

# GROUNDSWELL

PREPARING FOR INTERNAL CLIMATE MIGRATION

## Overview



**WORLD BANK GROUP**

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## Overview

# Acknowledgements

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The core research team comprised Kanta Kumari Rigaud (World Bank), Alex de Sherbinin (CIESIN), Bryan Jones (CUNY), Jonas Bergmann, Viviane Clement, Kayly Ober (World Bank), Jacob Schewe (PIK), Susana Adamo (CIESIN), Brent McCusker (West Virginia University), Silke Heuser, and Amelia Midgley (World Bank). Critical support was provided by Rubaina Anjum, Anam Basnet (World Bank); Alyssa Fico, Tricia Chai-Onn, Valentina Mara, Malanding Jaiteh, Marc Levy, Kytt MacManus, Jane Mills, Kira Topik, Haibin Xia, Greg Yetman (CIESIN); Anastasia Clark (CIDR); and Jan Volkholz (PIK).

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**Internal climate  
migrants are rapidly  
becoming the human  
face of climate change.**

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**By 2050—in just three  
regions—climate  
change could force  
more than 143 million  
people to move within  
their countries.**

.....



Sub-Saharan Africa by 2050

**86 million**  
internal climate migrants

“ In the planting season, it wouldn't rain, but when we didn't want it, it would rain. This created drought and because of this I didn't want to suffer anymore. I wanted to try my luck in the city, so I came to Hawassa.”

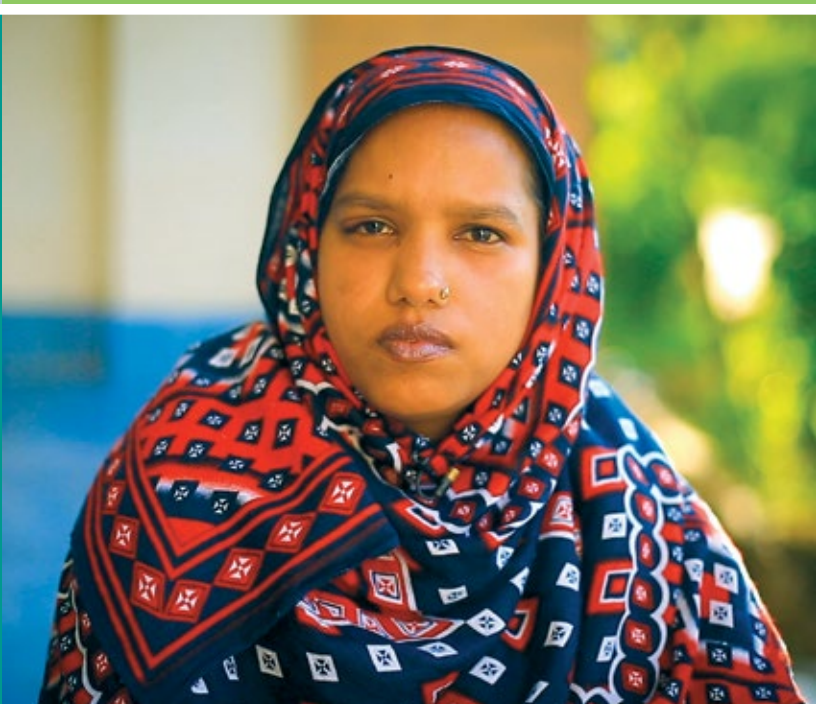
—Wolde Danse (28) Ethiopia

South Asia by 2050

**40 million**  
internal climate migrants

“ Floods come every year, but this year the situation is worse. Now all my family is living in one relative's house. I don't want to go back to my village, mainly because of the flood. In Dhaka, I can work and have a good secure life.”

—Monoara Khatun (23) Bangladesh



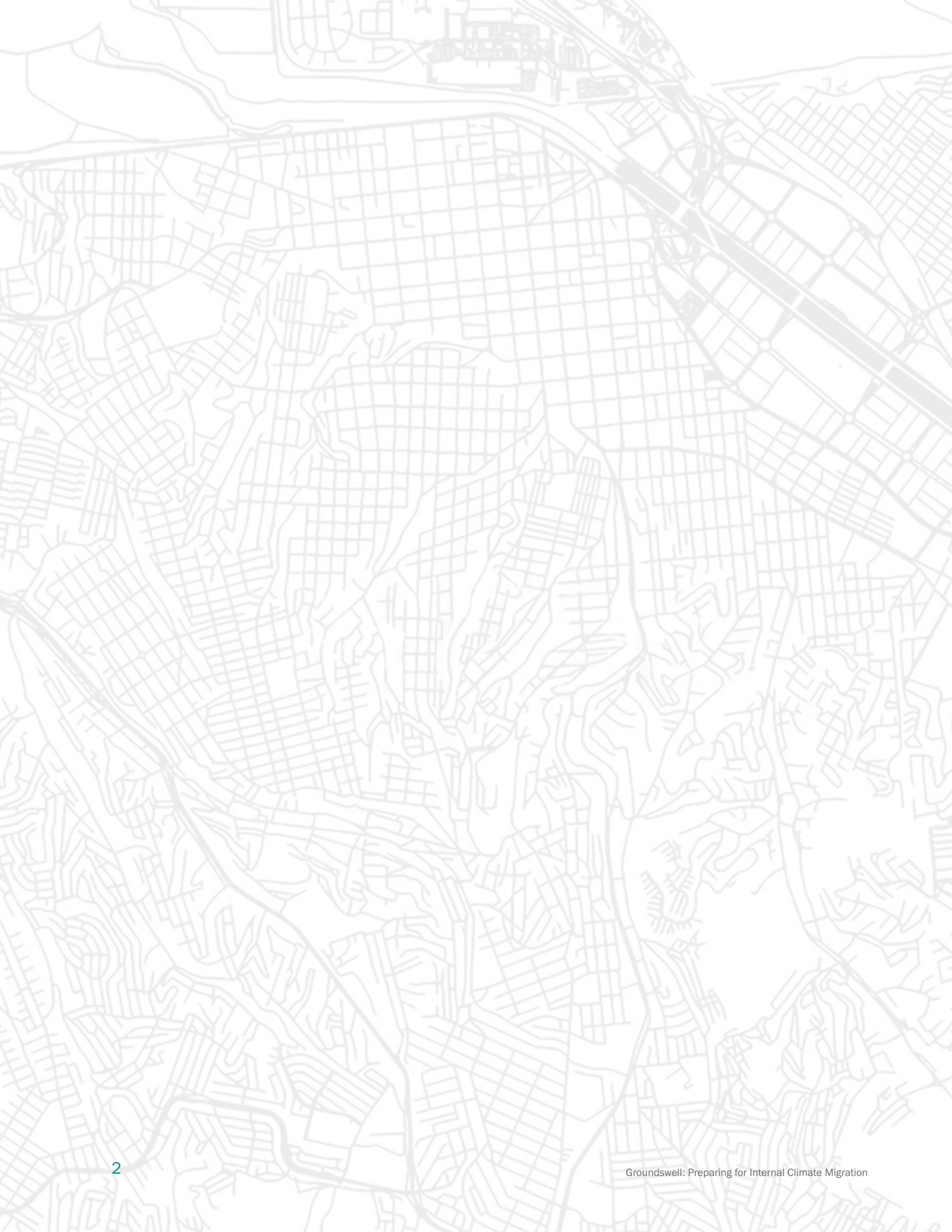
Latin America by 2050

**17 million**  
internal climate migrants

“ ...we have jobs here so people migrate very little, there isn't a high need to go away...at the forest level there is employment; in businesses there is employment. The quality of the wood is one of our priorities. We have the famous green seal as a certified forest and not many communities have it.”

—Javier Martinez (26) Mexico







## **Kristalina Georgieva**

Chief Executive Officer (CEO), World Bank

Every day, climate change becomes a more urgent economic, social, and existential threat to countries and their people. We see this in cities facing unprecedented water crises, in coastal areas experiencing destructive storm surges, and in once vibrant agricultural areas no longer able to sustain essential food crops.

And, increasingly, we are seeing climate change become an engine of migration, forcing individuals, families and even whole communities to seek more viable and less vulnerable places to live.

This report brings a much-needed focus to the nexus between climate change, migration and development in three regions: Sub-Saharan Africa, South Asia and Latin America. Its startling conclusion is that they may have to cope with more than 143 million internal climate migrants by 2050 unless concerted action is taken at the national and global levels.

Internal, rather than cross-border, migration is the report's central focus for good reasons. There is growing recognition among researchers that more people will move within national borders to escape the effects of slow-onset climate change, such as droughts, crop failure, and rising seas.

The number of climate migrants could be reduced by tens of millions as a result of global action to reduce greenhouse gas emissions and with far-sighted development planning. There is an opportunity now to plan and act for emerging climate change threats.


At the World Bank Group, we support countries to tackle their climate challenges and to build robust social protection systems. This work ranges from investing in emissions-reducing solar and wind power projects to developing climate insurance mechanisms to protect the most climate-vulnerable countries from economic disaster. We also work with countries to identify the risks they face from growing threats like climate change and plan accordingly.

We also have a role to play in the global dialogue about how to better manage and prepare for climate change and its effects. At this moment, the world is working towards Global Compacts on migration and refugees as well as ways that the UN Framework Convention on Climate Change can address human displacement.

Internal climate migration is a development issue. Unless we act it will become the human face of climate change.



# Overview



In recent times, cross-border migration and its implications for host countries have captured high-profile global attention. But there is increasing recognition that far more people are migrating within their own countries than across borders. They move for many reasons—economic, social, political, and environmental. Now, climate change has emerged as a potent driver of internal migration, propelling increasing numbers of people to move from vulnerable to more viable areas of their countries to build new lives.

## KEY FINDINGS

This report, which focuses on three regions—Sub-Saharan Africa, South Asia, and Latin America that together represent 55 percent of the developing world’s population—finds that climate change will push tens of millions of people to migrate within their countries by 2050. It projects that without concrete climate and development action, just over 143 million people—or around 2.8 percent of the population of these three regions—could be forced to move within their own countries to escape the slow-onset impacts of climate change. They will migrate from less viable areas with lower water availability and crop productivity and from areas affected by rising sea level and storm surges. The poorest and most climate-vulnerable areas will be hardest hit. These trends, alongside the emergence of “hotspots” of climate in- and out-migration, will have major implications for climate-sensitive sectors and for the adequacy of infrastructure and social support systems. The report finds that internal climate migration will likely rise through 2050 and then accelerate unless there are significant cuts in greenhouse gas emissions and robust development action.

## APPROACH

Understanding the scale of internal climate migration and the patterns of people’s movements is critical to countries so they can plan and prepare. But robust projections of internal climate migration over large areas are rare. This report—the first of its kind to introduce slow-onset climate impacts into a model of future population distribution—attempts to fill that gap. The focus on slow-onset climate impacts (water stress, crop failure, sea level rise) rather than rapid onset events such as floods and hurricanes, leads to a lower-bound estimate of the likely overall impact of climate change on migration across the three regions.

Beyond the three main regions of focus (Sub-Saharan Africa, South Asia and Latin America), deeper analysis was undertaken for three subregions: East Africa, South Asia (in its entirety), and Mexico and Central America which have contrasting climatic, livelihood, demographic, migration, and development patterns. Results were further contextualized through three country examples: Ethiopia, Bangladesh, and Mexico.

The model applies demographic, socioeconomic, and climate impact data at a 14-square kilometer grid cell level to model likely shifts in population within countries. To address the uncertainties of analyzing migration over the next 30 years, the report considers three potential climate and development scenarios. The model can be customized and expanded at different scales. Future work could modify and extend the models to more countries, more climate scenarios, and longer time periods, but also to more local levels. The scenario-based results should be seen as a plausible range of outcomes rather than precise forecasts.

## The three scenarios are:

- “pessimistic” (high greenhouse gas emissions combined with unequal development pathways)—the “reference scenario” for the report;
- “more inclusive development” (similarly high emissions but with improved development pathways); and
- “more climate-friendly” (lower global emissions combined with unequal development).<sup>1</sup>

This scenario approach provides policymakers with a way to better understand and plan for the likely movement of people within their countries—over time and across different geographies—due to climate change impacts.

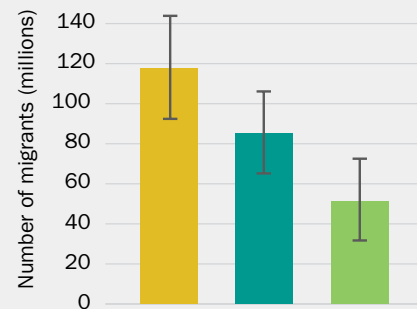
**Figure 1: Projected number of climate migrants in Sub-Saharan Africa, South Asia, and Latin America under three scenarios, by 2050**

### PLAUSIBLE SCENARIOS

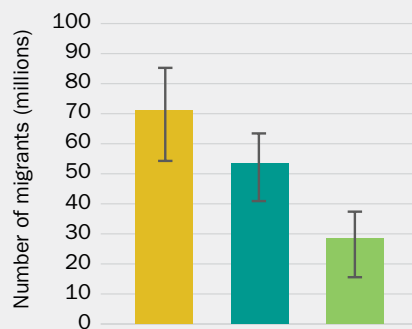
■ Pessimistic (Reference) 
 ■ More Inclusive Development 
 ■ More Climate-Friendly



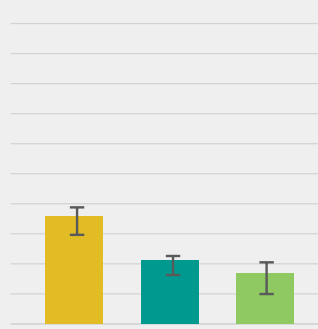
### TOTAL FOR THE THREE REGIONS



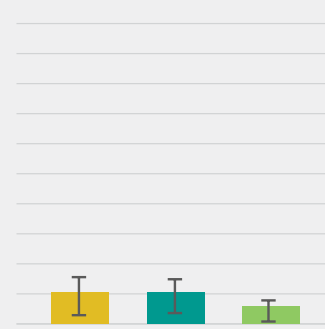
### SUB-SAHARAN AFRICA



### SOUTH ASIA



### LATIN AMERICA



Note: The whiskers on the bars in the charts represent the 95th percentile confidence intervals.

<sup>1</sup> According to the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report under the lower emissions scenario, temperatures are likely to peak at 0.4°–1.6°C above baseline levels by 2050 and then stabilize. For the higher emissions scenarios, temperatures rise by 1.4°–2.6°C by 2050, and by 2.6°–4.8°C by 2100.

# Key messages

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## MESSAGE 1:

**The scale of internal climate migration will ramp up by 2050 and then accelerate unless concerted climate and development action is taken.**

Under all three scenarios in this report, there is an upward trend of internal climate migration in Sub-Saharan Africa, South Asia, and Latin America by 2050. In the worst-case or “pessimistic” scenario, the number of internal climate migrants could reach more than 143 million (around 86 million in Sub-Saharan Africa, 40 million in South Asia, and 17 million in Latin America) by 2050 (Figure 1). The poorest people and the poorest countries are the hardest hit.

In the “more inclusive development” scenario, internal climate migration across the three regions could drop to between 65 and 105 million. The “more climate-friendly” scenario projects the fewest internal climate migrants, ranging from 31 million to 72 million across the three regions.

Across all scenarios, climate change is a growing driver of internal migration. Climate change impacts (crop failure, water stress, sea level rise) increase the probability of migration under distress, creating growing challenges for human development and planning. Vulnerable people have the fewest opportunities to adapt locally or to move away from risk and, when moving, often do so as a last resort. Others, even more vulnerable, will be unable to move, trapped in increasingly unviable areas.

Internal climate migration will intensify over the next several decades and could accelerate after 2050 under the pessimistic scenario due to stronger climate impacts combined with steep population growth in many regions.



## MESSAGE 2:

**Countries can expect to see “hotspots” of climate-induced in- and out- migration. This will have significant implications for countries and future development planning.**

The report projects that climate-driven “out-migration” will occur in areas where livelihood systems are increasingly compromised by climate change impacts. These “hotspots” are increasingly marginal areas and can include low-lying cities, coastlines vulnerable to sea level rise, and areas of high water and agriculture stress (Figure 2 for East Africa). In the northern highlands of Ethiopia for example, deteriorating water availability and lower crop yields will drive climate migrants from rainfed cropland areas. Even Addis Ababa, Ethiopia’s largest city, could see slower population growth due to its reliance on increasingly unpredictable rainfall. The major cities of Dhaka in Bangladesh and Dar es Salaam in Tanzania will also experience dampened population growth due to rising sea level and storm surges.

Climate “in-migration” hotspots across the three regions emerge in locations with better climatic conditions for agriculture as well as cities able to provide better livelihood opportunities. For example, the southern highlands between Bangalore and Chennai in India, the central plateau around Mexico City and Guatemala City, and Nairobi in Kenya are likely to become areas of increased climate in-migration.

Both types of hotspots emerge by 2030, and their number and spatial extent increase considerably by 2050. Planning and early action could help shape these hotspots: they are not pre-destined.

Many urban and peri-urban areas will need to prepare for an influx of people, including through improved housing and transportation infrastructure, social services, and employment opportunities. Policymakers can prepare by ensuring flexible social protection services and including migrants in planning and decision-making. If well managed, “in-migration” can create positive momentum, including in urban areas which can benefit from agglomeration and economies of scale.

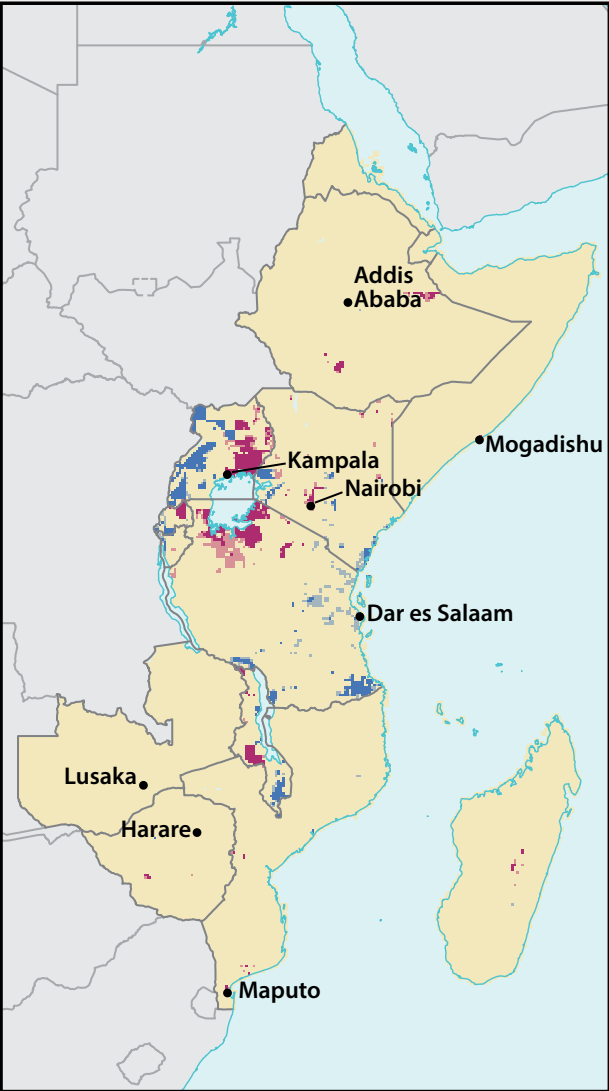
Even with expected out-migration, many climate-vulnerable areas will still need to support significant numbers of people. This increases the need for development strategies to support people to adapt locally or “stay in place” in areas where it makes sense to do so. Components of successful local adaptation strategies include: investing in climate-smart infrastructure; diversifying income generating activities; building more responsive financial protection systems for vulnerable groups; and educating and empowering women. Poverty reduction and social protection programs targeted at rural areas can help to increase adaptive capacity to climate change, potentially reducing the need for people to move under distress.

Still, “adaptation in place” has its limits. Where there is no credible long-term pathway to viable livelihoods, there is a risk that people will be induced to remain in places where conditions are deteriorating. For example, about 20 million people in coastal Bangladesh are already having their health affected from saltwater intrusion into drinking water supplies related to sea level rise. Remittances from family members working elsewhere can induce people in these areas to stay, possibly against their best interests. Without appropriate policy interventions, perverse incentives to stay in place could greatly undermine community health and well-being.

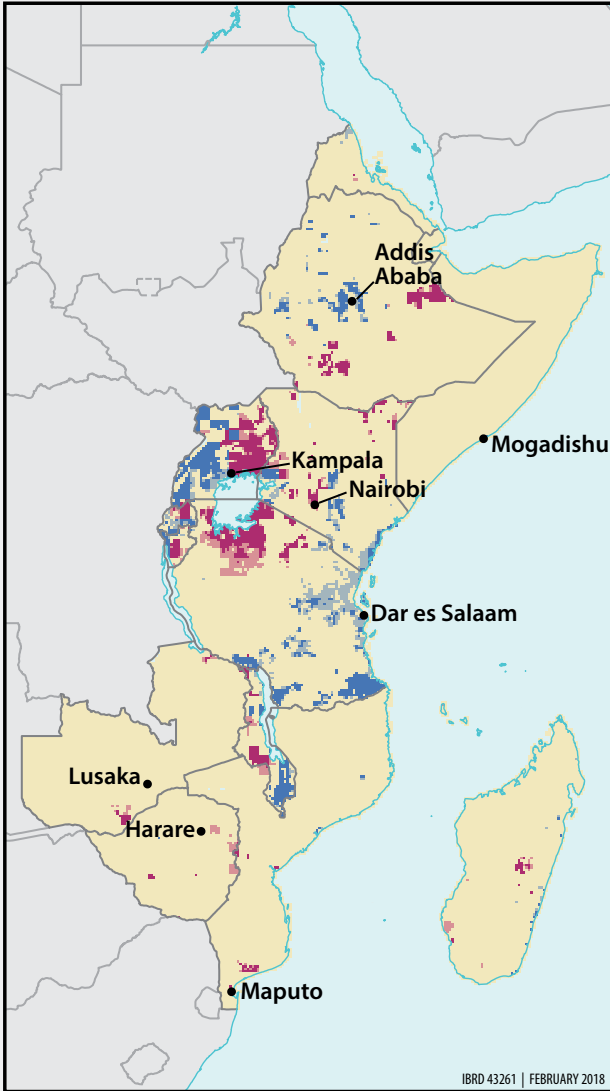
Internal climate migrants do not necessarily stop at borders. While this report does not focus specifically on cross-border migration, the modeling identifies numerous migration hotspots in areas close to national borders. Climate change can be an inhibitor or a driver of cross-border migration, depending on a range of factors that propel individuals to decide to move.

**Figure 2: Areas projected to have high climate in-migration and out-migration in East Africa, 2030 and 2050**

a. 2030



b. 2050



**IN-MIGRATION**

- High certainty in high levels of climate in-migration
- Moderate certainty in high levels of climate in-migration

**OUT-MIGRATION**

- High certainty in high levels of climate out-migration
- Moderate certainty in high levels of climate out-migration

*Note:* High certainty reflects agreement across all three scenarios modeled, and moderate certainty reflects agreement across two scenarios.



### MESSAGE 3:

## Migration can be a sensible climate change adaptation strategy if managed carefully and supported by good development policies and targeted investments.

Where the limits of local adaptation are anticipated, well-planned migration to more viable areas can be a successful strategy. A strong enabling environment for migration needs to be in place supported by direct incentives, such as skills training and job creation programs, for people to move to areas of low risk and greater opportunity. Strategies supporting internal migration need to safeguard not only the resilience of those moving, but also of those in sending and receiving communities.

Between 2030 and 2050, climate migration hotspots will intensify and possibly spread. Countries therefore will need to take a long-term, anticipatory approach to planning so that climate migrants are factored in to overall growth and development strategies.

Ethiopia, which could see a population increase of up to 85 percent by 2050 and experience lower agricultural productivity due to climate change, will need to plan for a more diversified economy, absorbing labor into non-agricultural and less climate-sensitive sectors.

Bangladesh, which is projected to have a third of the internal climate migrants in South Asia by 2050 under the pessimistic scenario, is developing a *Perspective Plan for 2041* that factors in climate change as a driver of future migration. The plan recognizes migration as a potential adaptation option for people living in the most vulnerable areas.

Mexico, as an upper middle-income country with a diversified and expanding economy that is relatively less climate sensitive, has some capacity to adapt to climate change but needs to pay close attention to its impacts on pockets of poverty.





#### MESSAGE 4:

**Internal climate migration may be a reality but it doesn't have to be a crisis. Action across three major areas could help reduce the number of people being forced to move in distress.**

Based on the report's projected range of internal migration, from a low of 31 million in the best-case to 143 million in the worst-case for the three regions, concerted action in three key areas could help reduce the number of internal climate migrants by as much as 80 percent by 2050.

##### **1. Cut greenhouse gases now**

Strong global climate action is needed to meet the Paris Agreement's<sup>2</sup> goal of limiting the future temperature increase to less than 2°C by the end of this century. Even at this level of warming, countries will be locked into a certain level of internal climate migration. Still higher levels of greenhouse gas emissions could lead to the severe disruption of livelihoods and ecosystems, further creating the conditions for increased climate migration.

Without rapid greenhouse gas emissions reductions over the next two decades, the report's pessimistic scenario is likely to become reality. Under the more climate-friendly scenario (in which greenhouse gas emissions are significantly reduced), a far lower number of people are projected to migrate in all three regions.

The window of opportunity to cut greenhouse gases and reverse warming trends is closing quickly.

##### **2. Embed climate migration in development planning**

There is an urgent need for countries to integrate climate migration into national development plans. Most regions have poorly prepared laws, policies, and strategies to deal with people moving from areas of increasing climate risk into areas that may already be heavily populated.

National agencies need to integrate climate migration into all facets of policy. To secure resilience and development prospects for all those affected, action is needed at each phase of migration (before, during, and after moving). Governments will require guidance, technical assistance, and capacity building to develop national laws, policies, and strategies that are in line with international frameworks related to climate migration. The engagement of private actors, civil society, and international organizations is key to building policy frameworks and capacity.

##### **3. Invest now to improve understanding of internal climate migration**

More investment is needed to better contextualize and understand climate migration, particularly at scales ranging from regional to local, where climate impacts may deviate from the broader trends identified in a global-scale analysis. In many cases, a richer, more detailed set of climate, biophysical, socioeconomic, and political indicators is available at regional, national, and local levels.

There are inherent uncertainties in the way climate impacts will play out in a given locale and this will affect the magnitude and pattern of climate change-induced movements. Over time, as more data become available on climate change and its likely impacts on water availability, crop productivity, and sea level rise, the scenarios and models would need to be updated.

Increasing the modeling resolution and improving data inputs to produce more spatially-detailed projections are among the possible future applications of the approach used in this report. Building country-level capacity to collect and monitor relevant data can increase understanding of the interactions

<sup>2</sup> Countries adopted the Paris Agreement at the UN Conference of the Parties—COP21—in Paris on 12 December 2015. The Agreement entered into force less than a year later. In the agreement, all countries agreed to work to limit global temperature rise to well below 2°C, and given the grave risks, to strive for 1.5°C.

among climate impacts, ecosystems, livelihoods, and mobility and help countries tailor policy, planning, and investment decisions. Including climate-related and migration questions in national census and existing surveys is a cost-effective way to advance understanding. Decision-making techniques under deep uncertainty need to be further developed and applied for policy making and development planning.

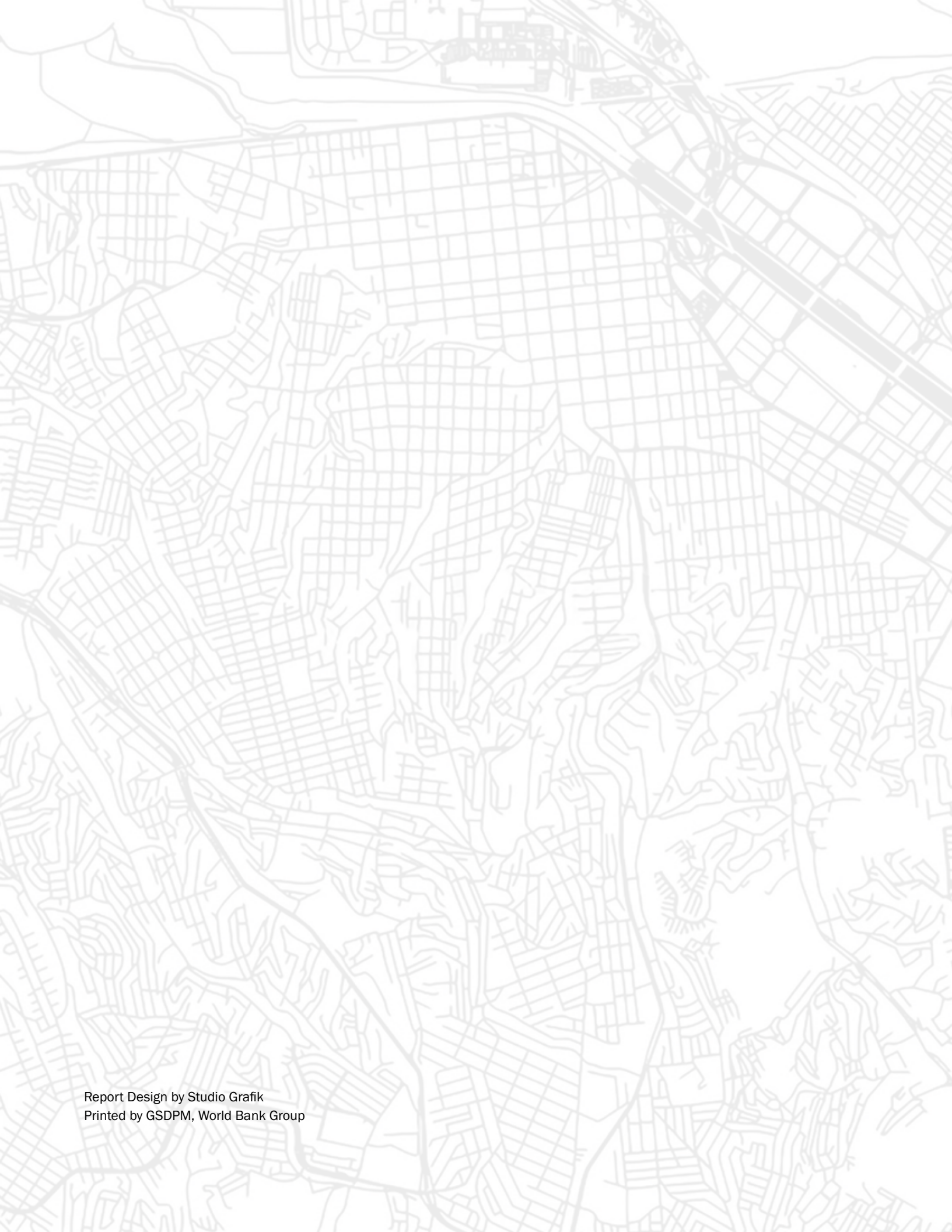
Evidence-based research, complemented by country-level modeling is vital. In support of this, new data sources—including from satellite imagery and mobile phones—combined with advances in climate information can be beneficial to improving the quality of information about internal migration. In all of these efforts, the privacy of personal data needs to be protected.

## CONCLUSION

*Groundswell: Preparing for Internal Climate Migration* helps to put a human face on the growing development issue of people being forced to move under distress to escape the long-term impacts of climate change. Its findings must be taken seriously if the world is to sustain recent development gains and provide sustainable livelihood options for all.



Photo Credit: Natalia Cieslik, World Bank





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