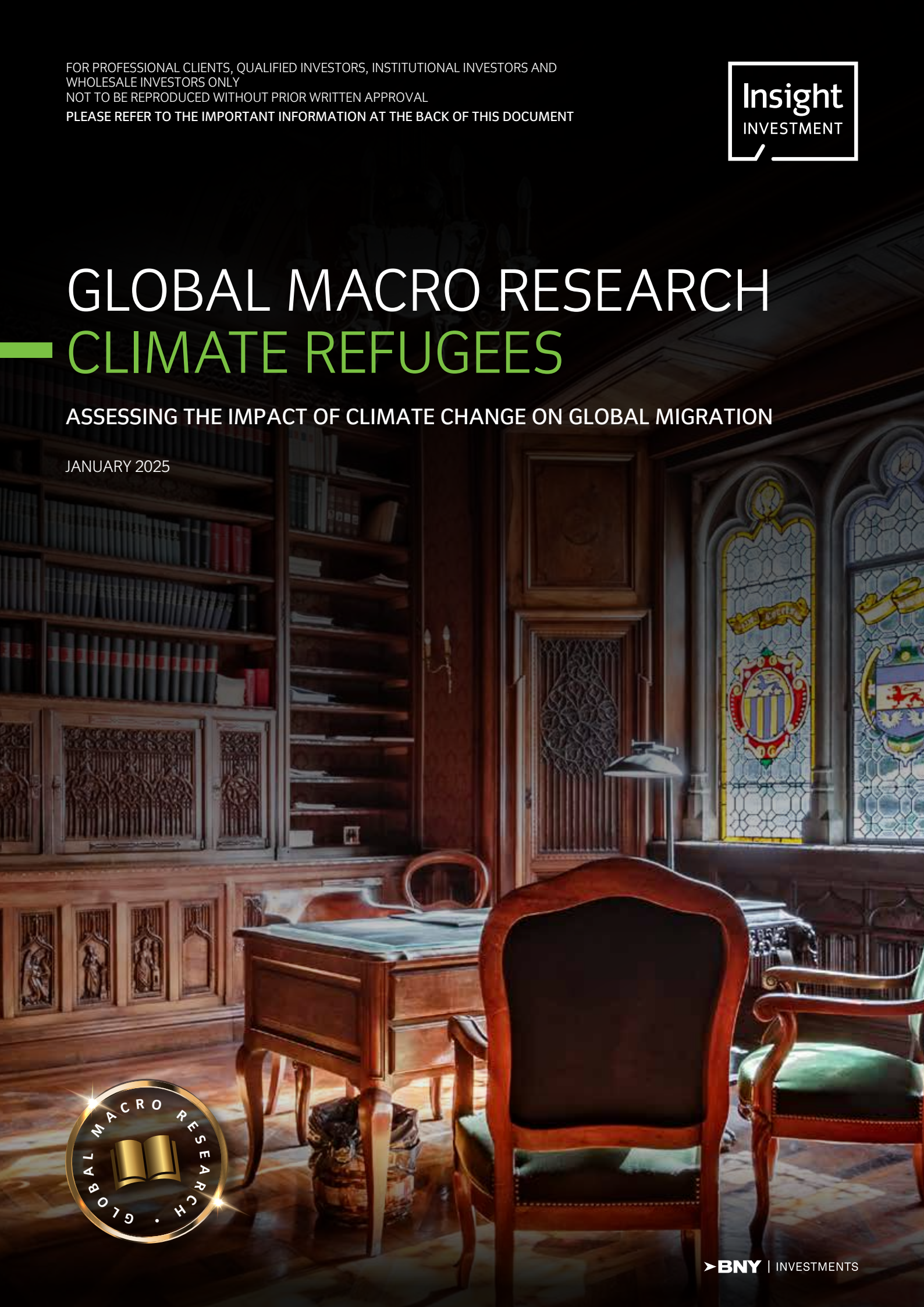
Insight INVESTMENT

# GLOBAL MACRO RESEARCH
# CLIMATE REFUGEES

## ASSESSING THE IMPACT OF CLIMATE CHANGE ON GLOBAL MIGRATION

JANUARY 2025

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> All scenarios are wrong, but some are useful.

A useful reference point for the use of climate risk scenarios within financial decisions is a paper authored by Moritz Baer, Matteo Gasparini, Ryan Lancaster, and Nicola Ranger, a link to which can be found here.

In this paper the authors argue that climate change is different to other traditional risks in that the past is not a guide to the future, and the transition to more extreme climate events is unprecedented and therefore difficult to predict. At the same time, major climate scenarios are not built for financial scenario analysis but to inform climate policy – they do not seek to stress test, but simply explore potential implications. This has created a disconnect between commonly used climate scenarios and what is required by financial institutions to make informed risk management decisions as these scenarios may understate vulnerabilities and tail risks.

# EXECUTIVE SUMMARY

In this paper we seek to understand how global migration could be impacted by climate change in the event of a pessimistic scenario for temperature change. This included the expected catalysts for climate migration, where these migrants are likely to go, and the potential impact of larger numbers of international migrants. We focus on the period up to 2050, utilising data from international agencies such as the UN and World Bank. 2050 is at the longer end of most investors' time horizons and captures the maturity of many of the bonds in issuance today.

As outlined in the paper "all scenarios are wrong, but some are useful", for stress tests and financial risk purposes, it is useful to use scenarios that sit further in the tail of probability distributions rather than central scenarios. There is a growing risk that the world ends up in one of these more pessimistic scenarios, so using them provides us with a prudent outlook for the purpose of assessing financial market and economic risks. Our analysis suggests that by 2050:

- 211 million people displaced as a result of climate change
- That although the majority of displaced people will remain in their countries of origin, 65 million could become international climate refugees
- Developed countries could need to plan for 27 million climate refugees (both from internal and international sources)

It is notable that these trends would be expected to intensify after 2050, with an accelerating rise in sea levels between 2050 and 2100 adding to the world's problems.

- Assuming that international climate migrants follow well-established migrant corridors, many will head to very high, or high, income countries. Countries such as the US, Saudi Arabia, France, the UK and Germany have large existing migrant communities, and high relative wealth makes them attractive for those that have the resources to reach them. Our analysis of the data suggests that these numbers could be significant.
- In France the UN median net migration projection is for an additional 2.7m migrants by 2050, but our analysis suggests that climate migration could add a further 3m migrants to that number. The UK could see 2.2m additional climate migrants above current UN projections of 7.4m, while the US could see an additional 7.7m above current projections of 33.3m. Perhaps surprisingly, there may also continue to be significant inflows into the wealthy Arab Gulf states from South and South-East Asia as well as other parts of the Middle East and North Africa. These migration patterns would have a significant impact on infrastructure requirements and are likely outside current government plans of most countries.
- While well-planned migration can help economies deal with demographic deficits, perceptions of migration appear to be changing, with surveys suggesting that reducing migration is now of increasing importance to voters in both Europe and the US. This is occurring even before climate migration has a meaningful impact on international migration.

This analysis will help us to challenge our future investment decisions. Some countries will face a significant fiscal strain either from mitigating climate-change effects or from dealing with displaced people. However, it also introduces potential for longer-term boosts to GDP, productivity, and tax revenues if countries can craft effective integration policies and welcome migrants into the labour force to fill demographic deficits.

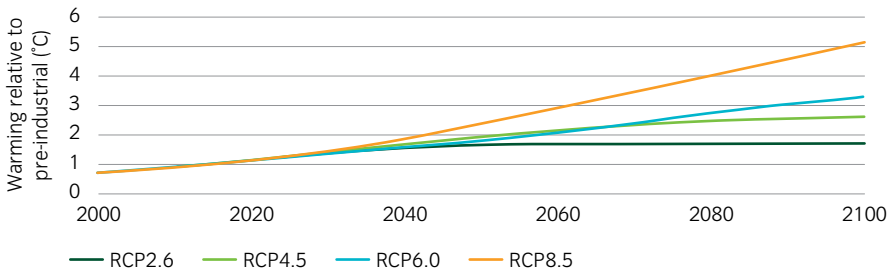
# ASSESSING THE MAJOR IMPACTS OF CLIMATE CHANGE

To understand the potential impact of climate change on migration we must first understand the ways in which climate change will impact areas of human population. To do this we have used a variety of 'Representative Concentration Pathways' (RCPs), which have been adopted by the Intergovernmental Panel on Climate Change (IPCC) to represent the potential future scenarios.

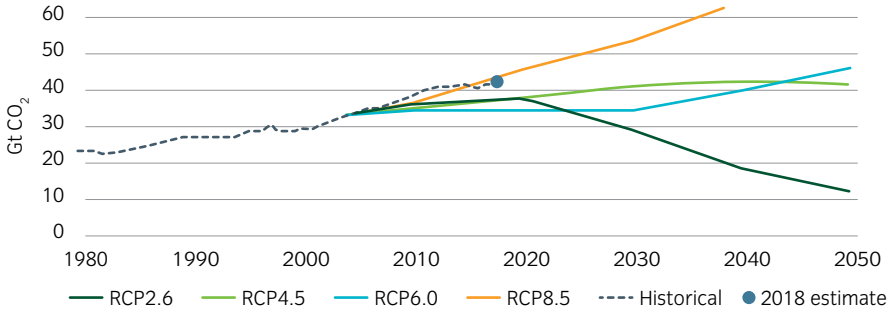
In this paper we are generally using RCP 6 and RCP 8.5, scenarios in which global temperatures rise significantly by 2100, as can be seen in Figure 1. These are pessimistic scenarios relative to the low warming scenarios that would occur if Net Zero is achieved, but their risk is growing. Historical data on $CO_2$ levels suggests much work is still needed to avoid a pessimistic outlook, and this makes the use of pessimistic scenarios highly relevant for the purpose of assessing financial market and economic risks.

Figure 1: Climate scenarios and why it may be prudent to be pessimistic[1]

Temperature projections for RCPs




Total $Co_2$ emissions and projected RCPs




We take this analysis to 2050 as we believe this captures a significant proportion of bonds in issuance today, but it is notable that all of these scenarios are expected to continue to worsen beyond 2050. A similar pattern can be seen for each of the factors we outline in this section, but with the impact from sea level rises experiencing the most pronounced acceleration after 2050.

[1] Source: (upper chart) https://www.migrationdataportal.org/climate-mobility-impacts, (Lower chart) https://www.carbonbrief.org/explainer-the-high-emissions-rcp8-5-global-warming-scenario/

## 1. HEATWAVES

Large areas of the world are expected to experience prolonged temperatures above 40°C by 2050. Such extreme heat can act as a headwind for growth if parts of the economy have to be shut down during the most extreme periods; it could also be expected to put many people's lives in danger. The focus here is 'wet-bulb temperature': the lowest temperature at which water can evaporate and cool a surface. When the combination of heat and humidity means the wet-bulb temperature rises so that perspiration no longer cools the body, this can put people's lives at risk. While theoretically heatwaves will be an effect of climate change that affects the largest number of people, wealthier countries and wealthy people in poorer countries may be able to mitigate this with air conditioning.

**Most impacted:** Africa and South America are some of the most impacted in terms of land area. But the picture looks somewhat different when looking at population, with Bangladesh, India, Nigeria, and Thailand severely impacted. A 2023 study[2] found that during more extreme heatwaves that occur roughly every five years in India and Bangladesh, the temperature was already around 2°C higher. Extreme heatwaves are likely to become 10 times as likely in Thailand in a world where global temperatures rise by 2°C from pre-industrial times.

## 2. WATER SCARCITY AND DROUGHT

As average temperatures rise in certain areas of the world, surface water evaporates more quickly and the soil will gradually dry out, making it harder for vegetation to grow and in extreme cases leading to desertification. This exacerbates the impact of low precipitation periods as water levels decline and are unable to fully recover, causing droughts to become more frequent and extreme. Droughts can be managed by water rationing and improved water efficiency and storage infrastructure, insulating wealthier countries to a degree. However, the secondary impact of droughts can be extensive, creating food instability, damaging transportation infrastructure and reducing hydroelectric power.


Read more about the growing risks of access to water

**Most impacted:** Analysis from the World Resources Institute shows that the Middle East and North Africa are the two most water-stressed regions today, with 83% of the population exposed to extremely high levels of water stress[3]. This is expected to rise to 100% by 2050, with an additional one billion people globally having to live with extremely high water stress by that date, even if the world succeeds in limiting the global temperate rise to between 1.3°C and 2.4°C.

[2] Extreme humid heat in South Asia in April 2023, largely driven by climate change, detrimental to vulnerable and disadvantaged communities, 17 May 2023, World Weather Attribution.
[3] 25 Countries, Housing One-quarter of the Population, Face Extremely High Water Stress, 16 August 2023, World Resources Institute.

## 3. WILDFIRES

Unplanned fires in forests and grassland tend to be more prevalent in areas impacted by hot, dry conditions as these conditions increase the potential for fires to start and then spread. Higher temperatures dry out vegetation, making them more susceptible to fire, while a lack of precipitation prolongs the length of time fires persist and increases the amount of damage they cause. Beyond damaging property, wildfires have a health impact as a result of inhaled smoke and lead to contamination of both land and water supplies. The UN Environment Programme (UNEP) has warned that the number of extreme wildfires could increase by up to 30% by 2050[4].

**Most impacted:** In terms of population impact, China and India are notably vulnerable to wildfires, but North American and European countries are also at risk, including the UK. The UK Health Security Agency included a chapter on wildfires in its 2023 Health Effects of Climate Change Report[5], noting that "Projections from the Met Office show that a 2°C increase in global temperatures will double the days in the UK with very high fire danger and extend the wildfire season into late summer and autumn. It is likely that this will mean more severe and larger wildfires, many in areas that are not used to having them". In 2024, both Canada and Greece have experienced particularly intense wildfire seasons. An out-of-control wildfire in Jasper National Park, Canada escalated to become the largest fire the area has seen in 100 years, destroying a significant part of the town. In Greece, the hottest June and July on record saw wildfires spread to the suburbs of Athens.

## 4. RIVER FLOOD

For every 1°C rise in the atmospheric temperature, the amount of water that can be held in the atmosphere rises by around 7%[6]. This exacerbates periods of intense rainfall, with rain falling in such volume that the earth is unable to naturally absorb it, causing flash floods and raised water levels in some areas. As this excess water finds its way into river systems, the speed and volume of water increases, and increases the risk of severe flooding.

**Most impacted:** On a population basis, China, India, and Pakistan are all expected to be significantly impacted. In 2022, floods in Pakistan caused an estimated $14.8bn in damage, impacting around 15% of the country's population as record monsoon rains (67% above normal levels) left around one third of the country underwater. This displaced 7.9m people and provided an example of the level of destruction that could become a more regular future occurrence. East Africa is another vulnerable area, and in 2024, heavy flooding in Somalia and Ethiopia has displaced hundreds of thousands of people, with the World Health Organization warning about associated cholera outbreaks.

## 5. TROPICAL CYCLONES

A tropical cyclone is a rapidly rotating storm that forms above tropical oceans. If they make landfall, winds of over 100mph are capable of significant destruction, and they are often associated with storm surges and torrential rain, raising flood risks. There is still some debate as to whether climate change will lead to an increase or decrease in the number of tropical cyclones as warmer atmospheric temperatures reduce the difference in temperature between sea and air, which helps their formation. However, when they do occur, warmer sea temperatures are expected to make them more intense and destructive.

**Most impacted:** On a population basis, coastal areas in East Asia, including Hong Kong, Taiwan, Korea, and the Philippines are all vulnerable as are coastal regions of China such as the Zhejiang and Fujian provinces. As cyclones and typhoons move northward as a result of climate change, Japan and more northern coastal areas in China are expected to become more vulnerable. The other area of note is the Caribbean, where lower land levels make storm surges especially problematic.

[4] Number of wildfires to rise by 50 per cent by 2100 and governments are not prepared, experts warn, 23 February 2022, UNEP.
[5] Climate change: health effects in the UK, 15 January 2024, UK Health Security Agency.
[6] Steamy Relationships: How Atmospheric Water Vapor Amplifies Earth's Greenhouse Effect, 8 February 2022, NASA.

## 6. LOWER CROP PRODUCTIVITY AND FAILURE

The initial impact of increased levels of carbon dioxide in the atmosphere has resulted in global greening, with surging plant growth helping to slow the pace of global warming[7]. It can be argued that this has helped to increase crop yields, at least at the margin, but the longer-term picture is more concerning; a number of studies have found that higher levels of carbon dioxide result in crops becoming less nutritious. One study published in 2018 concluded that this could have a severe impact on the global disease burden by 2050[8], disproportionately affecting South-East Asian and sub-Saharan African countries. More broadly heatwaves, droughts and extreme precipitation and flooding are all events that are expected to adversely impact crops in the medium term. This makes farming more unpredictable and raises the risk of a synchronised global crop failure, where failures across multiple countries mean it becomes difficult to compensate, threatening global food security.

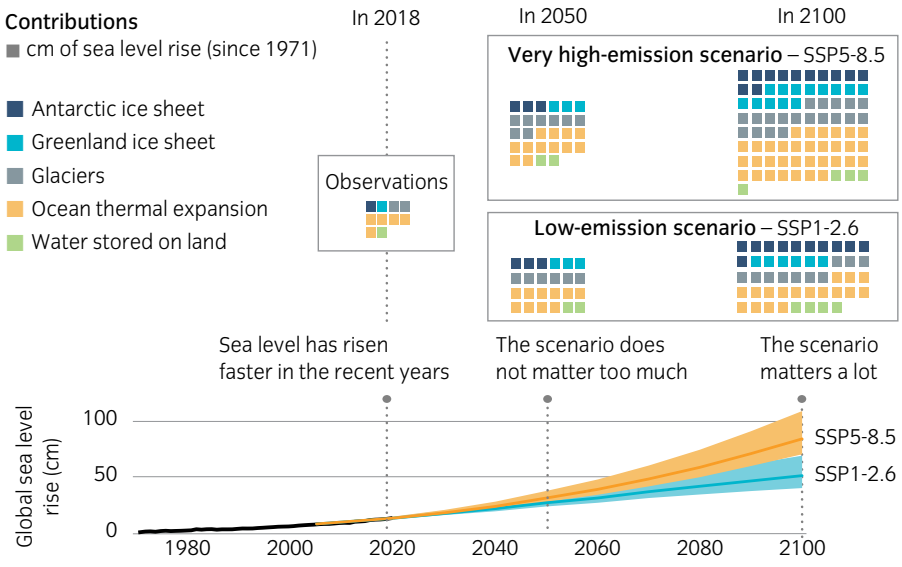
**Most impacted:** Although a synchronised crop failure across multiple countries would have global consequences, sub-Saharan Africa, India and China are all notably vulnerable to climate-related food security risks.

## 7. SEA LEVEL RISK INCREASES IN THE SECOND HALF OF THE CENTURY

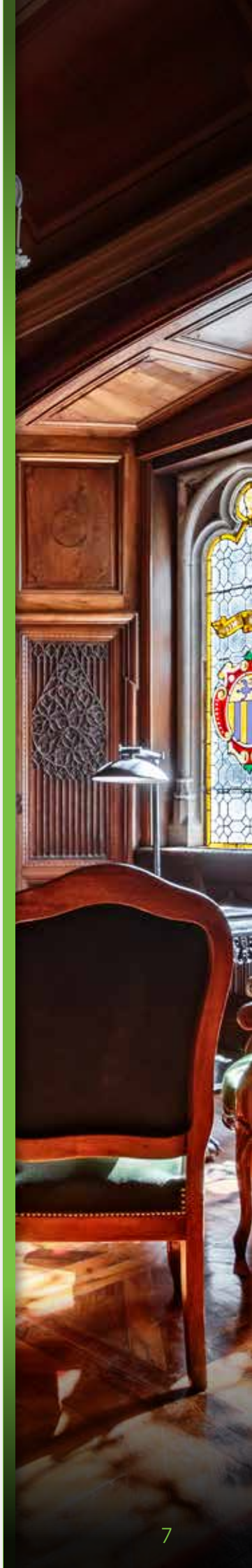
Satellite data from NASA shows a steady increase in sea levels since 1993[9]. This is a function of warmer sea temperatures causing volume expansion and additional water coming from melting ice sheets and glaciers.

Critically, the rate of change is expected to gradually accelerate over time. Data from the UK Met Office's sea-level dashboard shows that the contribution to sea level rise from ice sheets has increased by a factor of close to four between the 1990s to 2010s. Under the Met Office's low and very high-emission scenarios (see Figure 2), sea levels are very similar until 2050, then start to significantly diverge[10]. Assuming the worst-case scenario, the impact on the populations of areas which lie less than one metre above sea level would be significant. In wealthier countries some of this impact can be mitigated by improved sea defences, but in poorer countries it is likely to compound the climate migration issue in the second half of the century.

Figure 2: Projected sea level changes over coming decades[10]




[7] Global Green Up Slows Warming, 17 February 2020, NASA Earth Observatory.
[8] Anticipated burden and mitigation of carbon-dioxide-induced nutritional deficiencies and related diseases: A simulation modelling study, 3 July 2018, PLOS Medicine.
[9] Sea Level, NASA.
[10] Sea level, Met Office.

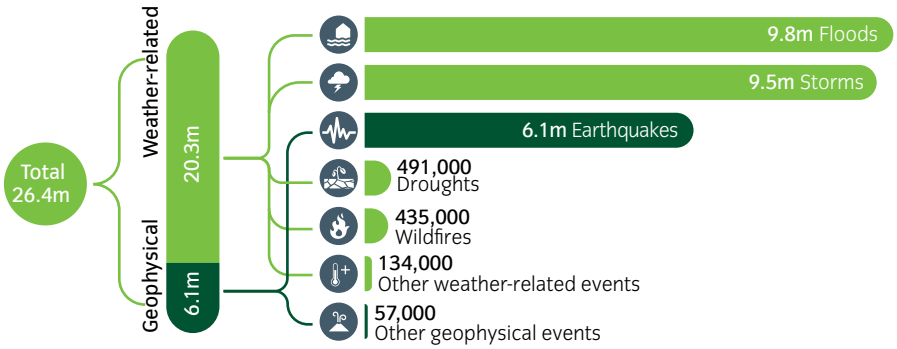


# NUMBERS OF DISPLACED PEOPLE

## CURRENT DISPLACEMENT

The International Displacement Monitoring Centre (IDMC) compiles independent data for internal displacement resulting from conflict and disasters. In its 2024 report the IDMC calculates that 26.4m people were internally displaced by disasters in 2023, with 20.3m from weather-related disasters. The most notable disaster was flooding in the Horn of Africa which displaced 2.9m people.

Figure 3: Disaster-related displacements during 2023[11]




As of the end of 2023, 7.7m remained displaced, largely within Afghanistan, Pakistan, Ethiopia, Turkey and China.

## PROJECTED DISPLACEMENT

The Groundswell reports, published by the World Bank[12], provide some of the most comprehensive projections on the potential for population displacement in different regions of the world under three scenarios. The combined results of the two Groundswell reports, published in 2018 and 2021, conclude that as a central case 170m additional people could become climate migrants by 2050 – forced to move within their countries to avoid the impact of climate change.

The most impacted regions are expected to be West Africa (54.4m or 6.9% of the population), North Africa (13.0m, 6.1%), Central Asia (2.4m, 3.5%), and the Lower Mekong (6.3m, 2.7%), of which Vietnam is the most affected (3.1m, 3.1%). Within South Asia, Bangladesh (13.3m, 7.5% of the population) is also severely impacted.

The World Bank data do not cover developed countries (they are assumed to have the resources to cope adequately), the Middle East (due to baseline population uncertainty as a result of ongoing conflicts and refugee flows), or small island developing states (too small to model successfully with that method).

[11] Global Report on Internal Displacement 2024, May 2024, IDMC.
[12] Millions on the Move in Their Own Countries: The Human Face of Climate Change, 13 September 2021, Work Bank.

Figure 4: Climate refugees – World Bank projected migration by 2050[13]

| Region | Reference (pessimistic) scenario | Range | Percent of population |
|---|---|---|---|
| Africa | 84.1m | 63.2-105.0m | 3.7% |
| West Africa | 54.4m | 44.8-64.0m | 6.9% |
| North Africa | 13.0m | 6.6-19.3m | 6.1% |
| East Africa | 10.1m | 8.1-12.1m | 1.3% |
| Central Africa | 5.1m | 3.1-7.1m | 1.3% |
| Southern Africa | 1.5m | 0.6-2.5m | 2.3% |
| East Asia and the Pacific | 36.2m | 24.1-48.4m | 1.9% |
| East Asia (excl. Lower Mekong) | 29.9m | 19.9-39.9m | 1.8% |
| Lower Mekong | 6.3m | 5.2-7.4m | 2.7% |
| Vietnam | 3.1m | 2.4-3.8m | 3.1% |
| South Asia | 35.7m | 30.9-40.5m | 1.6% |
| Bangladesh | 13.3m | 6.8-19.9m | 7.5% |
| Latin America | 10.7m | 4.3-17.1m | 1.6% |
| South America | 8.6m | 3.9-13.2m | 1.9% |
| Mexico and Central America | 2.1m | 0.3-3.9m | 1.0% |
| Eastern Europe and Central Asia | 3.7m | 2.2-5.1m | 1.7% |
| Central Asia | 2.4m | 1.3-3.4m | 3.5% |
| Eastern Europe* | 1.3m | 1.0-1.5m | 0.8% |
| **Totals** | **170.3m** | **124.6-216.1m** | **2.3%** |

**Note:** Coverage does not include the Middle East, Western Europe, North America, developed countries in East Asia and Pacific, or Small Island Developing States. Model is driven by climate change impacts on water availability and crop productivity as well as sea-level rise augmented by storm surge. *Turkey is included in this figure for E. Europe.

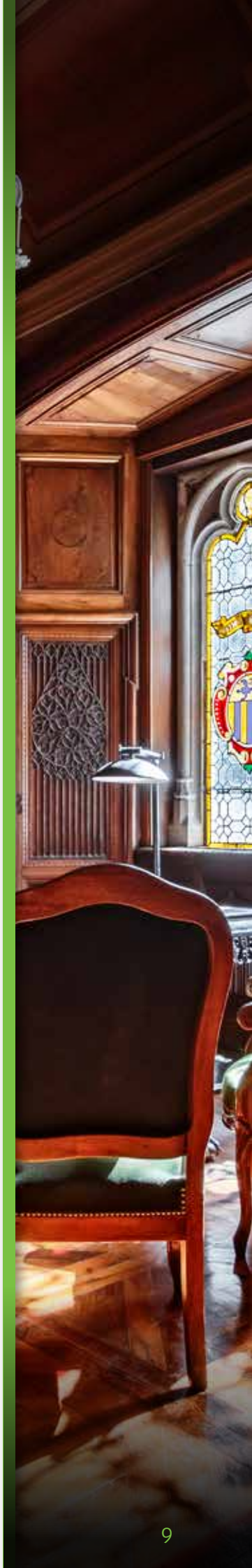
For the developing Middle East (so excluding Turkey, Israel and the Gulf Cooperation Council (GCC) countries), it is possible to approximate numbers of climate displaced people by applying a similar rate as for North Africa (6.1%). This would suggest a figure of around 18m people by 2050, but this should be taken with appropriate caveats. Given the existing and projected levels of water scarcity and drought in Turkey there are likely to be displaced people here also. Although numbers are harder to estimate given the higher level of development, applying the Mexico rate (1.0%) to Turkey suggests approximately one million displaced people by 2050. Similar issues could be considered for Israel (~0.1m) and southern California/Arizona (~0.3m) although fully developed status should confer some protection on those populations, and they will in any case likely be internally displaced rather than international migrants.

Small Island Developing States are likely to be some of the hardest hit by sea level rises, and some could almost disappear altogether. The Maldives with a population of 0.54m people could lose around 80% of its land area if sea levels rise 0.5 metres[14]. The Marshall Islands and Tuvalu (as well as the Netherlands) are likely to see over 30% of their populations below annual coastal flood sea level by 2050, and there are several others with 10% of the population at risk. Even combined, however, the populations of the small island states are small in a global context.

As these small island states approach a tipping point and are unable to cope with rising sea levels, it is possible that larger neighbouring countries will agree to resettle these small populations over time. For example, Australia already has an agreement with the small island nation of Tuvalu, providing permanent residency for up to 280 Tuvaluans each year to mitigate the effects of climate change.

[13] Source: https://www.worldbank.org/en/news/feature/2021/09/13/millions-on-the-move-in-their-own-countries-the-human-face-of-climate-change

[14] Sea Level Rise Projection Map – Maldives, 31 July 2020, Earth.Org.



Sea level rise is a factor that even developed states will struggle to mitigate, although as the Netherlands shows, it can be done. Projections come with wide ranges. Nevertheless, averaging such datasets will at least give us estimates for displaced people in the developed markets, and help provide a cross-check on other countries and regions. In terms of increase in population below annual coastal flood levels by 2050, the most-affected nine countries are in Asia (see Figure 5). Over 200,000 people would also likely be affected in the Netherlands, US, UK, and Egypt.

Figure 5: Climate refugees – projected populations living below annual coastal flood level by 2050, RCP8.5[15]

| Region | Population below annual coastal flood level | | | Increase in population below annual coastal flood level | % of pop. displaced |
|---|---|---|---|---|---|
| | Current | 2050 | 2100 | By 2050 | By 2050 |
| Asia | 89.1m | 113.2m | 186.4m | 24.0m | 0.6% |
| China | 35.0m | 42.1m | 66.3m | 7.1m | 0.5% |
| Bangladesh | 10.3m | 16.1m | 29.4m | 5.8m | 3.6% |
| India | 10.7m | 13.4m | 20.7m | 2.7m | 0.2% |
| Vietnam | 11.6m | 13.8m | 21.3m | 2.3m | 2.8% |
| Indonesia | 8.3m | 10.1m | 16.4m | 1.8m | 0.8% |
| Thailand | 2.4m | 3.9m | 7.6m | 1.5m | 2.4% |
| Japan | 3.55m | 4.40m | 7.79m | 0.85m | 0.7% |
| Philippines | 2.08m | 2.70m | 4.73m | 0.62m | 0.6% |
| Myanmar | 1.55m | 2.05m | 3.95m | 0.50m | 1.0% |
| Europe | 9.9m | 11.0m | 14.7m | 1.2m | 0.2% |
| Netherlands | 5.18m | 5.65m | 6.99m | 0.48m | 3.1% |
| United Kingdom | 1.59m | 1.81m | 2.50m | 0.23m | 0.4% |
| Africa | 3.6m | 4.3m | 7.3m | 0.7m | 0.1% |
| Egypt | 1.17m | 1.37m | 2.35m | 0.20m | 0.3% |
| Latin America | 1.37m | 1.78m | 3.73m | 0.42m | 0.1% |
| North America | 1.31m | 1.71m | 3.20m | 0.41m | 0.1% |
| United States | 1.02m | 1.41m | 2.80m | 0.39m | 0.1% |
| Oceania | 0.31m | 0.38m | 0.73m | 0.07m | 0.2% |
| **World** | **105.6m** | **132.4m** | **216.3m** | **26.8m** | **0.4%** |

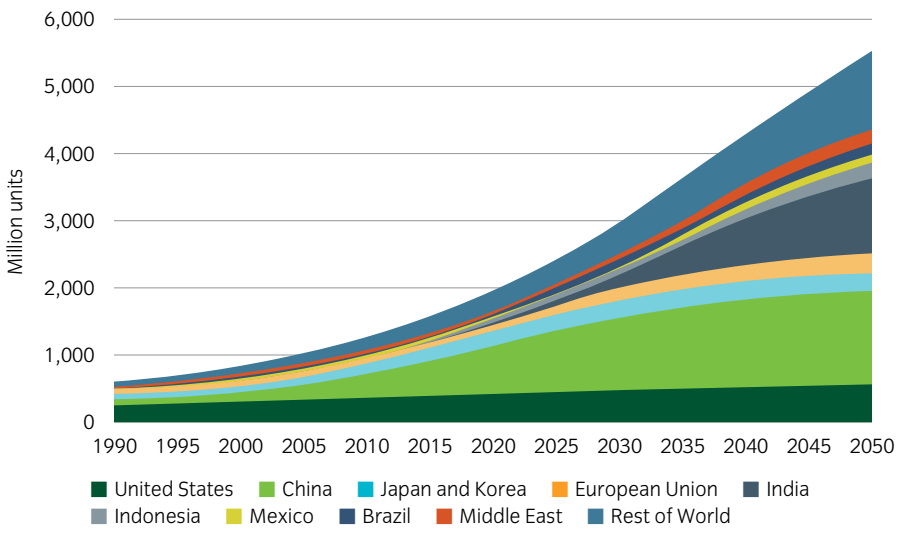
Given that the data in Figure 5 are only from sea level rise and storm surge, and do not cover drought or crop failure, it does not seem inconsistent with the World Bank data (see Figure 4). For the purposes of estimating the number of climate migrants from slow-onset factors, we take the central case reference numbers from Figure 4 for those regions covered (170.3m by 2050) and add in our estimates for other regions (21.2m Middle East and developed markets) to give a total of 191.5m.

Other factors not covered by the World Bank report include heatwaves, wildfire, river floods and (partially) tropical storms. These factors may be much less likely to drive international migration as displaced people will not have time to migrate internationally and can potentially return home after the disaster is over, but they will still add to the burden of displaced people globally that countries need to cope with.

[15] Source: Insight analysis of source data from New elevation data triple estimates of global vulnerability to sea-level rise and coastal flooding, 29 October 2019, Nature.

IDMC data suggests heatwave-induced displacements are low so far and can be mitigated by higher adoption of air conditioning. To the extent this is expected to happen (see Figure 6), we discount heatwaves as a factor in causing significant migration.

Figure 6: Global air conditioner stock, 1990-2050[16]




Wildfires, however, are clearly rapidly increasing as a factor in displacements, at a rate far above UNEP predictions of a 30% increase in extreme fires by 2050. However, using these UNEP predictions we can estimate future internal displacements due to wildfire by country. These will necessarily be rough estimates as actual numbers will vary each year. These are lower overall numbers than many of the slow-onset factors, but still quite material for North America and Greece in particular (see Figure 7).

Figure 7: Global displacements from wildfires by around 2050[17]

| Country | People displaced by wildfire pa by 2050 | % of population |
|---|---|---|
| United States | 374k | 0.10% |
| Canada | 58k | 0.13% |
| Greece | 20k | 0.23% |
| Spain | 13k | 0.03% |
| Israel | 12k | 0.09% |
| Turkey | 11k | 0.01% |
| Australia | 11k | 0.03% |
| France | 10k | 0.01% |
| China | 7k | <0.01% |
| Colombia | 6k | 0.01% |
| **World** | **560k** | **0.01%** |

We can use the same dataset together with predictions of an approximate 15% worsening in river flooding by 2050 under RCP6 to get estimates for that factor. Although numbers will vary each year, we would expect around 14m extra people internally displaced each year by 2050, with China, India and Pakistan being particularly affected.

[16] The Future of Cooling, May 2018, International Energy Agency.
[17] Source: IDMC, Insight calculations.

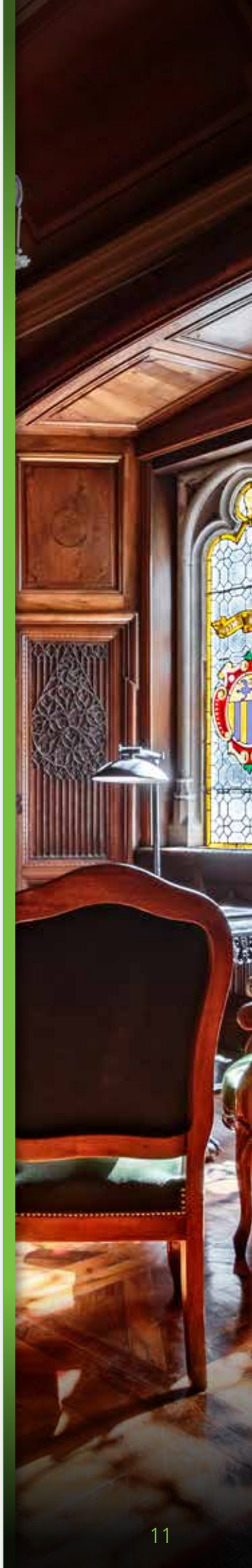


Figure 8: Global displacements from flooding by around 2050[18]

| Country | People displaced by river floods pa by 2050 | % of population |
|---|---|---|
| China | 3.4m | 0.27% |
| India | 3.0m | 0.18% |
| Pakistan | 1.74m | 0.47% |
| Philippines | 0.64m | 0.48% |
| Nigeria | 0.36m | 0.17% |
| Bangladesh | 0.46m | 0.21% |
| Indonesia | 0.33m | 0.10% |
| Colombia | 0.28m | 0.48% |
| Somalia | 0.27m | 0.73% |
| Myanmar | 0.25m | 0.42% |
| **World** | **14.0m** | **0.15%** |

For tropical storms or hurricanes, the situation is more complex, as some of the effect from storms is already captured in the World Bank and sea-level rise data for storm surges. So, we need to consider the excess in each country due to storms over the numbers we already have for coastal floods resulting from higher sea levels (which we outlined in Figure 5). Where the number of people expected to be impacted by coastal floods exceeds those expected to be displaced by storms, we will assume these people overlap. We will once again consider an increase in storm severity of around 15%. The Philippines and Cuba look to be most impacted on this measure. In the US an additional 160,000 people each year on average may be temporarily displaced by hurricanes.

Figure 9: Global displacements from tropical storms by around 2050[19]

| Country | People displaced by storms pa ~2050 | Increase in population below annual coastal flood level | Additionally affected people | % of population |
|---|---|---|---|---|
| Philippines | 4.15m | 0.62m | 3.53m | 2.3% |
| China | 2.54m | 7.05m | - | - |
| Bangladesh | 1.19m | 5.83m | - | - |
| India | 1.10m | 2.65m | - | - |
| United States | 0.55m | 0.39m | 0.16m | 0.04% |
| Cuba | 0.44m | 0.01m | 0.43m | 4.5% |
| Vietnam | 0.38m | 2.28m | - | - |
| Japan | 0.28m | 0.85m | - | - |
| Mozambique | 0.17m | 0.06m | 0.11m | 0.18% |
| Brazil | 0.17m | 0.12m | 0.05m | 0.02% |
| **World** | **12.1m** | **26.1m** | **4.9m** | **0.05%** |

Adding these numbers for displaced people from sudden-onset factors onto those from slow-onset factors gives us a central case estimate of the total number of climate displaced people in 2050. By origin the regions generating the most migrants are likely to be from the developing world: sub-Saharan Africa (73.8m), South and Central Asia (60.7m), Middle East and North Africa (32.4m), South-East Asia (19.4m) and Latin America (12.2m). China will have around 25.4m internally displaced people, and the developed world will have around 4m. Within the developed world the most affected countries will be the US (1.3m), Japan (0.9m), the Netherlands (0.5m), the UK (0.2m) and Korea (0.2m).

[18] Source: IDMC, Insight calculations, and https://www.bristol.ac.uk/cabot/news/2024/global-flooding-media-release.html

[19] Source: IDMC, Insight calculations, and https://www.bristol.ac.uk/cabot/news/2024/global-flooding-media-release.html

Adding this together gives an overall total of 211m climate displaced people by 2050 as a central case, with that number also certainly continuing to rise thereafter.

This is of course in addition to people who are displaced for other reasons, such as conflict or geophysical disasters, and those people who migrate for other reasons such as reuniting families or seeking either freedom or better economic opportunities.

# WHERE WILL THEY GO?

Our central estimate suggests around 211m people could become climate migrants by 2050. Most of these migrants will remain within their country of origin, but a proportion (generally not the most destitute) are likely to migrate internationally. The question is where these new migrants are likely to settle.

To get a better sense of how many climate migrants could end up becoming international migrants we can look at data from the 2024 World Migration Report, published by the International Organization for Migration (IOM)[20]. This shows that there were 117m displaced people across the world in 2022 (see Figure 10). Of these, 71.2m or 61% remain internal, with 45.8m refugees, asylum-seekers, or others in need of international protection. Around 70% of refugees were hosted within countries neighbouring their countries of origin – this suggests around 21.2m, or 18% of displaced populations end up moving further afield.

There is no definition of climate refugees covered by the 1951 Refugee Convention. This means that climate cannot currently be cited as a direct reason for seeking asylum or refugee status. However, refugee status can be given to those fleeing conflict or violence and there will be situations where future conflicts occur or are exacerbated by the impact of climate change. There are also likely to be more desperate situations where large numbers of people are impacted by drought or floods and international borders simply give way to climate-induced chaos.

Figure 10: Current numbers of displaced people[21]

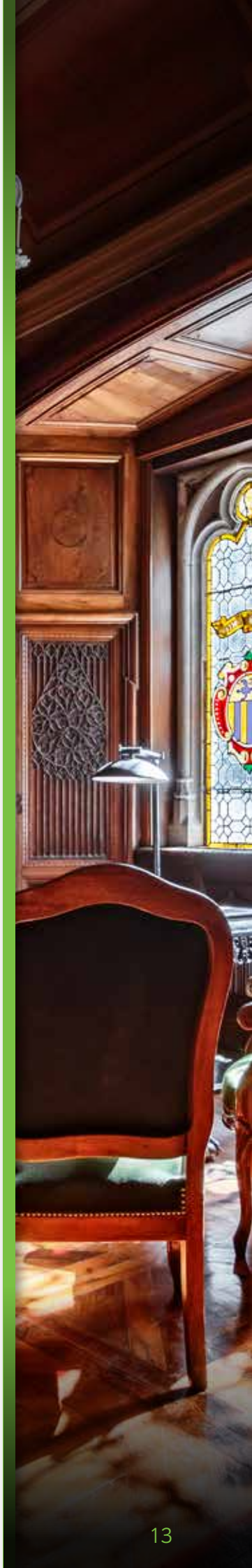

**117 million**

**people were living in displacement** globally at the end of 2022 (includes refugees, asylym seekers, IDPs and others)

| | | |
|---|---|---|
| Refugees | 35.3 million | **refugees** globally in 2022 |
| Asylum-seekers | 5.4 million | **asylum-seekers** globally in 2022 |
| Others in need of international protection | 5.2 million | **others displaced** globally in 2022, mainly Venezuelans (not including those who were refugees or asylym-seekers) |
| Internally displaced persons (IDPs) | 71.2 million | **IDPs globally in 2022:** 62.5 million due to conflict and violence: 8.7 million due to disasters |

[20] World Migration Report 2024, IOM.

[21] Source: https://worldmigrationreport.iom.int/msite/wmr-2024-interactive/



For the purposes of estimation, we assume that this proportion of 61% displaced people remaining in their country of origin holds for slow-onset factors in developing countries, while for developed countries we assume they are all accommodated within their country of origin.

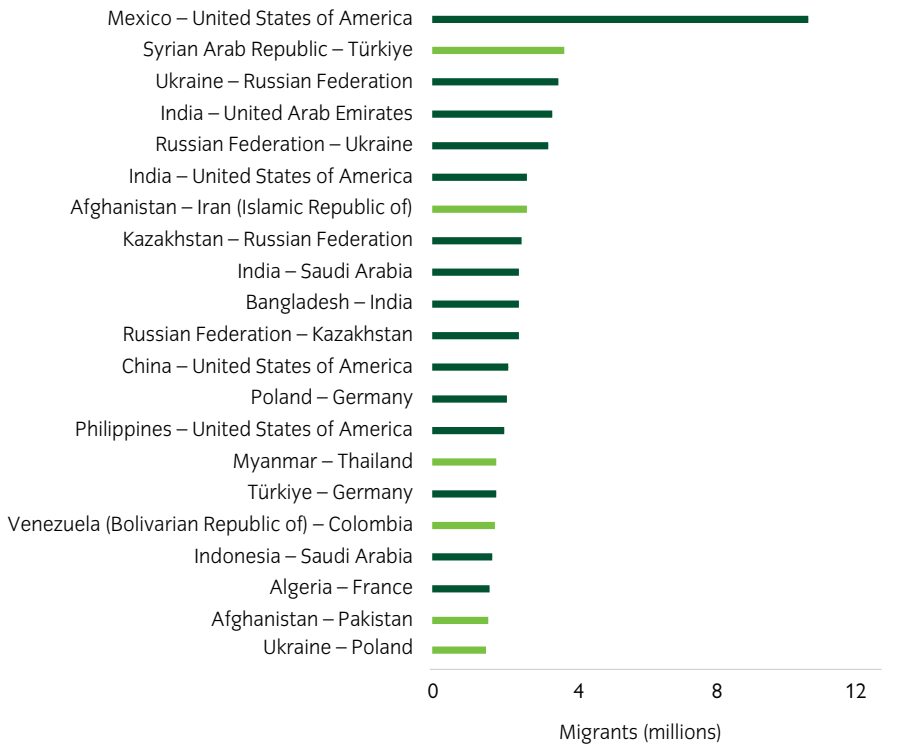
## LOOKING FOR CLUES IN TODAY'S MIGRATION TRENDS

As of 2020, many international migrants have originated in high or very high-income countries and migrated to high or very high-income countries. India, Bangladesh, and Pakistan are middle-income countries with populations that have a propensity to become international migrants. This is despite all three countries shifting from low to middle income between 1995 and 2020.

International migration from low-income countries is currently relatively limited, but as our analysis has shown, climate change may increase this. The proportion of migrant citizens within very high-income economies has increased significantly over time. Well-established migrant communities, combined with high levels of income, are likely to reinforce these places as attractive destinations for future climate migrants, but flows can change over time.

A significant amount of international migration also tends to occur across established country to country corridors, the largest of which is the corridor between Mexico and the US (see Figure 11). It is likely that climate migrants would follow these existing corridors, so the most natural destination for climate refugees from Bangladesh for example would likely be India.

Figure 11: Top international country-to-country migration corridors, 2024[22]




[22] https://worldmigrationreport.iom.int/msite/wmr-2024-interactive/
Source: UN DESA, 2021a; UNHCR; 2023a.
Note: The corridors represent the number of international migrants (millions) born in the first-mentioned country and residing in the second. Corridors represent an accumulation of migratory movements over time and provide a snapshot of how migration patterns have evolved over time and provide snapshot of how migration patterns have evolved into significant foreign-born populations in specific destination countries. Those corridors comprising mainly displaced persons are coloured bright green. Revisions have been made based on large-scale displacement from Ukraine to neighbouring countries (as at the end October 2023).

## ANALYSING THE DATA

This data allow us to undertake our own analysis to assess which countries could experience the largest inflows of international climate migrants. We outline the results in Figure 12. On the right hand side of the table we show the latest UN median projections of net migration as a comparator.

Unsurprisingly a significant proportion of the displaced climate migrants that move internationally are likely to remain within their regions. However, a meaningful proportion are also likely to move to Europe and the US, and in some cases the numbers are startling. For example, in France, the UN median net migration projection is for an additional 2.7m migrants by 2050, but our analysis suggests that climate migration could add a further 3m migrants to that number. The UK could see 2.2m additional climate migrants above current UN projections of 7.4m, while the USA could see an additional 7.7m above current projections of 33.3m. Perhaps surprisingly, there may also continue to be significant inflows into the wealthy Arab Gulf states from South and South-East Asia as well as other parts of the Middle East and North Africa. These are numbers that would have a significant impact on infrastructure requirements and are likely not part of current government plans in most countries.

Figure 12: Climate refugees – projected climate change displaced people by destination by 2050, RCP8.5[23]

| Region | Displaced population by destination country or region, 2050 | | | | UN median net migration projection, by 2050 | |
|---|---|---|---|---|---|---|
| | International | Internal | Total | % | Total | % |
| Asia | 21m | 81m | 102m | 1.9% | -48m | -0.9% |
| Southern Asia | 4.2m | 27.3m | 31.6m | 1.3% | -43m | -1.7% |
| Middle East | 13.5m | 12.0m | 25.5m | 6.1% | 0.2m | 0.0% |
| Saudi Arabia | 4.4m | 0m | 4.5m | 9.4% | 1.1m | 2.4% |
| UAE | 2.8m | 0.1m | 2.9m | 19.0% | 0.8m | 5.4% |
| Turkey | 1.2m | 0.6m | 1.8m | 2.0% | -3.1m | -3.4% |
| Eastern Asia | 0.9m | 26.4m | 27.3m | 1.9% | -1.7m | -0.1% |
| China | 0.3m | 25.4m | 25.6m | 2.0% | -5.8m | -0.5% |
| Japan | 0.3m | 0.9m | 1.2m | 1.1% | 3.3m | 3.1% |
| South-East Asia | 1.8m | 13.8m | 15.6m | 2.0% | -2.1m | -0.3% |
| Central Asia | 0.1m | 1.5m | 1.6m | 1.4% | -1.1m | -1.0% |
| Africa | 20m | 54m | 74m | 3.0% | -19m | -0.8% |
| West Africa | 13.6m | 34.1m | 47.7m | 6.5% | -6m | -0.8% |
| East Africa | 2.6m | 7.3m | 9.8m | 1.2% | -9.7m | -1.1% |
| North Africa | 1.0m | 7.9m | 9.0m | 2.4% | -5.4m | -1.4% |
| Middle Africa | 2.1m | 3.4m | 5.5m | 1.4% | -1.9m | -0.5% |
| Southern Africa | 0.9m | 1.2m | 2.1m | 2.3% | 3.9m | 4.3% |
| Europe | 13.7m | 1.5m | 15.1m | 2.2% | 31.4m | 4.5% |
| UK | 2.0m | 0.2m | 2.2m | 2.9% | 7.4m | 9.8% |
| France | 2.9m | 0.1m | 3.0m | 4.4% | 2.7m | 4.0% |
| Germany | 2.0m | 0.1m | 2.1m | 2.7% | 3.8m | 4.9% |
| Italy | 1.5m | 0.1m | 1.6m | 3.1% | 1.4m | 2.7% |
| Spain | 1.3m | 0.1m | 1.3m | 2.9% | 1.8m | 4.0% |
| Netherlands | 0.5m | 0.5m | 1.0m | 5.1% | 1.5m | 7.6% |
| Latin America | 1.9m | 8.0m | 9.9m | 1.4% | -16.8m | -2.3% |
| North America | 7.5m | 1.4m | 8.9m | 2.1% | 40.5m | 9.5% |
| United States | 6.4m | 1.3m | 7.7m | 2.0% | 33.3m | 8.8% |
| Canada | 1.1m | 0.1m | 1.2m | 2.7% | 7.2m | 15.7% |
| Oceania | 1.0m | 0.1m | 1.1m | 1.9% | 4.0m | 7.0% |
| Australia | 0.9m | <0.1m | 0.9m | 2.9% | 4.0m | 12.4% |
| **World** | **65m** | **146m** | **211m** | **2.2%** | - | - |

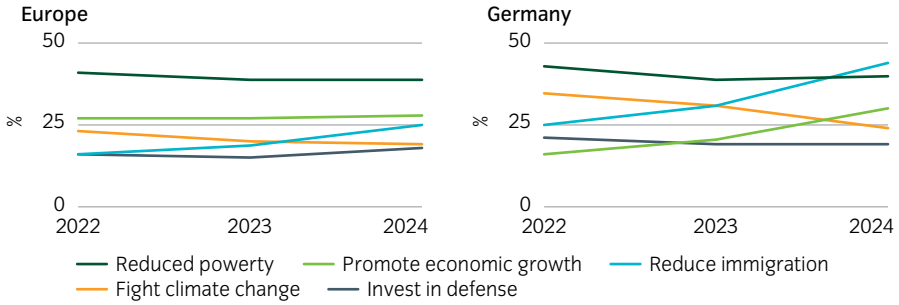
[23] Source: UN DESA 2024, World Bank Groundswell 2018, 2021, Insight calculations and estimates

# EFFECTS ON RECIPIENT COUNTRIES

## POLITICAL IMPACT

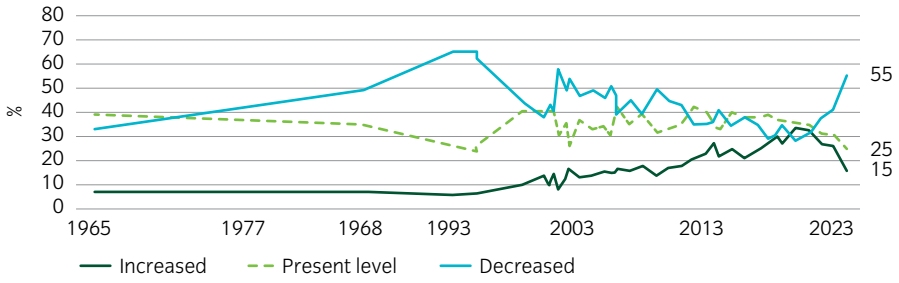
As international migration has increased, so perceptions of migration appear to be changing. The Democracy Perception Index survey[24] shows an increasing number of voters believing that a reduction in immigration should be a government priority, especially in Europe (see Figure 13). Reducing immigration is now a higher priority for European voters than climate change, and in Germany it is above all other issues. A similar trend can be seen in the UK, Ireland, France, and the Netherlands.

Figure 13: European and German views – immigration a rising priority for voters[25]




In the US, polling from Gallup shows a sharp rise in US adults that want to see US immigration decreased[26] (see Figure 14). The latest poll in July 2024 is the first time since 2005 that more than 50% of Americans want to see less migration, and the US/Mexico border is very much on the agenda for the US election in November.

Figure 14: American views: Immigration to the US[27]




If international migration increases due to climate migration, then it is likely to increase social tensions and result in gains by parties with anti-migration positions. In many cases political parties which are anti-immigration also have anti-green policies that push back against measures designed to limit emissions and climate change.

For example, in the Netherlands, the previous government had a target to reduce the Netherlands' greenhouse gas emissions by 49% by 2030, compared to 1990 levels, and a 95% reduction by 2050. Elections, held in November 2023, saw a surge in support for parties seeking to restrict migration and a new coalition government has formed led by the Party for Freedom. The coalition agreement includes significant changes to the country's climate change policies, including raising motorway speed limits, reintroducing subsidised fuel for farmers, and reducing the countries climate change fund by €1.2bn.

[24, 25] Democracy Perception Index 2024 (PDF), Alliance of Democracies Foundation.
[26, 27] Sharply More Americans Want to Curb Immigration to U.S., 12 July 2024, Gallup.

## ECONOMIC IMPACT

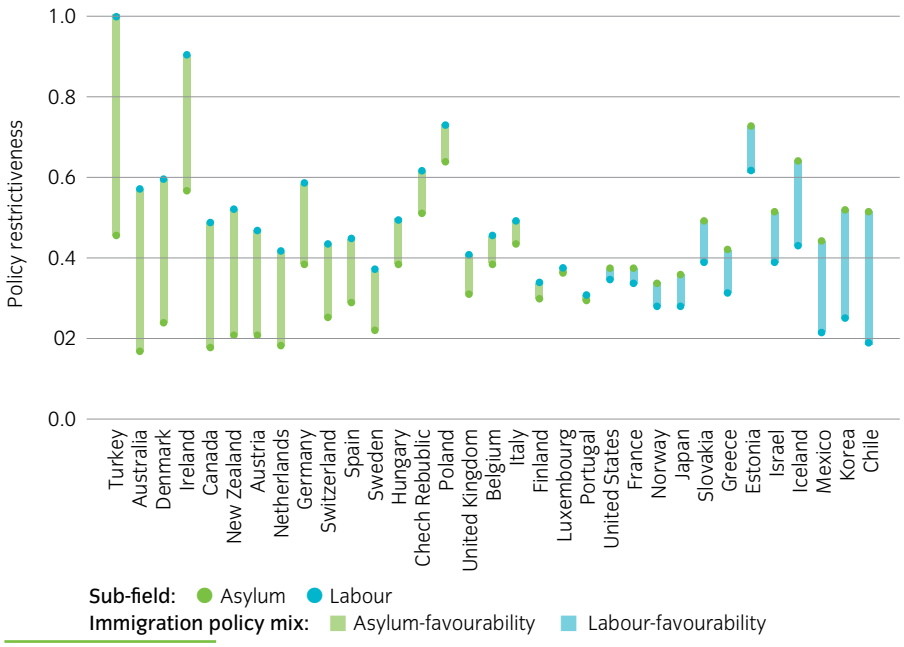
As with any other population, migrants and displaced people need infrastructure and services, such as housing, food, security, education, and healthcare. The development of that infrastructure and the provision of those services will naturally boost GDP in the countries where migrants settle, although not necessarily GDP per capita, and scarcity may also lead to higher levels of inflation and prices. For example, house prices in Canada and New Zealand have remained strong partly due to immigration. In most cases there will be a need for increased fiscal spending by host governments.

The perceived success or failure of immigration can be a result of various factors including cultural affinity, language barriers, historical experiences, and government policy on integration, but the greatest impact from an economic respect is due to government policy on access to labour markets.

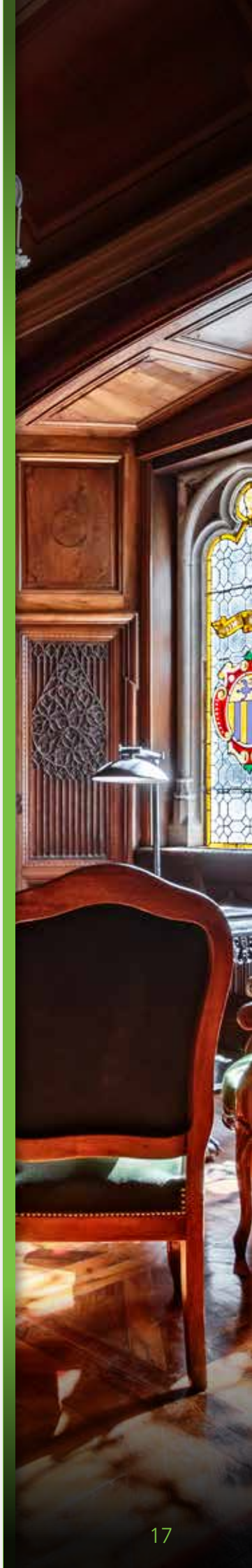
Countries that are able to integrate immigrants into the labour market will see those migrants able to legitimately earn enough money to pay for their own needs, as well as taxes, and will see increases in productivity per capita and hence GDP per capita. Countries that exclude immigrants from the labour market see that spending coming from government resources, and competition for this with local populations is one reason for deteriorating political situations. Immigrants excluded from the legitimate labour market will have very low productivity, and the country will see GDP per capita fall. There may be corresponding effects on wages in different segments of the labour markets under different policy regimes.

Caroline Schultz, Philipp Lutz and Stephan Simon have produced some interesting research on how 33 OECD countries combine labour and migration policy which is shown in Figure 15. The authors score each country based on the restrictiveness of the two policies; the higher the score the more restrictive the policy, and the longer the line the larger the policy difference between the two. They found that 21 countries have more restrictive policies on labour than asylum, and 12 have more restrictive policies on asylum than labour, with significant cross-country variation. One conclusion they draw when analysing this data over time, is that EU countries have seen the greatest convergence between labour and migration policies amongst OECD countries. This suggests that this is driven, at least in part, by Europeanisation. Generally speaking, however, the immigration policy mix has been relatively stable over time and OECD countries have showed no signs of moving towards more economically motivated admission.

Figure 15: Asylum policy restrictiveness vs labour policy restrictiveness, 1980-2010[29]




[29] Explaining the immigration policy mix: Countries' relative openness to asylum and labour migration (PDF), 2020, European Journal of Political Research.



## REMITTANCE FLOWS

As migrant populations become established and grow, many send money back to their country of origin, either to support families that remain in those countries or with the view of returning at some future date. These remittance flows have been buoyed by low-cost technology platforms and are becoming increasingly important to currency markets. For example, in Mexico, annual remittances in excess of $60bn are critical to rural communities, with whole towns sustained by remittance flows coming from workers in the US. At the same time, for developed countries such as the US, remittances have become a structural and growing outflow.

# CONCLUSIONS AND INVESTMENT IMPLICATIONS

Regions which will face severe disruption and displacement of people due to climate change include West Africa, North Africa and the developing Middle East, Central Asia and parts of South-East Asia. Bangladesh is by far the most impacted of larger states. Cuba, Guyana, Philippines, Vietnam, the Netherlands, the Maldives, Thailand, and China will also be significantly affected. Although many of those impacted will remain within those countries, some will not, moving to either neighbouring countries or further afield.

In all cases these risks need to be factored into longer-term investments as those countries will face a significant fiscal strain either from mitigating climate-change effects or from dealing with displaced people.

If current international migration patterns hold, then the flow of international climate migrants could be very significant into the GCC countries, perhaps overwhelmingly so. Developed countries likely to receive notably high proportions of climate refugees relative to existing populations include France and Italy. Other parts of western Europe as well as Australia, Canada and the US are also likely to be impacted. In all cases there will be an initial fiscal impact, either to try to keep the migrants out, to process and provide for those migrants, or to keep local populations happy. There is however also potential for longer-term boosts to GDP, productivity, and tax revenues if countries can craft effective integration policies and welcome migrants into the labour force to fill demographic deficits.

Overall, the need to build fresh infrastructure and provide additional services will modestly boost GDP in those countries less affected directly by climate change, which would likely lead to modestly higher global inflation over the long term. There may be investment opportunities in companies that cater to these increases in demand; for example, through the provision of air conditioning and related goods to India, the Middle East and China.

As climate-related stresses become more extreme and people become displaced, so pressure will increase on governments to take action to protect their populations. This could be in reaction to neighbouring countries exacerbating climate risks or directly to insulate at-risk areas from the impact of climate change. These actions introduce some uncertainty to current projections, as they could effectively shift displacement elsewhere, or intensify the stresses within certain countries. At its most extreme, these actions could result in outright conflict, with those fleeing violence eligible for refugee status.

Ultimately, these findings introduce a range of issues for us to factor into our investment thinking in the years ahead. These are not short-term problems, so the impacts will not be immediate, but we will be monitoring these trends closely going forward and doing further work to try to assess the investment implications of climate change over time.

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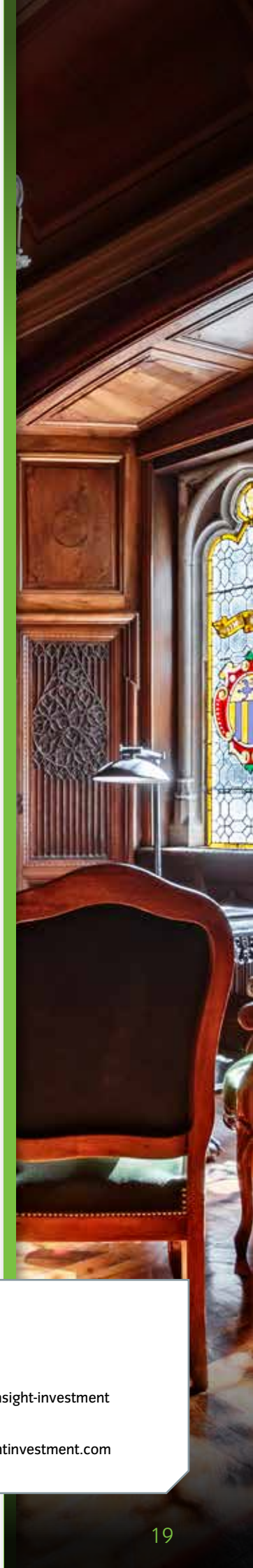

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