

GROUNDSWELL

ACTING ON INTERNAL CLIMATE MIGRATION

PART II Overview



WORLD BANK GROUP

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GROUNDSWELL



ACTING ON INTERNAL CLIMATE MIGRATION

PART II

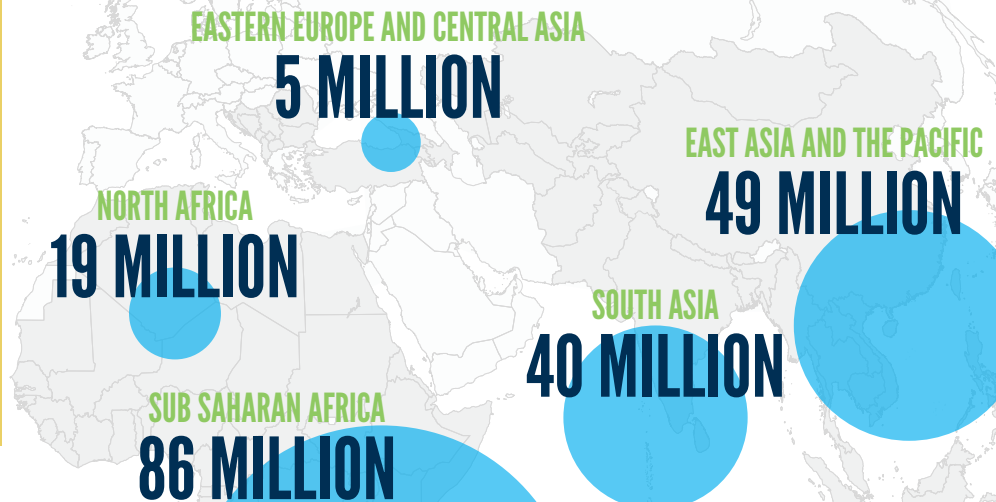
Overview

GROUNDSWELL

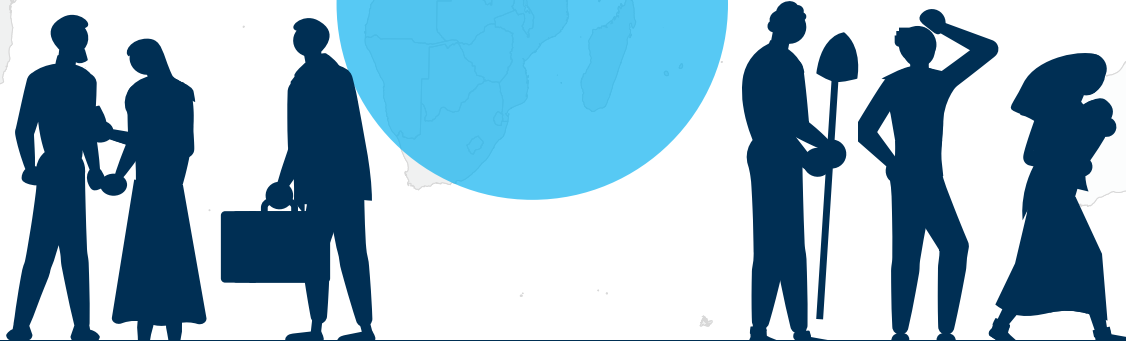
By 2050—without concrete climate and development action—climate change could lead more than

216 MILLION PEOPLE

in 6 regions to migrate within their own countries



LATIN AMERICA
17 MILLION



Hotspots of internal climate migration will intensify in rural, urban, and coastal systems

People will migrate due to slow-onset climate change impacts—those included in the model are:



Water scarcity



Lower crop productivity



Sea level rise and storm surge

Some places may become less livable—factors examined include:



Heat stress



Extreme events



Land loss

People in the Middle East and Small Island Developing States (SIDS) will also be affected by climate-driven migration

TAKING ACTION ON INTERNAL CLIMATE MIGRATION

The number of people forced to move because of climate change could be reduced by as much as 80 percent...

80%

IF WE ACT NOW TO:



CUT GLOBAL GREENHOUSE GASES

to reduce the climate pressures that drive climate migration



INTEGRATE CLIMATE MIGRATION

into far-sighted green, resilient and inclusive development planning



PLAN FOR EACH PHASE

of migration — before, during and after — to ensure positive adaptation and development outcomes



INVEST IN UNDERSTANDING THE DRIVERS

of climate migration through evidence-based research, models, and consultations, to inform policy response

Foreword



Juergen Voegele

Vice President for Sustainable Development, World Bank

Three years ago, the World Bank's first *Groundswell* report projected that, by 2050, climate change could lead 143 million people in three regions of the world (South Asia, Latin America and Sub-Saharan Africa) to migrate within their own countries. Since then, the world has been hit by the COVID-19 pandemic and a reversal of decades-long progress reducing poverty. At the same time, the impacts of climate change are increasingly visible. We have just lived through the warmest decade on record and are seeing extreme weather events around the world, with changes in the Earth's climate occurring in every region and across the [whole climate system](#).

The new *Groundswell* report builds on the work of the first, modeling three additional regions, namely East Asia and the Pacific, North Africa, and Eastern Europe and Central Asia—to provide a global estimate of up to 216 million climate migrants by 2050 across all six regions. It's important to note that this projection is not cast in stone. If countries start now to reduce greenhouse gases, close development gaps, restore vital ecosystems, and help people adapt, internal climate migration could be reduced by up to 80 percent—to 44 million people by 2050.

Without these actions, the report predicts that “hotspots” of climate migration will emerge as soon as within the next decade and intensify by 2050, as people leave places that can no longer sustain them and go to areas that offer opportunity. For instance, people are increasingly moving to cities, and we find that climate-related challenges such as water scarcity, declining crop productivity, and sea-level rise play a role in this migration. Even places which could become hotspots of climate out-migration because of increased impacts will likely still support large numbers of people. Meanwhile, receiving areas are often ill-prepared to receive additional internal climate migrants and provide them with basic services or use their skills.

The trajectory of internal climate migration in the next half-century depends on our collective action on climate change and development in the next few years. What will it take to slow it? First and foremost, early action to reduce greenhouse gas emissions to reduce the climate pressures that drive internal climate migration. This must be a global effort and it must happen now.

At the same time, it will be important to recognize that not all migration can be prevented and that, if well managed, shifts in population distribution can become part of an effective adaptation strategy, allowing people to rise out of poverty and build resilient livelihoods. Countries can start planning today for orderly and well-managed internal climate migration. This report lays out how this can be supported, including by embedding climate migration in development planning and better understanding the factors that drive it in order to craft well-targeted policies. It will also entail planning for each phase of migration—before, during, and after moving—according to the different needs of communities and countries.

Development that is green, resilient, and inclusive can slow the pace of distress-driven internal climate migration. This report is a timely call for urgent action at the intersection of climate, migration, and development.

A handwritten signature in black ink that reads "J. Voegele". The signature is written in a cursive style with a long horizontal line extending to the right.

Overview



Climate change is an increasingly potent driver of migration. This report, which builds on the 2018 *Groundswell* report, presents new regional analyses that reaffirm how climate-driven internal migration could escalate in the next three decades. Looking at slow-onset climate change impacts on water availability and crop productivity, plus sea-level rise, it highlights the urgency for action as livelihoods and human well-being are placed under increasing strain.

Internal climate migration is set to increase across regions and countries. Climate change impacts will hit the poorest and most vulnerable regions the hardest and threaten to reverse development gains. In some places, questions of habitability will arise. Exploring future scenarios and identifying patterns of potential “hotspots” for both in- and out-migration are key steps to better understand the nexus of climate, migration, and development.

The trajectory of internal climate migration in the next half-century depends on our collective action on climate and development in the next few years. The window to avert the conditions that lead to distress-driven internal climate migration is shrinking rapidly. Countries must come together and act decisively both to ensure that development is green, resilient, and inclusive, and to sharply reduce global emissions, consistent with the Paris Agreement.

It is also crucial to begin planning for orderly and well-managed internal climate migration where appropriate, so it can serve as an effective adaptation strategy with positive development outcomes. Action now at the intersection of climate, development, and migration is critical to safeguard the achievement of the Sustainable Development Goals over the next 10 years and ensure shared prosperity to mid-century and beyond.

THE GROUNDSWELL REPORT SERIES: BRIDGING THE GAP

There is an urgent need to better understand how escalating climate change impacts may affect internal migration patterns in the coming decades—to drive better informed and evidenced-based policy and planning. Governments and development partners can no longer assume that population distribution, development trends, and livelihoods in rural and urban systems will remain unchanged in the face of climate change.

The first *Groundswell* report, published in 2018, used a robust and novel modeling approach to help understand the scale, trajectory, and spatial patterns of future climate migration within countries, with a focus on three regions: Sub-Saharan Africa, South Asia, and Latin America. Specifically, it examined how slow-onset climate change impacts on water availability and crop productivity, and sea-level rise augmented by storm surge, could affect future internal migration, modeling three plausible scenarios. The report, which included subregional analyses and country case studies, aimed to inform policy dialogue and foster proactive solutions.

This second *Groundswell* report builds on that work, applying the same approach to three new regions: the Middle East and North Africa, East Asia and the Pacific, and Eastern Europe and Central Asia. Qualitative analyses of climate-related mobility in countries of the Mashreq and in Small Island Developing States (SIDS) are also provided.

The two reports' combined findings provide, for the first time, a global picture of the potential scale of internal climate migration across the six World Bank regions, allowing for a better understanding of how projected climate change impacts, population dynamics, and development contexts shape mobility trends. They also highlight the far-sighted planning needed to meet this challenge and ensure positive and sustainable development outcomes.

Both *Groundswell* reports use the same modeling approach, which allows for direct comparison of results and for aggregation to derive the global figure for internal climate migration. They take a scenario-based approach and implement a modified form of a gravity model to isolate the projected portion of future changes in spatial population distribution that can be attributed to slow-onset climate factors up to 2050. The Spotlight discusses the key innovations and scope of the modeling approach.

Spotlight: Key Features of the *Groundswell* Modeling Approach

Modeling at scale: The gravity model used in the report illuminates the relative importance of push factors (environmental or economic factors at origin that influence the decision to migrate) versus pull factors (similar factors at destination that influence the decision to migrate) over larger geographic areas. Modeling the attractiveness of locations in terms of economic or demographic characteristics, expressed as an agglomeration effect and influenced by environmental conditions, fits with existing theory. While the model does not focus on individual reasons for migration, it provides compelling information on patterns and trends to inform policy dialogue and action. To enable comparisons across countries and regions, select global datasets and scenario pathways, including spatially and temporally consistent sectoral impact datasets, were used as model inputs.

Calibration, simulation, and visualization: The model was calibrated in two periods, 1990–2000 and 2000–2010, using historical climate change impacts and population distribution data to demonstrate that populations are already sensitive to climate change impacts and assess how this sensitivity could affect population distribution in the coming decades. The projection simulations were then done in decadal steps from 2020 to 2050. Applied at the level of 14-kilometer grid cells and aggregated upward to national and regional levels, the datasets allow for the visualization of hotspots of climate in- and out-migration. The full methodology, sources of uncertainty, and possibilities for expanding the scope of the work are laid out in Appendices B and C of this report.

Spotlight: Key Features of the Groundswell Modeling Approach (cont.)

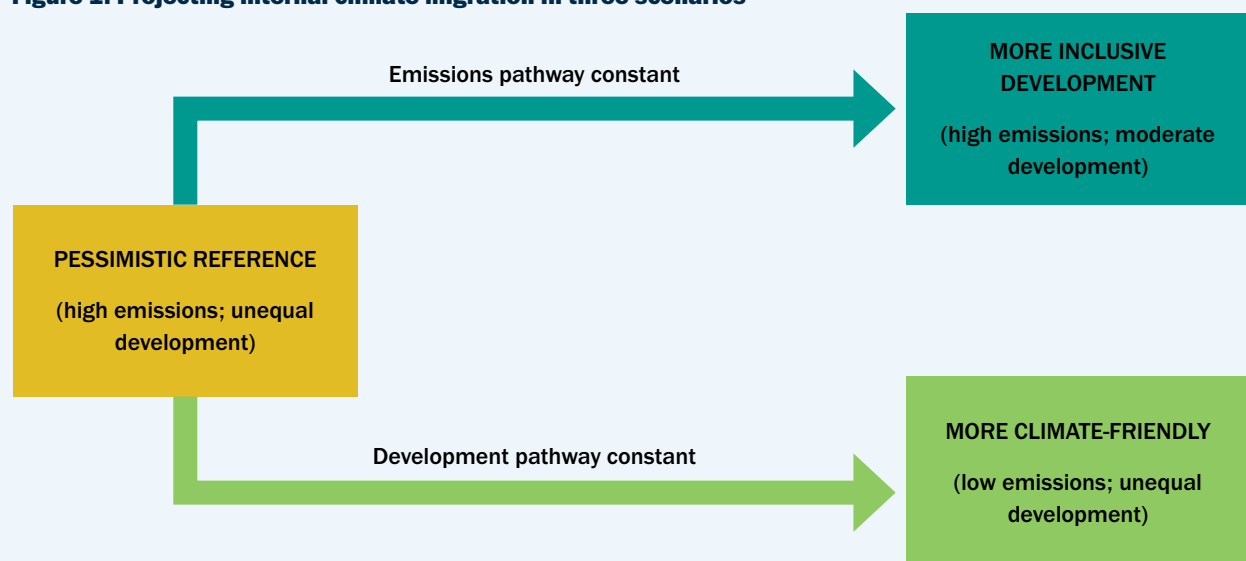
Slow-onset climate change impacts: Rather than using simple future projections for precipitation and temperature, the model uses the Inter-Sectoral Impact Model Inter-comparison Project (ISIMIP) global crop and water simulations. These represent a database of state-of-the-art model simulations of biophysical climate change impacts that are directly relevant to livelihoods and development outcomes. They offer a framework for consistently projecting the impacts of climate change across affected sectors and spatial scales. Additionally, sea-level rise, augmented by storm surge, is included as a spatial mask, reflecting expected loss of habitability in areas likely to be inundated.

A scenario-based approach: Future migration dynamics will be driven by several factors with varying degrees of uncertainty, from changes to local climate conditions to evolving political changes, social norms, or technologies. To manage this uncertainty, the report uses a scenario-based approach, which helps to explore potential futures and plan for different possible outcomes. Three internal climate migration scenarios are developed—pessimistic reference, more inclusive development, and more climate-friendly—with different combinations of development (Shared Socioeconomic Pathways) and emissions (Representative Concentration Pathways) trajectories, based on modeled inputs (see Figure 1). The range of internal climate migration within and across scenarios provide insights on how both climate- and development-related factors could affect internal climate migration over the coming decades.

Regional and country applications: Beyond the upward aggregation of internal climate migration in the regions of focus, deeper analysis is undertaken for selected subregions and individual countries. These provide valuable context for plausible internal climate migration patterns under contrasting demographic and economic profiles, vulnerability to climate risk, and past migration trends, to inform policy and planning.

Scope of the modeling approach: The modeling focuses on *internal* climate migration as the great majority of migrants do not cross borders, but rather move within their own countries, and a better understanding of this form of mobility is needed and warranted. Other forms of mobility including cross-border migration, displacement, and planned relocation, as well as immobility, are therefore not included. The modeling also focuses on *long-term* migration or shifts in population and does not reflect shorter-term, seasonal, or cyclical migrations. Moreover, it focuses mainly on the effect of *slow-onset* climate change impacts on livelihoods, through shifts in water availability and crop productivity, as well as sea-level rise augmented by storm surge. The model therefore does not reflect rapid-onset climate change impacts, such as short-term climate variations and extreme weather events, except where successive shocks accumulate over multiple years. Different forms of mobility and climate change impacts are all important for development policy and planning, and are discussed as appropriate in the report.

Figure 1: Projecting internal climate migration in three scenarios



Note:

1. The scenarios are based on combinations of two Shared Socioeconomic Pathways—SSP2 (moderate development) and SSP4 (unequal development)—and two Representative Concentration Pathways—RCP 2.6 (low emissions) and RCP 8.5 (high emissions).
2. Estimates of climate migrants are derived by comparing these plausible climate migration (RCP-SSP) scenarios with development only (SSP) or the “no climate impact” scenarios.

KEY FINDINGS



1. Internal climate migration is set to accelerate to 2050 across six regions, hitting the poorest and most vulnerable the hardest and threatening development gains.

The combined results of the two *Groundswell* reports show that by 2050, as many as 216 million people could be internal climate migrants across the six World Bank regions (at the high end of the pessimistic reference scenario), as shown in Figure 2. This represents almost 3 percent of these regions' total projected population.¹ Sub-Saharan Africa could see as many as 85.7 million internal climate migrants (4.2 percent of the total population); East Asia and the Pacific, 48.4 million (2.5 percent of the total population); South Asia, 40.5 million (1.8 percent of the total population); North Africa, 19.3 million (9.0 percent of the total population); Latin America, 17.1 million (2.6 percent of the total population); and Eastern Europe and Central Asia, 5.1 million (2.3 percent of the total population).

The scale of internal climate migration will be largest in the poorest and most climate-vulnerable regions, an indication that underlying gaps in the ability of livelihood, social, and economic systems to cope with climate change could undermine development gains. Of the six regions examined in the two reports, Sub-Saharan Africa is projected to have the largest number of internal climate migrants. The region is highly vulnerable to climate change impacts, especially in already fragile drylands and along exposed coastlines. Agriculture, which is almost all rainfed in the region, also accounts for a large share of employment. North Africa is projected to have the largest share of internal climate migrants relative to total population. This is due to a great extent to severe water scarcity, as well as the impacts of sea-level rise on densely populated coastal areas and in the Nile Delta. Within regions, there are particularly vulnerable countries that drive up the overall numbers. For example, as shown in the first *Groundswell* report, Bangladesh, with up to 19.9 million internal climate migrants by 2050, has almost half the projected internal climate migrants for the entire South Asia region.

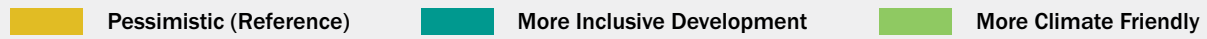
It is important to note that the estimates presented in this report are likely to be conservative for several reasons. The analysis focuses on migration driven by slow-onset climate change impacts acting through water availability, crop productivity, and sea-level rise augmented by storm surge. It also only estimates climate migration within countries and does not consider other forms of mobility. Moreover, although the two reports combined model all six World Bank regions, they do not cover most high-income countries, including in Europe and North America. The estimates also exclude the Middle East and Small Island Developing States (SIDS), which could not be modeled using the established methodology.

These projections should impart a sense of urgency for early action. Climate change could shift social, economic, and livelihood circumstances in ways that may force people to migrate in distress. This could place significant pressures on both sending and receiving areas, if left unplanned. Countries that have made important development gains may see their progress threatened, and some could face existential challenges related to habitability. Compounding shocks, including conflicts, situations of fragility, and health and economic crises, also impact decisions to move, while simultaneously reducing the capacity to cope, adapt, and rebound. Conversely, if well managed, internal climate migration and associated shifts in population distribution can become part of an effective adaptation strategy, allowing people to rise out of poverty, build resilient livelihoods, and improve their living conditions.

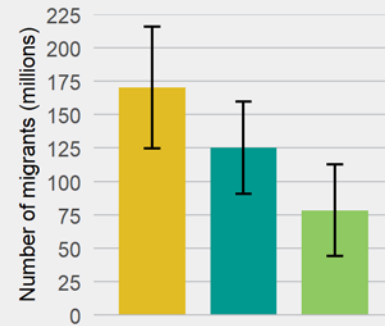
1. The report includes modeling for a total of 106 countries across the six World Bank regions.

Figure 2: Projected number of internal climate migrants across six regions, in three scenarios, by 2050

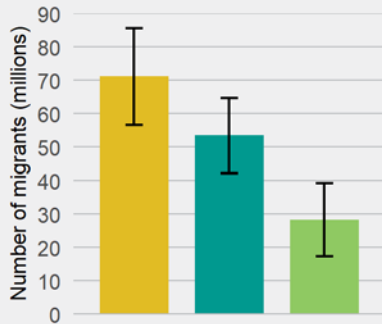
SCENARIOS



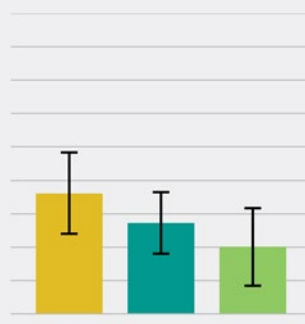
TOTAL FOR THE SIX REGIONS



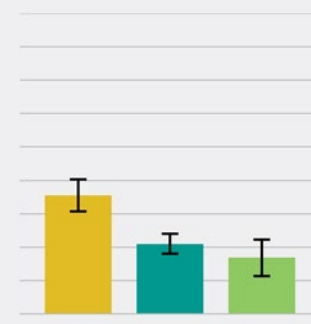
SUB-SAHARAN AFRICA



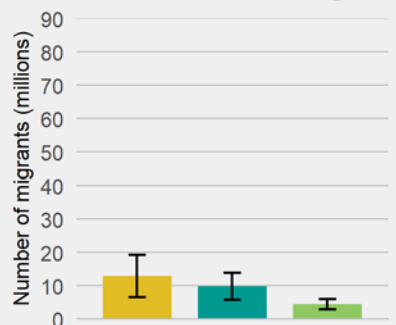
EAST ASIA & PACIFIC



SOUTH ASIA



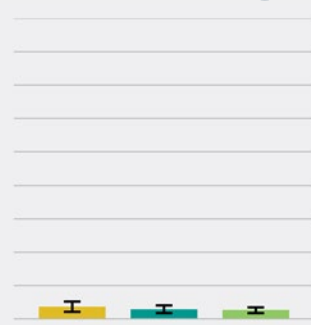
NORTH AFRICA



LATIN AMERICA



EASTERN EUROPE & CENTRAL ASIA





2. Hotspots of internal climate in- and out-migration emerge as early as 2030 and grow and intensify by 2050, highlighting the need to integrate plausible migration scenarios in spatial development.

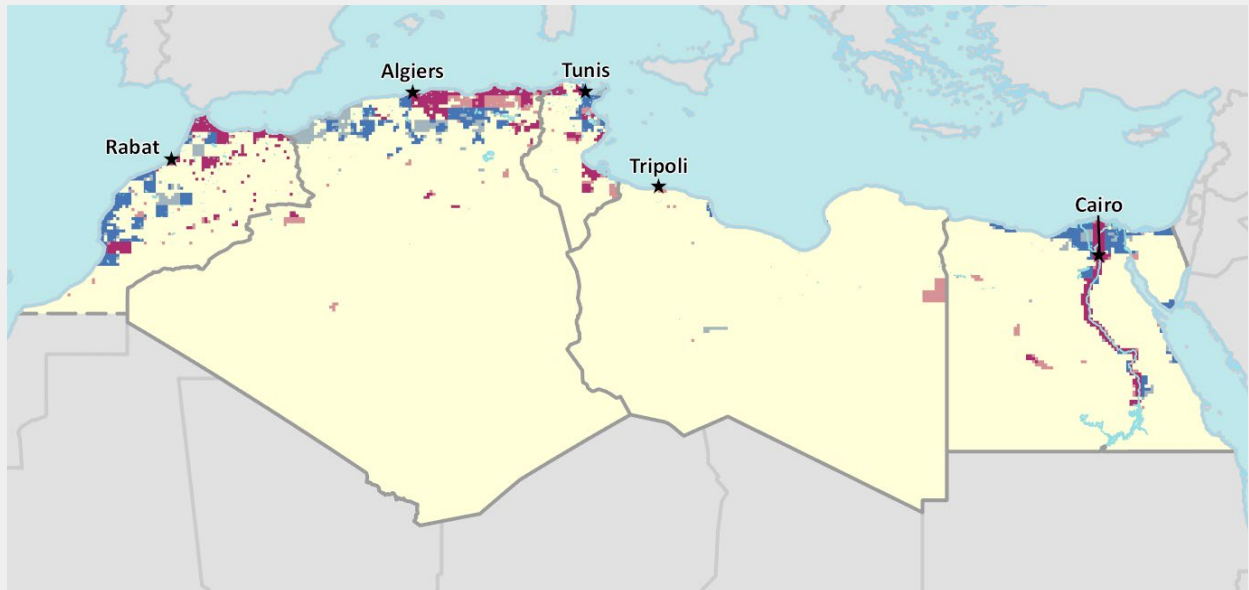
The model results show clear spatial patterns of internal climate in- and out-migration within each country and region—including hotspots that emerge as early as 2030 and are considerably more pronounced by 2050. Climate change impacts are already unfolding and are set to alter the attractiveness of livelihood and resource conditions in rural, coastal, and urban systems across regions. As a result, many countries could see shifts in population distribution, on top of already complex mobility dynamics. Development planning needs to be proactive in preparing in-migration hotspots for inflows of migrants, to ensure they are prepared to fully integrate them, while out-migration hotspots need to plan for options to adapt in place and build resilience for the populations who remain.

In North Africa, the model results show changes in water availability as a main driver of internal climate migration. They push people out of coastal and inland areas where water is becoming scarcer, slowing population growth in climate out-migration hotspots along the northeastern coast of Tunisia, the northwestern coast of Algeria, western and southern Morocco, and the already water-stressed central Atlas foothills (see Figure 3). In Egypt, the eastern and western portions of the Nile Delta, including Alexandria, could become out-migration hotspots due to both declining water availability and sea-level rise. Several places with better water availability, meanwhile, are projected to become climate in-migration hotspots, including important urban centers such as Cairo, Algiers, Tunis, Tripoli, the Casablanca-Rabat corridor, and Tangiers.

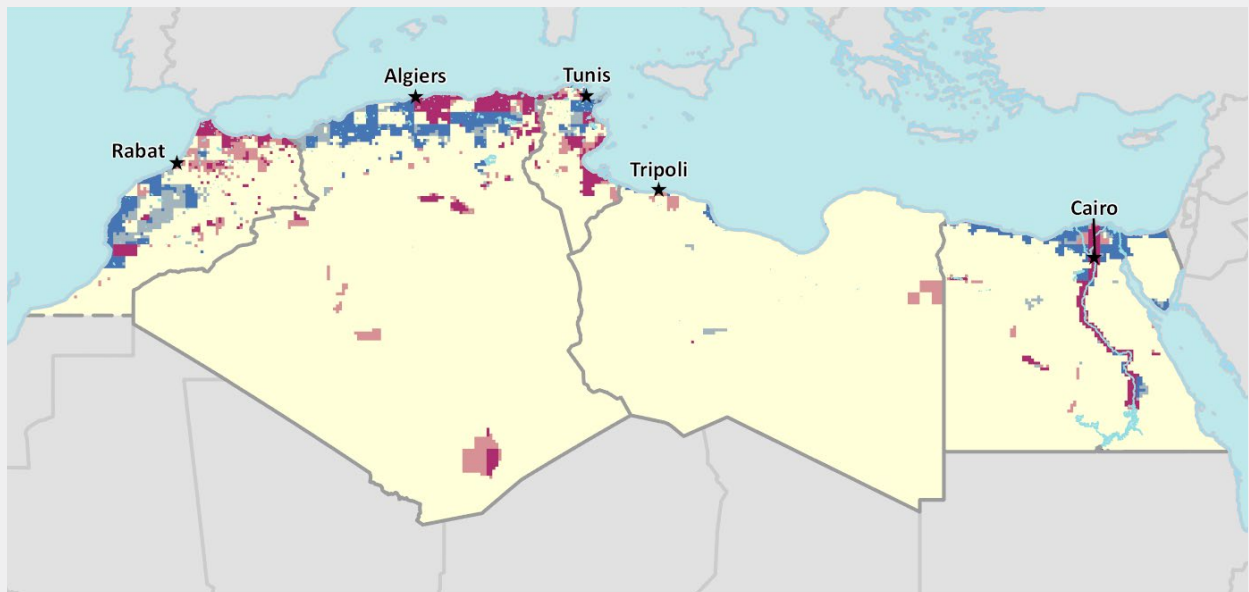


Figure 3: Areas projected to have high climate in-migration and out-migration in North Africa, 2030 and 2050

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.

In the Lower Mekong subregion, sea-level rise, augmented by storm surge, is projected to create climate out-migration hotspots in some densely populated, low-lying coastal regions—such as the Mekong Delta in Vietnam. Sea-level rise and related impacts there pose threats to key livelihoods, including rice production, aquaculture, and fisheries. Climate in-migration hotspots are projected to emerge in areas where the population is already growing, such as the Red River Delta and the coastal central region of Vietnam. Both may see more favorable water availability and crop productivity conditions, but they are also very vulnerable to increasingly frequent and severe tropical storms. Out-migration hotspots in agricultural areas of central Thailand and Myanmar coincide with areas expected to see declines in both water availability and crop productivity, while in-migration hotspots to the southeast of Phnom Penh in Cambodia along the Mekong River and southern Myanmar are expected to see increases in both factors.

In Central Asia, both water availability and crop productivity increases are projected to create climate in-migration hotspots in already densely populated and economically productive areas, such as the Ferghana Valley, and also drive migrants into new areas of potential livelihood opportunities, such as northern Kazakhstan. These projections do not take into account impacts from glacial melt, which could decrease water flows in the subregion's major rivers in the long run, potentially leading migrants to be attracted elsewhere. In the Kyrgyz Republic, reduced water availability is expected to create climate out-migration hotspots in important agricultural and pastoral areas in the northern, central, and southwestern regions, which are already seeing rural-urban migration, particularly from mountainous areas.

In many places, internal climate migration will amplify patterns of mobility that are already unfolding. The regional and country-level analyses in this report highlight the importance of tailoring approaches to the different needs, risks, and opportunities identified in emerging hotspots of climate in- and out-migration. Notably, many out-migration hotspots are economic and population growth centers that will continue to support large numbers of people despite increasing climate change impacts. This includes the Mekong Delta in Vietnam, where those who remain will face significant social, economic, and environmental risks, including from severe floods. Many in-migration hotspots also face escalating risks from both rapid-onset and slow-onset climate change impacts, even if water availability and crop productivity become more favorable. In Morocco, for example, the Tingitana Peninsula and eastern coast are expected to attract growing numbers of migrants due to better water availability, but they face sea-level rise and storm surge risks. Some oasis settlements, including Tamanrasset in southern Algeria, could see in-migration due to relative increases in crop productivity and water availability, but these are very arid areas that may have limited capacity to accommodate additional agricultural activity.

In some places, severe climate change impacts threaten habitability. In the Mashreq countries, for instance, the number of days with temperatures that exceed thresholds of human tolerance is projected to increase in several major and growing urban areas, including Amman, Aden, and Baghdad, as well as in coastal regions including southern Yemen, countries on the eastern Mediterranean, the southern coast of Iran, and the southernmost part of Iraq. Heat stress could also affect the continuity of agricultural livelihoods. Such environmental thresholds could increasingly act as push factors for migration. In many SIDS, meanwhile, sea-level rise is shrinking the available land area, while exposure to extreme weather events and the deterioration of key ecosystems and livelihood systems are raising questions about long-term habitability.



3. Early action both to cut global greenhouse gas emissions and to ensure inclusive and resilient development is essential, and can reduce the scale of internal climate migration by as much as 60–80 percent.

Global action to reduce greenhouse gas emissions could dramatically slow the rise in internal climate migration. In the more climate-friendly scenario in this report, the number of internal climate migrants would be as much as 80 percent lower by 2050 across the six regions (44 million people at the low end of the more climate-friendly scenario, compared with 216 million at the high end of the pessimistic reference scenario). The differences are particularly stark in regions with large populations in climate vulnerable areas and climate-sensitive livelihoods: Sub-Saharan Africa, East Asia and the Pacific, South Asia, and North Africa.

In the other two regions, the difference between the pessimistic reference and more-climate friendly scenarios are smaller. Latin America for instance, hosts middle-income countries with diversified economies and highly urban populations, many of which have already experienced their demographic transitions. Stronger economies can mean greater adaptive capacity and financial resources to support the most vulnerable areas and groups. In Eastern Europe and Central Asia, countries are generally less dependent on agriculture, and mobility is more heavily influenced by historical and other non-environmental factors. Still, reducing global emissions is critical to mitigating climate change impacts on vulnerable areas and livelihoods, particularly where these coincide with pockets of poverty.

Inclusive and resilient development trajectories are also central to reducing the scale of internal climate migration. In the more inclusive development scenario, this scale is reduced by up to 60 percent (91 million people at the low end of the more inclusive development scenario, compared with 216 million at the high end of the pessimistic reference scenario). This reduction is particularly evident in regions that host low- and middle-income countries, especially those with rapid demographic growth and large numbers of young people, such as Sub-Saharan Africa, South Asia, and North Africa.



The future scale, trend, and spatial patterns of internal climate migration will depend on our level of collective climate and development action now in this pivotal decade.

Photo Credit: World Bank

POLICY RECOMMENDATIONS

The first *Groundswell* report identified key policy recommendations to address the underlying drivers of internal climate migration and prepare for expected migration flows. The findings presented in this second report emphasize the importance and urgency of these actions—particularly in this pivotal decade.



1. Cut global greenhouse gases now to reduce the climate pressures that drive internal climate migration.

Managing the scale of internal climate migration will require immediate collective action to get on lower global greenhouse gas emission trajectories with differentiated strategies across regions and countries. Five years after the Paris Agreement, the world is still headed for at least 3°C of warming by 2100. Ambitious action to curb global emissions is critical to reducing the burden of climate change impacts on key resources, livelihood systems, and urban centers that may drive people to migrate in distress.

In the lead-up to COP26 in Glasgow, countries are updating and enhancing their commitments under the Paris Agreement. This is a critical opportunity to ratchet up ambition to put the world on track for net-zero emissions by mid-century and have a chance at limiting global warming to 1.5°C. Adhering to the Paris Agreement, and staying close to the more climate-friendly scenario used in this report, would help substantially reduce internal climate migration. Urgent and aggressive action on inclusive, resilient, and sustainable development alongside global action on emissions reductions will also be needed.



2. Embed internal climate migration in far-sighted green, resilient, and inclusive development planning.

The modeling results show how much the scale of internal climate migration can be reduced by pursuing more inclusive and resilient development pathways. Integrating internal climate migration in development planning is critical to address the poverty factors that make people particularly vulnerable to climate change impacts, such as a lack of viable livelihood options and lower quality assets. This is particularly important as the most vulnerable groups tend to have the fewest opportunities to adapt locally or move away from risk—and when moving they tend to do so in adverse circumstances. Systematic planning at the nexus of climate, development, and migration can help broaden the opportunities for people to adapt where they live, or else enable them to move under better circumstances.

Far-sighted development planning can also enable countries to pursue green, resilient, and inclusive economic transformations. Notably, accounting for internal climate migration alongside broader demographic patterns can help fuel momentum towards the next generation of skills and jobs in both sending and receiving areas. Good management of demographic transitions is vital in this regard and will need to be accompanied by continuing investments to enable working-age populations to find opportunities in productive and climate-resilient labor markets, with good access to health care, education, and public services. Investment in human capital can increase adaptive capacity to cope with climate change impacts, particularly empowering youth, who face high unemployment rates in certain regions, as well as women. Supporting safer, more informed, and more economically beneficial migration for women—which requires addressing gender disparities and, in some cases, shifts in social norms—can help ensure that women can realize their full potential.

Climate-smart urban and rural transitions can also provide important win-win opportunities to drive economic transitions. Primary and secondary cities can be promoted as hubs of innovation and knowledge transfer, accelerators of the digital transformation, and centers of green technology and resilient infrastructure in key sectors, including energy, water, and transport. Cities have opportunities to leverage rural-urban migration and broader urbanization trends in many regions, capitalize on agglomeration effects, and develop economies of scale. In rural areas, nature-based solutions emphasizing the protection of

ecosystem services can benefit agricultural productivity, provide buffers against floods and droughts, and enhance management of landscapes, forests, and watersheds on which livelihoods depend. More broadly, flexible social protection systems with robust and rapid delivery can significantly increase resilience to climate change and other shocks, particularly for the most vulnerable.

Development policies will also need to address compounding shocks that can increase underlying vulnerabilities and the likelihood of movement under distress. Climate change impacts can act as both a threat multiplier in the onset of other shocks, and as an amplifier in the fallout of such shocks. Fragility and conflict situations can be exacerbated by climate change, natural disasters, and natural resource degradation, putting additional stress on economic, social, and political systems. Extreme weather events can also hinder humanitarian responses to crises—as seen with the COVID-19 pandemic—or heighten the vulnerability of people returning to at-risk areas due to lockdowns in other places. Climate change, current situations of fragility and conflict, and the global pandemic make a clear case for the need to adopt migrant-inclusive risk management approaches and enhance emergency preparedness and response.

Internal climate migration should also be placed at the intersection of humanitarian, development, and peace partnerships, working with national and local stakeholders for end-to-end solutions. Global and regional dialogue and processes are starting to recognize climate change and migration in multilateral agreements and frameworks, while national governments are taking action to embed these issues in national development policies, strategies, and territorial planning. Greater cooperation, information sharing, and action needs to be pursued between the development, humanitarian, security, and disaster risk reduction communities to support countries in taking holistic action across the mobility continuum. Strong regional institutions are essential to address the multi-dimensionality of challenges. Locally led approaches working with civil society and community actors are critical to generate inclusive, participatory, and empowering solutions.



Photo Credit: World Bank



3. Plan for each phase of migration, so that internal climate migration as an adaptation strategy can result in positive development outcomes.

Planning for internal climate migration means accounting for all phases of migration—before, during, and after moving. Before migration, adapt-in-place solutions can help communities stay in place where local adaptation options are viable and sensible. During migration, policies and investments can enable mobility for people who need to move away from unavoidable climate risks. After migration, planning can ensure that both sending and receiving areas are well equipped to meet the needs and aspirations of their populations.

Policy makers will need to understand and account for differences in vulnerabilities across landscapes to provide a stronger basis for adaptive practices that would enable people to stay in viable livelihood systems. Integrated management of landscapes and natural resources, combined with resilient agri-food systems, will be central to ensuring livelihood sustainability and food security, particularly in densely populated localities or in productive areas that may already be stretched. Diversified livelihoods that are not tied to climate-sensitive sectors need to be available as options to adapt in place. Building adaptive capacity also means putting in place effective land administration systems that provide security of tenure, reduce informal tenure, and recognize customary land practices, as well as help manage appropriate land uses. Careful attention to the carrying capacity and reach of social, service delivery, economic, and livelihood systems is also key for spatial planning.

For people who need to move away from unavoidable climate risks, policy makers will need to enable mobility by creating supportive environments for planned and orderly migration into areas of low risk and high opportunity. Inclusion and sensitivity to migrants' needs will be crucial. In many regions, internal climate migration will have to be managed as an important part of a broader set of adaptation options and in the context of existing patterns of mobility. Targeted interventions can be deployed in the short and medium term to support migrants. For instance, informed decision-making can be facilitated for migrants through better access to financial resources and social services, increased financial literacy, secured legal status, and pre-departure training, skills, and orientation. Investments can also make social protection portable and scalable by easing registration and communication in receiving areas, particularly major urban centers; improving access to benefits through mobile money and digital identification systems; and allowing for social welfare systems to be adaptable to changing needs. Policy can also maximize the potential of financial and social remittances to bolster adaptation investments and income-generating activities and encourage knowledge transfer through diasporas and social networks.

In places where options to adapt in place have reached their limits, inclusive decision-making processes can help ensure that planned relocation and managed retreat enable movement in a safe and dignified manner. Planned relocation is a complex and multidimensional process to be adopted as a last resort and only when needed. It should involve the participation of affected people, and to be developed in a way that is specific to national and local contexts. Many SIDS, for example, have already taken proactive leadership roles on integrating mobility in the context of climate change in national policy frameworks to anchor the ability of inhabitants to remain where viable, while ensuring continued opportunities to migrate for those who choose to do so.

Policy makers will also need to ensure that both sending and receiving areas are adequately prepared to ensure the resilience of those who remain and to integrate additional flows of people. Many of the climate migration hotspots identified in the regions covered by this report are major urban areas, such as Algiers, the Casablanca-Rabat corridor, Tangiers, and Tunis in North Africa; Osh and Jalal-Abad in the Kyrgyz Republic; and Hanoi in Vietnam. These cities will need to provide advanced public service provision, affordable housing programs, and employment opportunities for increasing numbers of people. Fostering integration and social cohesion can also help ensure that destination areas leverage the opportunities that migrants bring to fill labor and demographic gaps, diversify human capital, and bring new skills and knowledge.

National and city planning systems will need to account for important changes to existing settlement patterns. These will need to go hand in hand with climate-resilient infrastructure investments and improved connectivity networks, especially as cities continue to grow and draw migrants from rural areas. Even cities projected to be out-migration hotspots and thus see potentially slower population growth, such as Alexandria and Ho Chi Minh City, will still continue to support large numbers of people who may face escalating climate risks. Urban planning and land use management will need to be inclusive and address the needs of the most vulnerable, who often live in areas with inadequate services, including informal settlements, sometimes on marginal land exposed to floods and other hazards. Vulnerable people, including those that are lower-skilled, poorer, and older, may also be unable to move away from areas of high risk. Involuntary immobility in the context of climate change should therefore be equally considered in development planning.



4. Continue to invest in improving understanding of internal climate migration to inform well-targeted policies.

More investments are needed in research at scale, including new, more granular data sources and differentiated climate change impacts, to better contextualize and understand internal climate migration at the regional and country level. The novel and transparent modeling presented in the *Groundswell* reports is a starting point, but decision-makers will need more spatially detailed projections to identify the most appropriate strategies in each location.

Such “deep dives” are already being undertaken by the World Bank in West Africa and the Lake Victoria Basin. They corroborated the *Groundswell* findings for those regions, while also using an updated methodology. Enhancements include shorter time steps, higher spatial resolution, and more climate change impact parameters—all of which provide a more granular analysis of the scale, trends, and spatial patterns of internal climate migration at the country level.

State-of-the-art models on the current and future trends of internal climate migration continue to be crucial to inform early action. Updated models using an array of climate change impacts and other biophysical, socioeconomic, and political indicators factors can help better inform decision-making at appropriate scales. These should also account for the inherent uncertainties in the way climate change impacts will play out in given locales that will affect the magnitude and pattern of climate change-induced movements. Important strides have been also made in new research to extend regional and national-scale modeling, and to gain further insights into how climate stressors impact individual decisions to move. The need to create a shared understanding of the scale, trajectory and spatial dimensions of internal climate migration remains critical to support development policy and planning.

A RENEWED CALL TO ACTION

The *Groundswell* report series reaffirms that internal climate migrants will continue to be the human face of climate change. The potency for climate change to drive migration is set to increase to mid-century and beyond if no action is taken. The call for solutions on internal climate migration cannot be subscribed to the very communities who would have to move in response to the increasing intensity and frequency of climate change impacts. Early and far-sighted global, regional, and national action is imperative to address the urgent challenges at the nexus of climate, migration, and development and foster momentum toward inclusive, sustainable, and resilient economic transitions for all.

