	1	2	2
Tunisia	56	2	5	2	2	1	5	1	1	5
Costa Rica	55	2	5	1	4	1	2	1	5	3
Cyprus	54	2	5	2	2	1	5	1	1	3
Latvia	53	2	5	1	3	3	2	1	1	5
Greece	52	2	5	1	3	1	3	1	2	5
Belarus	51	2	5	1	4	2	1	1	1	5
Malaysia	50	2	2	2	2	1	2	2	2	2
Northern Cyprus	49	2	5	2	1	1	5	1	1	4
Guyana	48	2	3	2	2	1	2	3	1	3
Gabon	47	2	4	3	1	1	4	3	1	3
Kazakhstan	46	2	5	1	3	1	1	2	1	5
Serbia	45	2	5	1	3	1	4	1	1	5
Estonia	44	2	5	1	3	3	2	1	1	5
South Korea	43	2	3	1	3	2	2	1	3	3
Turkmenistan	42	2	5	1	2	1	2	1	1	5
Poland	41	2	5	1	3	1	1	1	2	5
Brazil	40	2	3	1	3	1	2	1	2	3
Montenegro	39	2	5	1	3	1	2	1	1	5
Jamaica	38	2	3	1	2	1	3	1	3	2

Country	ETR Rank	ETR Score	Catastrophic Score	Resource Scarcity Score	Natural Disasters and Temperature Change Score	Rapid Population Growth Score	Water Risk Score	Food Risk Score	Natural Disasters Score	Temperature Anomaly Score
Western Sahara	37	2	4	2	2	1	3	2	1	4
Austria	36	2	5	1	4	1	1	1	3	5
Brunei	35	1	3	2	1	1	3	2	1	2
Paraguay	34	1	3	1	2	1	2	1	2	3
French Guiana	33	1	4	1	1	2	1	2	1	4
Luxembourg	32	1	4	1	2	2	2	1	1	4
Suriname	31	1	4	1	1	1	4	1	1	3
Chile	30	1	4	1	3	1	2	1	4	2
Hungary	29	1	5	1	2	1	1	1	1	5
Portugal	28	1	3	1	2	1	3	1	1	3
Switzerland	27	1	5	1	4	1	1	1	1	5
Saint Vincent and the Grenadines	26	1	2	1	1	1	2	2	1	1
France	25	1	4	1	3	1	1	1	2	4
Slovenia	24	1	5	1	3	1	1	1	1	5
Australia	23	1	3	1	2	2	1	1	2	3
Canada	22	1	5	1	3	1	1	1	1	5
Croatia	21	1	5	1	2	1	1	1	1	5
Spain	20	1	4	1	2	1	3	1	1	4
Slovakia	19	1	5	1	3	1	1	1	1	5
Czech Republic	18	1	5	1	3	1	2	1	1	5
Belgium	17	1	4	1	2	1	3	1	1	4
Trinidad and Tobago	16	1	3	1	1	1	3	1	1	2
Germany	15	1	4	1	2	1	1	1	1	4
New Zealand	14	1	2	1	1	1	1	1	2	1
Argentina	13	1	1	1	1	1	1	1	1	1
Denmark	12	1	4	1	1	1	2	1	1	4
Åland Islands	11	1	5	1	2	1	1	1	1	5
Hong Kong	10	1	2	1	1	1	2	1	1	1
Sweden	9	1	4	1	2	1	1	1	1	4
Uruguay	8	1	1	1	1	1	1	1	1	1
Finland	7	1	5	1	2	1	1	1	1	5
Netherlands	6	1	3	1	1	1	1	1	1	3
Norway	5	1	3	1	1	1	1	1	1	3
United Kingdom	4	1	1	1	1	1	1	1	1	1
Ireland	3	1	1	1	1	1	1	1	1	1
Singapore	2	1	2	1	1	1	1	1	1	2
Iceland	1	1	1	1	1	1	1	1	1	1

Source: IEP

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SECTION 1: RESULTS

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29 Given this is a weighted score, there is multiple combinations of the number of disasters and mortality rate. On average a country with 9 disasters and a historical mortality rate of 7.2 deaths per 100,000 will receive a high threat score. However, a country with many more disasters but with less mortality may also receive a high threat score. See methodology for more details.
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24 While the FAO has national food security figures for all very high-peace countries, it lacks figures for five of the 44 high-peace countries. To calculate the global totals, the average high-peace country food insecurity rate of 19 per cent was applied to these five countries, which were then applied to those countries' population totals.

25 In the figures in this section, low-peace and very low-peace countries have been grouped together under the broad category of "low peace", while high-peace and very high-peace countries have been grouped together under the broad category of "high peace".

26 FAO estimates only.

27 It should be noted the list of countries facing widespread food insecurity likely includes several countries not included in the table, as food insecurity figures are not available for all countries. For example, there were eight countries with extreme undernourishment rates in 2020 – Haiti, Yemen, Madagascar, North Korea, Iraq, Rwanda, Chad and Venezuela – for which food insecurity statistics were unavailable.

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Sahel

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