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The Impact of Climate Change on Forced Displacement

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PART I

The Impact of Climate Change on Forced Displacement

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ABSTRACT

Understanding the impact of climate change on forced displacement is critical to informing solutions. The latest scientific findings confirm that climate change is a factor in displacement, albeit unquantified, and that climate and weather extremes are increasingly driving displacement. Climate change is influencing and amplifying the multiple underlying risk drivers of displacement. The complexity of risk drivers requires significant investments and prioritization in adaptation, risk reduction and risk-informed development strategies. As such, the need for attribution and quantification are critical if public policy and international finance are to effectively respond.

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Introduction

The dedicated fund and new funding arrangements agreed at last year's 2022 United Nations Climate Change Conference (COP27) underpin the need for attribution and quantification of climate change. States are discussing how an international loss and damage mechanism will operate to address the adverse effects of climate change through finance, technology, and capacity building. The question of liability is likely to be explored further, as climate jurisprudence evolves, and affected States seek legal recourse (Ostřanský, 2023).

Most climate-related displacement will be a determinant of public policy, and the ability of States to invest in resilience, particularly in the face of intense natural hazards, such as droughts and floods. Indeed, the decision and ability to invest, or not, in an at-risk area will have tangible displacement outcomes given the impact of exposure and underlying vulnerabilities in addition to climate change (Otto et al., 2022).

Recent analysis by the Organization of Economic Co-operation and Development (OECD) found that only one-third of countries mentioned forced displacement, when detailing their medium- and long-term climate adaptation priorities and strategies, either in the National Adaptation Plans (NAPs) of developing States, or in the Nationally Determined Contributions (NDCs) (Gagnon and Hesemann, 2023). This is telling. These documents, particularly those of developing states, set out their priorities in climate finance and technical assistance. As noted by the OECD, where NAPs and NDCs address forced displacement, there was a lack of concrete commitment, objectives, and tangible actions, and they rarely made a connection between displacement and loss and damage. The disconnect between forced displacement, national adaptation priorities and strategies, and climate finance will need to be resolved if solutions are to be advanced.

In framing this Digest, it is recognized that forced displacement sits on a mobility continuum, with voluntary and informed migration at one end and forced displacement, triggered by a sudden event or the absence of safety and security, such as a tropical cyclone or conflict, at the other. In between, there is a complexity that the literature continues to grapple with. One example is the concept of migration as an adaptation

strategy. On first reading, this suggests a degree of agency and informed decision making. However, adapting to climate change is a necessity (Thalheimer and Webersik, 2020).

In the same vein, it is recognized that forced displacement and migration for economic reasons are not only physical acts but have a socioeconomic dimension which, in the case of forced displacement, is often underexamined. This could be from a lack of new investment in climate resilient infrastructure or a decision not to reconstruct damaged infrastructure after a disaster. The impact of this could cause previously functioning livelihoods to become unviable in the face of increasingly frequent and intense floods. In these locations this would affect different population groups including those forcibly displaced and impact on or force the movement of the local population.

This Digest explores emerging evidence surrounding climate change as a driver of forced displacement, paying particular attention to the public policy implications. The Digest will initially explore the latest climate science to understand the evidence as a basis for what is being observed. The current state of play will be outlined, providing emerging and established global trends that will then be explored through the lens of selected country case studies. Some suggested areas for further research and consideration will then be made.

Forced displacement and climate change: basic scientific findings

Climate change is a factor in displacement. The synthesis report of [the Intergovernmental Panel on Climate Change \(IPCC\) sixth assessment report \(AR6\)](#) found, with a very high rate of confidence, that climate change is contributing to humanitarian crises where climate hazards interact with a high level of vulnerability. Further, it found a causal relationship between increases in extreme weather events and increases in mortality and morbidity, the occurrence of climate-related food-borne and water-borne diseases, the range and reproduction of vector-borne diseases, and the emergence of animal and human disease in new areas.

The AR6 found with varying degrees of confidence, that climate and weather extremes are increasingly driving displacement in Africa, Asia, North America, and Central and South America, and that small island states in the Caribbean and South Pacific are being disproportionately affected relative to their small population size.

The report also found, with a high rate of confidence, that concurrent and repeated climate hazards have occurred in all regions, with increasing impact on and risks to health, ecosystems, infrastructure, livelihoods and food. The compounding nature of extreme events, including more frequently concurrent heatwaves and droughts, fire weather, and compound flooding is highly relevant to explaining the multiple drivers of displacement. How these risks interact and the ability of populations to adapt, withstand, and recover, determines the level of ensuing displacement.

Therefore, understanding the interaction between climate change, inequality and poverty is critical. As the impact of climate change is felt across economies and more frequent and intense natural hazards are triggered, median projections suggest that climate change will induce the voluntary and forced relocation of 62 million working-age individuals during this century, most of them internally displaced. This is reflective, in part, of the restrictive nature of current international migration laws and policies that see only a small fraction of people who suffer from the negative effects of climate change crossing borders (Burzynski et al., 2022). This reinforces earlier research that concluded that climate shocks are unlikely to induce mass cross-border movement but rather internal movements (Rigaud et al., 2018).

The current state of play

While the influence of climate change on the triggers and drivers of displacement, including on natural hazards, conflict and food security, are not in dispute, understanding the extent of the impact is difficult to assess. This section discusses the complexity of the phenomenon, its diverse manifestations in different areas of the world, and its interaction with other factors and the need for further explanation to inform responses and solutions.

The Global Report on Internal Displacement (IDMC, 2023) is a leading reference of internal displacement population data globally. While the report categorizes the triggers of displacement as either conflict and violence or disaster, it does not – understandably – report on displacement driven by climate change. This reflects the complex relationship between climate change, natural hazards, and conflict on displacement, and the influence of climate change as an exacerbating force.

In 2022, the number of people internally displaced and the number of new internal displacements were the highest ever recorded.¹ While the vast majority of these people were displaced by conflict, climate change is likely to be a factor also, although the extent is unknown.

While this Digest finds a growing link between climate change and internal displacement, it is useful to look at forcibly displaced who cross an international border to understand possible link to climate change. Abel et al. (2019) looked at how environmental and political drivers interact as determinants of forced displacement, measured by asylum claims. While no empirical evidence of a robust link between climate shocks, conflict, and asylum seeking was found between 2006-2015, it suggests that drought severity and the likelihood of armed conflict played a statistically significant role in the number of asylum seekers from countries affected by the Arab Spring (2010-2012).

Asia and the Pacific are the regions affected by disaster displacement the most. There were over 225 million internal displacements — or movements — in the region from 2010 to 2021, which was over three-quarters of the global total for this period. Weather-related hazards, such as monsoon rains and tropical storms, were responsible for 95% of all disaster displacements (ADB/IDMC, 2022). While preliminary evidence shows that climate change makes some hazards in the region more frequent and intense, the report was unable to quantify the impact climate change has on disaster displacement.

¹ The number of displacements in a year refers to the sum of all new forced movements of people recorded within that year. The total number of displaced people is the sum of all those living in displacement at the end of the year. The two numbers do not need to coincide: for example, if a person is forced to move four times in a year, these movements will account for four displacements, but only one person is counted as displaced. For further details, see IDMC (2023), pp. 135-136.

The issue of attribution is difficult given the intersection of drivers. As explored by Selby et al. (2016), the extended drought in Syria from 2006-2011 caused food insecurity and forced millions into extreme poverty. This, in turn, saw mass rural-urban movements, compounded social economic pressures and political instability, triggering unrest that resulted in the civil war. However, as highlighted by Selby et al. (2016) and Abel et al. (2019), there is considerable complexity to be unpacked and a lack of adequate empirical research to confirm the link between the different factors. While climate change may have exacerbated the drought, a causal relationship has not been established.

The impact of extreme deviations in weather patterns provides important context when considering the role of climate change. Mugeru and Yoshimura (2023) explored the consequences of drought on food security and displacement in Somalia, highlighting how extreme weather drives displacement. Since 2021, Somalia has been affected by the longest and most severe drought in 40 years, with five consecutive failed rainy seasons. The drought has affected almost half of the population and triggered a record 1.1 million internal displacements in 2022, almost six times than in the previous year. With widespread crop failures and loss of livestock, large numbers of people have abandoned farming, increasing the likelihood of protracted displacement.

Similarly, flooding is not a new phenomenon to Pakistan. However, the extent of the 2022 floods highlights the influence climate change has on existing hazards. The extreme fluctuations in precipitation coupled with the highly saturated soil had a cascading effect that was exacerbated by an extreme rise in temperature (Nanditha et al., 2023). This event resulted in the deaths of over 1,700 people and the displacement of 33 million, as well as a massive destruction of property and disruption of livelihoods. While the degree of attribution to anthropogenic forces was not made, the future impact of extreme fluctuations in precipitation on displacement is clear. To mitigate this, significant investments need to be made to aid adaptation and build resilience.

This complexity is also discussed in the context of the Solomon Islands where people living in locations exposed to climate hazards use mobility as a means of managing a host of social, economic, and environmental pressures that are amplified by climate change (Ramsay et al., 2023). The role that climate change and disasters play in people's displacement or migration journey is ultimately predicated on the extent of

household social, economic, and environmental vulnerability.² This highlights the externalities at play where mobility is being used to manage the impacts of repeated climate-related shocks, where previously local knowledge and systems were effective.

The reductive narrative of ‘climate refugees’ should also be considered when looking at the wider drivers and influencing factors at play. The binary nature of the victim discourse, whereby the displaced are framed as helpless and desperate, can fail to recognize the wider political economy. This narrative can also take agency, particularly from women, who are assumed to be victims of climate change rather than agents seeking out better economic prospects (Dewan, 2023). This is particularly relevant in rural and coastal communities where public policy can be a determining factor. Insufficient or absent investment in public infrastructure that supports community resilience (embankments or cyclone shelters for example), mismanagement of productive natural resources, and poor public service delivery in health and education cannot easily be separated or discounted from other drivers of movement, such as climate-related shocks.

Other drivers of displacement also need to be understood. Asia is the world’s most rapidly urbanizing region. Urbanization plays a defining role in how displacement shapes and interacts with climate change. To date, much of the region’s urban development has increasingly exposed people and assets to hazards by the development of flood plains and coastlines into urban areas, which are most vulnerable to climate change, particularly from sea-level rise, and increasingly intense storms (ADB/IDMC, 2022). With advancements in hazard mapping and modeling, the risks are known.

As outlined in the papers discussed in this Digest, an understanding of how different drivers combine and the role that climate change plays in amplifying these drivers, is needed if solutions are to be found. The importance of context and recognition of the intersectionality behind climate change, as it a contribute to displacement, needs to be further explored.

² For a review of existing literature on the connections between sea level rising and migration, see McMichael et al. (2020).

Summary and further research

In summary, climate change - manifested by extreme climate events - is contributing to forced displacement. But the extent of climate impact is largely determined by existing vulnerability and exposure. This is driven by a combination of underlying disaster risks, including poverty and inequality, unplanned and rapid urbanization, and poor risk governance. Other factors, including public policy on risk reduction, adaptation, and resilience, can influence the level of disaster risk by increasing levels of exposure and vulnerability or reducing capacity. These factors result in a high degree of complexity making attribution difficult.

Further research is needed to disentangle the drivers and better understand the role that climate change has in displacement. While the causal relationship between displacement and climate change, such as sea-level rise, is evident, given clear baselines, attribution to existing hazards, such as floods and tropical cyclones, is less clear. More granular analysis and modeling can provide important insights into the role that climate change plays in exacerbating existing risks, rather than a first-order driver.

While the phenomenon is hard to define, a better understanding of the continuum of mobility in the context of climate change can underpin an evidence-based response and avoid a reductive narrative that can take agency away from those most affected. Reducing the risk of displacement requires significant investment and prioritization in adaptation, risk reduction and development strategies.

Most of the displacement related to climate change is expected to be internal. While an international loss and damage mechanism and the existing (unmet) agreement of States to provide \$100 billion a year in climate finance may fund the response to internal displacement, the effective deployment of these resources requires investment to mitigate the multiple causes of displacement.

Entry points for this investment exist across the continuum. In Bangladesh, for example, the government is investing in the climate and disaster resilience of 22 coastal towns by enhancing municipal infrastructure and services that are critical to resilience building and adaptive capacity (ADB, 2022). In Tonga, the government has

established the Tonga Climate Change Trust Fund, a mechanism to provide financing in the form of small grants that help communities implement climate change adaptation and disaster risk reduction projects (ADB, 2017). In Kenya, investments in climate smart agriculture aim to increase productivity and build resilience to climate-change on smallholder farming and pastoral communities by scaling up climate-smart agricultural practices, strengthening climate-smart agricultural research and seed systems, and supporting agrometeorological, market, climate, and advisory services. Built into the program is a credit line to provide immediate support in the event of a crisis (World Bank, 2017). These investments, together with others in service delivery and integrated flood risk management, are about building communities that are resilient to climate extremes. By reducing the potential impact of climate shocks and disasters on vulnerable communities the drivers of displacement can be explicitly addressed within a broader sustainable development approach.

PART II

Summaries of Select Academic Articles and Research Reports*

Global Report on Internal Displacement 2023: Internal Displacement and Food Insecurity

Internal Displacement Monitoring Center (IDMC), June 2023

<https://www.internal-displacement.org/global-report/grid2023/>

The 2023 Global Report on Internal Displacement (GRID) **presents global figures for internal displacement due to conflict and violence and disasters**. This year's report also includes a special section on the intersecting dynamics and consequences of displacement and food insecurity.

Main messages:

- **The global number of IDPs (Internally Displaced Persons) increased to 71 million at the end of 2022**, an increase of 20 percent since 2021 and the highest figure ever recorded. This includes 62.5 million IDPs displaced by conflict and violence across 65 countries and territories and 8.7 million IDPs displaced by disasters across 88 countries and territories.
- **Worldwide, 60.9 million internal displacements, or movements were recorded in 2022**, 60 percent more than in 2021 and the highest figure ever recorded.
- **Disasters triggered 32.6 million new displacements in 2022**, a 41 percent increase above the annual average of the past ten years. 98 percent of disaster-

*The JDC Quarterly Digest provides summaries of published research to encourage the exchange of ideas on topics related to forced displacement. The findings, interpretations and conclusions expressed in the literature included in this review are entirely those of their authors and do not necessarily represent the views of the Joint Data Center, UNHCR, the World Bank, the Executive Directors of the World Bank or the governments they represent. For convenience, the Digest contains links to websites operated by third parties. The Joint Data Center and its affiliate organizations do not represent or endorse these sites or the content, services and products they may offer, and do not guarantee the accuracy or reliability of any information, data, opinions, advice or statements provided on these sites.

induced displacements were caused by weather-related hazards such as floods, storms, and droughts, with record levels of flood displacement recorded in Pakistan, Nigeria, and Brazil. In the Horn of Africa, the worst drought in 40 years triggered 2.1 million movements, including 1.1 million in Somalia alone, fueling acute food insecurity across the region. Displacement caused by slow-onset hazards linked to climate change is still largely unaccounted for in the global figures.

- **Conflict and violence caused 28.3 million movements in 2022**, almost double the figure in 2021, and three times higher than the annual average of the past ten years. Sixty percent of conflict-induced displacements (16.9 million) were recorded in Ukraine, the highest annual figure ever recorded for any country. Thirty-two percent of the global total was recorded in sub-Saharan Africa. Democratic Republic of Congo (DRC) accounted for around four million and Ethiopia just over two million movements.
- **Three-quarters of the world's IDPs live in just 10 countries:** Syria, Afghanistan, DRC, Ukraine, Colombia, Ethiopia, Yemen, Nigeria, Somalia, and Sudan. In many of these countries, disasters and conflict overlapped in 2022, causing prolonged and repeated displacement. Sub-Saharan Africa and the Middle East and North Africa continue to have the highest numbers of IDPs.
- **Conflict, disasters, and displacement have aggravated global food insecurity.** While data on food security and internal displacement are incomplete, the available data show that these phenomena overlap. Three-quarters of countries facing crisis levels of food insecurity had internally displaced populations. Just five countries experiencing the highest levels of food insecurity (DRC, Nigeria, Afghanistan, Ethiopia, and Yemen) were also home to more than 26 million IDPs, over a third of the global total. Conflict and violence are major triggers of internal displacement, and some of the main causes of acute food insecurity globally, including the disruption of the production and distribution of food. Sudden-onset climate hazards trigger displacement, but also damage or destroy crops and food stocks, warehouses and other assets needed to produce, deliver, and sell food, while slow-onset hazards can leave entire areas unsuitable for agriculture and force communities to move.

The report proposes three priority actions to address the overlapping problems of food insecurity and internal displacement:

- **Support IDPs using cash assistance and social protection.** Anticipatory action, including cash assistance, can reduce the impacts of food insecurity linked with displacement. Social protection systems offer another solution, particularly when tailored to address the specific vulnerabilities of groups like IDPs.
- **Support livelihoods and skills development for IDPs' self-reliance.** Developing IDPs' livelihoods and skills can increase their food security self-reliance.
- **Fill data gaps.** Filling data gaps would provide evidence on the common drivers and impacts of displacement and food insecurity, including how IDPs are affected by disruptions to food systems.

Synthesis Report of the IPCC Sixth Assessment Report (AR6)

The Intergovernmental Panel on Climate Change (IPCC), March 2023
<https://www.ipcc.ch/assessment-report/ar6/>

The Synthesis Report of the IPCC Sixth Assessment Report (AR6) **summarizes the state of knowledge of climate change, its impacts and risks, and climate change mitigation and adaptation**, based on peer-reviewed scientific, technical, and socio-economic literature published since the release of the IPCC's Fifth Assessment Report (AR5) in 2014.

Main findings relevant to climate-induced displacement:

- **Climate change is increasing weather and climate extremes around the world.** Climate change is already affecting weather and climate extremes in every region of the world, including heatwaves, heavy precipitation, droughts, and tropical cyclones. Weather and climate extreme events will become larger in the near term with global warming.
- **Increasing weather and climate extremes are causing widespread adverse impacts and related losses and damages to nature and people.** Weather and

climate extremes have exposed millions of people to acute food insecurity and reduced water security, with the largest impacts in Africa, Asia, Central and South America, least developed countries, small island states, and the Arctic, and for small-scale food producers, low-income households, and indigenous peoples. Losses and damages are projected to increase with global warming.

- **Poor and vulnerable communities will continue to be disproportionately affected.** Vulnerability to climate-related hazards is higher in places with poverty, governance challenges and limited access to basic services and resources, violent conflict, and high levels of climate-sensitive livelihoods (e.g., smallholder farmers, pastoralists, fishing communities), as many of these factors constrain adaptation options.
- **Future exposure to climatic hazards is increasing globally** due to socio-economic development trends such as growing inequality, and when urbanization or migration increase exposure.
- **Climate change is increasingly driving displacement and involuntary migration, exacerbating vulnerability.** Climate and weather extremes are increasingly triggering displacement in Africa, Asia, North America, and Central and South America, with small island states in the Caribbean and South Pacific disproportionately affected relative to their population size. Climate-induced displacement and involuntary migration is in turn generating and perpetuating vulnerability.
- **Reducing future risks of involuntary migration and displacement due to climate change is possible through cooperative, international efforts to enhance institutional adaptive capacity and sustainable development.** Increasing adaptive capacity minimizes risk associated with involuntary migration and immobility and improves the degree of choice under which migration decisions are made, while policy interventions can remove barriers and expand the alternatives for safe, orderly, and regular migration that allows vulnerable people to adapt to climate change.

Climate change increased extreme monsoon rainfall, flooding highly vulnerable communities in Pakistan

Friederike E L Otto, Mariam Zachariah, Fahad Saeed, Ayesha Siddiqi, Shahzad Kamil, Haris Mushtaq, T Arulalan, Krishna Achuta Rao, S T Chaithra, Clair Barnes, Sjoukje Philip, Sarah Kew, Robert Vautard, Gerbrand Koren, Izidine Pinto, Piotr Wolski, Maja Vahlberg, Roop Singh, Julie Arrighi, Maarten van Aalst, Lisa Thalheimer, Emmanuel Raju, Sihan Li, Wenchang Yang, Luke J Harrington, and Ben Clarke
Environmental Research: Climate, Volume 2, Number 2 (2023), Article number 025001

<https://iopscience.iop.org/article/10.1088/2752-5295/acbfd5/meta>

This paper **examines the role of human-induced climate change in the extreme monsoon rainfall that led to widespread flooding in Pakistan in 2022**. The flooding affected over 33 million people, destroyed 1.7 million homes, and caused nearly 1,500 deaths, with disproportionate effects among vulnerable populations.

The authors use probabilistic event attribution, a scientific method used to determine the likelihood that a specific weather event was caused by human-induced climate change. The authors repeat the analysis using a variety of climate models to assess the robustness of their findings and assess the range of possible outcomes.

The authors consider two regions in their analysis: (1) the region covering the entire Indus river basin; and (2) a smaller region covering only the southern provinces of Sindh and Balochistan. They define two events as follows: (a) the annual maximum of the mean 60-day precipitation during June–September, over the Indus river basin (capturing the monsoon rainfall season), and (b) the annual maximum of the mean 5-day precipitation in June–September over the Sindh and Balochistan provinces (capturing the most extreme spell).

The analysis is based on detailed precipitation data drawn from three sources: (1) the Climate Prediction Center (CPC) dataset produced by the National Oceanic and Atmospheric Administration (NOAA) in the United States; (2) the fifth generation of the European Reanalysis (ERA5) dataset produced by the European Centre for Medium-Range Weather Forecasts (ECMWF); and (3) Integrated Multi-satellitE Retrievals for Global Precipitation (IMERG) dataset produced by the Global Precipitation Measurement (GPM) mission.

Main findings:

- **Most models show a potentially large increase in likelihood and intensity of 60 day and 5 day extreme rainfall values.**
- Best estimates indicate that climate change has led to an estimated 50 percent increase in 5-day maximum rainfall intensity over Sindh and Balochistan provinces.
- It was not possible to estimate the impact of climate change on 60-day rainfall across the basin, due to the high variability in rainfall in the region and relatively short observational datasets, coupled with the possibility that observed changes could have a variety of drivers, including, but not limited to, climate change.

The authors conclude that **intense rainfall has become heavier as Pakistan has warmed, with some models suggesting that climate change could have increase rainfall intensity by 50 percent.** The authors note that other factors have contributed to the impact of the floods, including the proximity of human settlements, infrastructure (homes, buildings, bridges), and agricultural land to flood plains, inadequate infrastructure, limited ex-ante risk reduction capacity, an outdated river management system, underlying vulnerabilities driven by high poverty rates and socioeconomic factors (e.g., gender, age, income, and education), and ongoing political and economic instability.

The migration response to increasing temperatures

Cristina Cattaneo and Giovanni Peri

Journal of Development Economics, Volume 122 (2016), Pages 127-146,

<https://doi.org/10.1016/j.jdeveco.2016.05.004>

This article **examines the long-run effect of temperature changes on emigration and rural-to-urban migration in poor and middle-income countries.**

The empirical analysis looks at emigration from both poor and middle-income countries as a function of temperature, and weather variables are interacted with a dummy variable taking a value of 1 if a country is poor. The authors use data on average temperature and on international migration and urbanization for 115 countries

(30 low-income countries and 85 middle-income countries) between 1960 and 2000.

The data shows that:

- The average ten-year net emigration rate is higher in middle-income countries (4.2 percent) than in low-income countries (1.8 percent). While emigration rates are stable in middle-income countries, there is more variation and a larger proportion of emigration rates that increase over time, relative to those decreasing.
- The average urbanization rate is much higher in middle-income countries (42 percent) than in low-income countries (19 percent), but both are well below the average urbanization rate in high-income countries (around 75 percent).
- Agriculture accounts for a much higher share of value-added production in low-income countries (35 percent) compared to middle-income countries (16 percent).
- Between 1960 and 2000, temperatures increased in most middle-income and low-income countries.

Main results:

- **In middle-income countries, higher temperatures increase urbanization rates and international migration.** In a middle-income country with an average yearly temperature of 22 degrees Celsius, a one degree increase in temperature (about a 5 percent increase) would increase international migration rates by 20 percent and increase urbanization rates by 4 percentage points.
- **In low-income countries, higher temperatures reduce urbanization rates and international migration, consistent with severe liquidity constraints.** In a poor country with an average yearly temperature of 22 degrees Celsius, a one degree increase in temperature (about a 5 percent increase) would decrease international migration rates by 80 percent and decrease urbanization rates by 4 percentage points. This effect is strongest in low-income countries that are highly dependent on agriculture: a one degree increase in temperature (about a 5 percent increase) would decrease international migration rates by an additional 60 percent.
- **Increasing temperatures may decrease overall emigration to OECD countries.** Rising temperatures increase emigration rates from middle-income countries only to close and non-OECD destinations but have no significant effect

on emigration to OECD countries. Low-income countries experience a decrease in emigration rates to any country.

- **In middle-income countries, long-run temperature increase promotes a structural transition away from agriculture towards more urban and productive sectors, leading to growth in average incomes.** Increases in temperature significantly decrease the agricultural share of GDP for middle-income countries. The mobility of workers into cities (with higher productivity potential) and the out-migration of poor rural workers has a positive effect on GDP per capita.
- **In low-income countries, increases in temperature slow structural transformation and reduce income.** Long run temperature increase slows structural transformation in low-income countries since poor rural workers become less likely to move to cities or abroad. Moreover, higher temperatures have a negative effect on GDP per capita.

Higher temperatures affect migration by lowering agricultural productivity both in poor and middle-income countries. In middle-income countries, lower agricultural productivity increases incentives to migrate either to urban areas or abroad, which in turn leads to a further reduction in agricultural value-added. In low-income countries, lower agricultural productivity amplifies liquidity constraints and prevents people from migrating, and consequently lower agricultural productivity does *not* trigger a structural change from rural to urban economies. The authors conclude that **in middle-income countries, migration provides an important adjustment to global warming, potentially contributing to structural change and even increasing income per worker, but this adjustment mechanism does not seem to work in poor economies.**

Climate change and migration: is agriculture the main channel?

Chiara Falco, Marzio Galeotti, and Alessandro Olper
Global Environmental Change, Volume 59 (2019), Article number 101995,
<https://doi.org/10.1016/j.gloenvcha.2019.101995>

This paper **examines the causal effect of weather variations on agricultural productivity and international migration.**

The authors employ a two-stage least square (2SLS) empirical approach, whereby they first regress agricultural outcomes on climate variables, and then regress migration on the predicted agricultural outcomes. The analysis is based on data on 108 poor and middle-income countries from 1960 to 2010 covering international migration, temperature and precipitation, agricultural output and agricultural productivity, proportion of land area that is irrigated, per capita income, conflict, quality of institutions, life expectancy at birth, export diversification, and diaspora networks in destination countries. The data indicates that:

- The average migration rate in the period considered (1960–2010) is 2.9 percent (2.4 percent for low-income countries and 3.5 percent for the middle-income countries).
- The agricultural share of GDP in low-income countries (31 percent) is more than twice that in middle-income countries (13 percent).
- The proportion of agricultural areas with irrigation (a measure of vulnerability to climate change), is 24 percent in middle-income countries but only 16 percent in low-income countries.

The authors demonstrate empirically that **negative shocks to agricultural productivity caused by climate fluctuations significantly increase net migration outflows for developing countries overall, and for low-income countries.** A climate-driven reduction in agricultural productivity of 1 percent below trend, over a 10-year period, induces an additional increase in the emigration rate from about 2.5 percent overall, to about 4.5 percent in poor countries. There is not a statistically significant effect in middle income countries.

The authors conclude that **negative shocks to agricultural productivity caused by (long-run) weather variation positively affect net migration outflows. The climate-agricultural-migration nexus is particularly strong for poor and most vulnerable countries,** where the agricultural sector represents the main income

stream of the population, is more vulnerable to climate shocks, and where people are more likely to use migration as an adaptation response strategy.

Climate, Conflict, and Forced Migration

Guy J. Abel, Michael Brottrager, Jesus Crespo Cuaresma, and Raya Muttarak
Global Environmental Change, Volume 54 (2019), Pages 239-249
<https://doi.org/10.1016/j.gloenvcha.2018.12.003>

There is growing public interest in climate as a driver of conflict and forced migration, however there is little empirical evidence that demonstrates a causal path from climate to conflict to forced migration. This paper **assesses the determinants of refugee flows to examine the causal link between climate, conflict and forced migration.**

Exploiting data on asylum applications for the years 2006–2015 for 157 countries, the authors employ a gravity-type model with endogenous selection to: (a) estimate the impact of climate on conflict; and (b) assess how conflict influences forced migration.

Main results:

- There is no empirical evidence of a robust link between climatic shocks, conflict and asylum seeking for the full period 2006–2015.
- **Climatic conditions, by affecting drought severity and the likelihood of armed conflict, played a significant role as an explanatory factor for asylum seeking only in the period 2011–2015.** The severity of drought episodes is mostly able to explain conflicts occurring in the interval 2010–2012 and so appear related to the emergence of armed conflict in the context of the Arab spring and the Syrian war, during which many countries were undergoing political transformation.

The authors conclude that **climatic shocks will not generate forced displacement everywhere, and the causal relationship is highly dependent on the specific country context.** They argue that climatic variations are more likely to generate asylum seeker flows in countries undergoing political transformation where conflict represents a form of population discontent towards inefficient response of the government to climate impacts. The authors also suggest that policies to improve the adaptive capacity to deal with the effects of climate change in developing countries

may have additional returns by reducing the likelihood of conflict and consequent refugee outflows.

Climate Change, Inequality, and Human Migration

Michał Burzyński, Christoph Deuster, Frédéric Docquier, and Jaime de Melo
Journal of the European Economic Association, Volume 20, Issue 3 (2022), Pages 1145–1197
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This paper **examines the long-term implications of climate change for migration and inequality**. The authors investigate: (i) the scale of climate migration; (ii) the characteristics of climate migrants including their age and educational attainment; (iii) their origins and destinations, including local displacements, migration within their country of origin, or international migration; and (iv) the socio-economic implications of climate migration.

The empirical model accounts for three types of climate change: (1) slow-onset changes in temperatures, which affect productivity in both agricultural and non-agricultural sectors; (2) rising sea levels, which cause flooding in low-elevation coastal areas; and (3) frequency and intensity of fast-onset natural disasters (heatwaves, droughts, floods, and severe storms) that result in utility and productivity losses. The model incorporates a spatial representation of the world's land surface divided into millions of pixels each measuring about 5 square kilometers at the equator.

Main results:

- **Increasing temperatures will increase migration from lower-productivity rural to higher-productivity urban localities in less-developed countries.** Median projections show that agricultural productivity will decrease more than 50 percent in regions close to the equator, while agricultural productivity will decline to a smaller degree (or even increase) at high latitudes. Non-agricultural productivity is projected to decrease by 30–40 percent in low-latitude areas and increase slightly at high latitudes. These slow onset changes, which are easier to anticipate, are projected to induce migration from lower- to higher-latitude locations. **While climate change is likely to increase the distance of migratory**

movements, it is not projected to induce a massive relocation across borders.

- **Rising sea levels are projected to generate local and regional forced displacement.** Median projections suggest that sea level will rise by approximately 0.7 meters by 2100, forcibly displacing an estimated 47 million people, destroying capital infrastructure, and reducing productivity in low lying areas. Highly populated coastal areas in the Mexican Gulf, eastern United States, and northern Europe are likely to be affected but are also expected to benefit from mitigation measures that will limit forced displacement. However, populations of many developing countries in Africa, Asia, and South America lack mitigation capacity and will be vulnerable to forced displacement. Around 25–30 percent of forced migrants are expected to migrate internationally, while 40–50 percent are expected to move inter-regionally within their home country. Rising sea levels also reduce the attractiveness of coastal areas, affecting the allocation of global migrants across destinations.
- **Fast-onset climate shocks will be concentrated in developing regions and are expected to lead to increased international migration.** Fast onset climate shocks will be concentrated in developing regions, inducing adverse effects on global GDP (a decline of 12.7 percent in 2100), inequality and poverty. The economic impact of these shocks will increase incentives to migrate, but internal migration responses will be limited due to the spatial correlation of fast-onset shocks. Consequently, the number of international migrants is projected to increase significantly, by a factor of 2–3.
- **Climate change will deepen the gap between developing and developed countries and between rural and urban areas, increasing extreme poverty in many developing regions.** Climate change is projected to intensify global inequality, with losses in gross domestic product (GDP) concentrated in Africa, Asia, and South America. Climate change is also projected to accelerate urbanization, especially in developing countries. Median projections indicate that 9.5 percent of the world’s population will be living in extreme poverty, compared to 4 percent without climate change.
- **Overall, median projections indicate that climate change will induce voluntary and forced migration of 62 million working-age individuals over the course of the 21st century.** In this mid-range scenario, climate change is

estimated to induce 62 million working-age migrants including 57 million international migrants (22 million people from Africa, 27 million from Asia, and 6 million from South America). It is projected that 24 million climate migrants will go to Europe, 17 million to North America, and 5 million to Oceania.

- **Climate change raises the world's stock of human capital, as people tend to move from poorer regions to richer regions, where there is almost universal access to education.** Compared to those staying in home countries, climate migrants are more educated (especially migrants leaving Africa), and tend to move longer distances, substituting within-country for cross-border movements.

The authors argue that aggregate numbers of international migrants are relatively small from the perspective of sending countries, indicating that **international climate migration will be a costly and unlikely adaptation strategy for most people affected by climate change.** The authors conclude that it is **unlikely that climate shocks will induce massive international flows of migrants**, except under combined extremely pessimistic climate scenarios and highly permissive migration policies. Rather, **moderate migration responses to climate change imply that many will be trapped in impoverished and troubled regions, inducing significant increases in extreme poverty.**

Climate refugees or labour migrants? Climate reductive translations of women's migration from coastal Bangladesh

Camelia Dewan

Journal of Peasant Studies (2023)

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This article **examines the multifaceted socio-economic and environmental causes of migration from coastal regions in Bangladesh.**

The analysis is based on qualitative research undertaken by the author in multiple sites in southwest coastal Bangladesh between August 2014 and July 2015. The research included in-depth interviews with development professionals in Dhaka and Khulna cities, observation of village life in the two unions of Nodi, and a qualitative survey of around 400 households in Nodi.

The author argues that three problematic “misreadings” of the socioecological landscape in Bangladesh arise from ‘climate reductive translations’ of migration, that is the tendency to reduce complex social and economic drivers of migration into a single environmental cause. These misreadings are:

- Attributing migration to climate change misreads coastal vulnerabilities and the importance of migration as an agrarian livelihood strategy to deal with rural precarity and debt, including for divorced women and widows.
- Misreading migration caused by saline tiger-prawn cultivation, infrastructure-related waterlogging and riverbank erosion as climate displacement or migration.
- Framing climate change as causing ‘gendered displacement’ ignores the importance of affective kinship relations in shaping single women’s migration choices.

The author concludes that migration from coastal Bangladesh is a complex phenomenon that cannot be reduced to a single cause, such as climate change. The author argues that common misunderstandings of migration from coastal Bangladesh hinder debate on effective policies and interventions for rural underemployment, floods, land loss, and salinization by aquacultures.

The Toll of Drought on Displaced and Vulnerable Persons in Somalia

Harriet Kasidi Mugeru and Kazusa Yoshimura

World Bank Group and World Bank-UNHCR Joint Data Center on Forced Displacement, June 2023

<http://documents.worldbank.org/curated/en/099650106132311344/IDU0c934f6e7043d304ddd0b6a10f4877b434222>

This brief **examines the impact of drought on displaced populations and their host communities in Somalia**. Between October 2021 and February 2023, a prolonged, acute drought in Somalia displaced an estimated 1.4 million people.

The analysis is based on a high-frequency phone-based survey (HFPS) undertaken by the World Bank in collaboration with the United Nations High Commissioner for

Refugees (UNHCR), National Bureau of Statistics (NBS) in Somalia and the World Bank-UNHCR Joint Data Center on Forced Displacement (JDC). The first round of the survey was conducted between November 2021 and March 2022 and the second round between July and August 2022. The survey covered about 500 households from host communities, IDPs living in camps, IDPs living outside camps, refugees, and refugee returnees.

Main findings:

- **Nine out of ten displaced and host community households had been affected by drought.** More than 95 percent of IDP (Internally Displaced Persons) households, 57 percent of refugee households, and 93 percent of host community households had been affected by drought.
- **The most widespread impact of the drought was the loss of livestock.** Host communities were most affected, with 70 percent of households having lost livestock. IDPs and refugee returnees were also greatly affected, with 54-66 percent of IDP households, and 55 percent of refugee returnees having lost livestock. 40 percent of those who had lost livestock reported severe or complete destruction of their herds.
- **Most survey respondents had delayed, reduced and/or abandoned farming activities in response to the drought.** 64 percent of host community households, and nearly 50 percent of IDPs and refugee returnees had completely abandoned crop farming due to the drought.
- **Only a third of affected households had received any drought-related assistance.** Food aid was the most usual form of assistance.
- **Food insecurity was acute among displaced and host households due to the combined effects of drought and higher food prices.** Approximately 50 percent of surveyed households had experienced moderate or severe hunger. Food insecurity was particularly severe among refugee households (more than two-thirds had suffered moderate or severe hunger) and among IDPs in camps (approximately 60 percent of had experienced moderate hunger).

Local Responses to Climate Change and Disaster-Related Migration in Solomon Islands

Rebekah Ramsay, John Cox, Lachlan McDonald, Ruth Maetala, John Clemo, Darian Naidoo, and Sonya Woo

Social Dimensions of Climate Change: Pacific Series, Research Paper 2 (2023)

<https://documents.worldbank.org/en/publication/documents-reports/documentdetail/099456503152328382/idu044b0d6c907cc80473b0bc3a04ac1c84b115a>

Communities in Solomon Islands are acutely vulnerable to the effects of climate change. Eighty percent of the population live in coastal areas vulnerable to sea level rise, coastal erosion, saltwater intrusion, and severe weather events such as drought, tropical cyclones, and flooding. Most services, infrastructure, and agricultural production are also concentrated in these vulnerable coastal areas. Climate-related displacement due to natural disasters is already occurring, including relocation of whole communities from low-lying atolls to urban areas, as well as some rural-to-rural migration.

This paper **examines the ways in which communities in Solomon Islands are experiencing and adapting to the impacts of climate change**. Specifically, the research addresses: (1) how local people understand the role of climate change and natural hazards in the decision to migrate; (2) the role of social capital and informal networks as a climate change adaptation strategy; and (3) how local people understand and navigate land access and relocation. The analysis draws on the results from research carried out in five communities in the Solomon Islands in 2021. The study adopted a mix of quantitative and qualitative methods, including household surveys, key informant interviews, and focus group discussions.

Main findings:

- **Climate change and natural hazards exacerbate local vulnerabilities.** Environmental vulnerabilities overlap with socioeconomic disadvantage, poverty, and gender inequalities. Climate change and disasters are among several drivers of migration, including social reasons (family unions, marriages, and disputes) and disparities in socioeconomic opportunities. Climate change also amplifies pre-existing vulnerabilities and disadvantages that affect migration decisions.

- **Social capital plays a significant role in how people adapt and migrate in response to climate-related vulnerabilities.** Solomon Islanders draw on their social capital, including strong and weak social ties, to negotiate climate-related migration. Informal social safety nets are an effective mechanism for sharing resources between and within locations. Migrants who relocated through family or relational ties to customary landowners had better resettlement outcomes than those who had relocated by other means. The challenges encountered during migration included the inability to meet basic material needs, access land for food gardens, and address insecure land tenure. Insufficient access to land represents a key structural barrier and cause of conflict for climate-impacted people seeking to relocate elsewhere. In response to these structural barriers, people managed land scarcity by mobilizing relationships with land owning groups on a temporary, incremental, and informal basis.
- **Locally driven migration helps alleviate population pressure, but communities seek to maintain ongoing connection to customary land or “homeland”.** People living in climate-impacted areas often migrate and relieve local population pressures but maintain connection with their “homeland”. Migration and displacement activities in response to a shock are often temporary. Most migrants expressed a desire to return to their homeland, maintained attachments to their homelands, and employed adaptive strategies that enabled ongoing physical connection to customary and ancestral lands.

The authors identify several policy and programmatic implications:

- Responses to climate change should go beyond physical adaptation measures (for example sea walls, or “climate proofing” infrastructure) to more holistic community development approaches that can support both physical adaptations to climate change, as well as strengthening communities’ social resilience.
- Responses should build on communities’ existing adaptation strategies, such as temporary and permanent migration, and relying on social networks that may extend across multiple sites and with homeland and diaspora hubs.
- Adopting a relational, small-scale, and locally negotiated land access approach may be a more effective solution to the problem of land scarcity.

- Government and donor-funded adaptation initiatives, including planned relocations, may have unintended impacts if the role of social capital and informal networks is not understood or anticipated.
- Climate-related migration can cause intangible losses for communities whose collective identities and social capital are grounded in deep cultural connections to customary land or ancestral “homelands”.

No longer a blind spot: Climate change adaptation policies must address forced displacement

Jason Gagnon and Jens Hesemann

<https://oecd-development-matters.org/2023/06/20/no-longer-a-blind-spot-climate-change-adaptation-policies-must-address-forced-displacement/>

This brief article advocates for a systemic, long-term, development-oriented approach to climate-induced displacement, alongside humanitarian responses.

The authors draw on an analysis of 42 National Adaptation Plans (NAPs) and 166 Nationally Determined Contributions (NDCs). NAPs are submitted by developing states to Conferences of the Parties (COP) and detail their medium- and long-term adaptation priorities and strategies. NDCs are climate action plans to cut emissions and adapt to climate impacts.

Main findings:

- **Only one-third of countries mention forced displacement in either NAPs or NDCs.** Forty-eight percent of states include provisions on climate-related displacement in NAPs, while 14 percent mention climate-related displacement in NDCs.
- When they address forced displacement, **NAPs and NDCs suffer lack concrete commitments, objectives, and actions on climate related forced displacement.** They fail to address concerns of pre-existing refugees and internally displaced persons, who are amongst the most vulnerable and often live in areas at-risk of being climate change. And they rarely make the connection between displacement and loss and damage.

The authors argue that ahead of the 2023 Global Refugee Forum and COP28, countries should systematically integrate forced displacement in NAPs and NDCs. This requires bringing together environmental experts, displacement experts and implementing agencies to integrate displacement into NAPs and NDCs, including extending existing adaptation initiatives to displaced persons, and developing new initiatives that address displacement impacts. Consideration should be given to addressing the root causes of climate-induced displacement, the sustainable integration of displaced populations in places where they settle, as well as regional and international implications. Finally, the authors call for better displacement disaggregated socio-economic data and analysis to enable more effective monitoring of climate actions.

Disaster Displacement in Asia and the Pacific: A Business Case for Investment in Prevention and Solutions

Internal Displacement Monitoring Center and the Asian Development Bank, 2022
<https://www.adb.org/publications/disaster-displacement-asia-pacific>

This report **provides the latest evidence on the scale and impacts of disaster displacement in the Asia and Pacific region and proposes actions to support prevention, response, and recovery.**

Main findings:

- **The Asia and Pacific region accounts for most global disaster displacement, and the scale of displacement is projected to increase with climate change.** More than 225 million internal displacements were reported during 2010–2021, equivalent to 78 percent of the global total during this period. Climate change is making some hazards in the region more frequent and intense, and as more people settle in hazard-prone areas, it is likely that disaster displacement will increase in the future.
- **Weather-related hazards were responsible for 95 percent of all disaster displacements across the region during 2010–2021.** Weather-related hazards displaced 213.5 million people across the region during 2010–2021, including

113.6 million internal displacements due to floods (mostly in urban coastal areas) and 98.2 million internal displacements due to storms. Geophysical events (earthquakes, tsunamis, and volcanic eruptions) accounted for 5 percent of all disaster displacements across the region during 2010–2021. Recorded internal displacements due to slow-onset hazards such as riverbank erosion, extreme temperatures, droughts, and glacial melt account for just 0.3 percent of the total, but this is a significant underestimate, given the lack of data on slow-onset hazards.

- **East Asia and Southeast Asia had the highest number of disaster displacements—two-thirds of the total—closely followed by South Asia.** All three subregions are densely populated and highly exposed to various hazards. Pacific island states are exposed to the greatest displacement risk relative to their population size.
- **The cost of disasters in the region is estimated to be several hundred billion dollars each year.** Annual economic losses caused by disasters in the Asia and Pacific region are estimated to be around US\$780 billion as of 2021, equivalent to 2.5 percent of the regional gross domestic product (GDP). In the worst climate change scenario, these losses will increase to US\$1.4 trillion by 2059, and will disproportionately affect the economies of Pacific small island states.
- **Displacement tends to exacerbate pre-existing vulnerabilities and reinforce social inequalities.** Poor households, children and youth, elderly people, LGBTIQ+ people, people with disabilities, and indigenous people are disproportionately affected by disaster displacement.
- **Pre-emptive movements or evacuations are life-saving measures undertaken to avoid or mitigate the impacts of an anticipated hazard.** The effectiveness of pre-emptive evacuations, however, depends on the responsiveness of people to evacuation orders, which varies depending on the hazard and perceived risk.
- **Investment in sustainable development and taking early action to address internal displacement will be more effective and less costly than relying on humanitarian aid in the long term.** Robust data on the scale, duration, and severity of disaster displacement—as well as its impacts on people and economies—will help guide actions to mitigate the negative consequences and realize potential opportunities for risk reduction. The urban nature of displacement

highlights the key role that urban planning and municipal administrations and services can play in preventive action and improved response. Rather than relying on humanitarian response, efforts should be made to take pre-emptive action through community resilience-building, investing in disaster risk reduction, early warning systems, and climate action.

- **Resettlement projects, whether done pre-emptively or in response to a disaster, can increase the risk of impoverishment for affected communities.** It is necessary to assess the complexity and costs involved, support livelihoods and community cohesion, involve communities in decision-making, and ensure they are provided with adequate and affordable housing.
- **There has been considerable progress across the region to develop and implement disaster displacement policies.** The Sendai Framework for Disaster Risk Reduction set the global agenda for addressing natural and human-made hazards to reduce the impact of disasters on lives, livelihoods, and economies. Most countries in the region have adopted new or revised policies and strategies that incorporate the globally agreed goals and priorities.

The report calls for expanded action to effectively mitigate the impact of disaster displacement on individuals, societies, and economies, and proposes the following actions:

- Undertake systematic data collection and analysis on disaster displacement to better understand its scale and its impacts on people and economies.
- Develop national policy frameworks on disaster displacement to ensure immediate, comprehensive, and inclusive support to IDPs.
- Invest in the planning and financing of durable solutions to disaster displacement, including options for return to areas of origin, or integration in host communities or other areas.
- Assess the risk of future disaster displacement and its potential consequences on people and economies to develop more effective, comprehensive, and inclusive prevention plans and allocate adequate resources in vulnerable areas.

- Strengthen regional collaboration on disaster displacement and foster the sharing of knowledge, experience, and expertise across Asia and the Pacific.

Annex A: Overview of Articles

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