



Most will stay: why climate adaptation must reach people where they live

Evidence from the CliC:ME model on aid targeting

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Migration will not protect most of the people hit hardest by climate change. The CliC:ME model projects that more than 400 million people will move permanently because of climate hazards over this century, but many more will stay in most affected areas. As a consequence, climate hazards alone could push 200 million adults below the poverty line in 2090. Limited reductions in migration costs make little difference when other barriers to mobility remain substantial. Adaptation funding should therefore help people where they live. For Luxembourg, which invests 1% of its national income in development, this means using projections to target the most vulnerable communities, testing targeted pilot interventions before scaling them up, and rigorously evaluating their impacts. Addressing climate-driven vulnerabilities requires raising political awareness and building consensus on priorities, while combining CliC:ME projections and field experiments to design, test and scale up effective adaptation policies.

Climate change threatens future economic prosperity and social cohesion in many parts of the world. The Paris Agreement threshold of 1.5°C is likely to be exceeded in the coming years, putting humanity on a risky path towards more frequent and more intense sudden-onset disasters, unprecedented heat, and the unknown consequences of climate tipping points. The longer-term outlook is no more reassuring: according to the recent Coupled Model Intercomparison Project Phase 7 (CMIP7) climate projections by van Vuuren et al. (2026), unless a technological breakthrough allows emissions to be cut drastically, the Earth will be 2.5–3.5°C warmer by the end of this century relative to pre-industrial average.

Given these grim projections and the persistent lack of global coordination on reducing emissions, policy discussions are placing increasing weight on adaptation to the coming damage and hardship. One important question is the role of migration as an effective form of adaptation to climate change and climate-induced poverty. Climate migration now features more prominently than ever in high-level international debates. At the Berlin Climate Mobility Forum in June 2026, countries launched the Global Principles for Addressing Climate Mobility, a shared framework for international action, which 54 countries had formally endorsed by early July. Developed by member states with the support of the Global Centre for Climate Mobility (GCCM), a United Nations (UN) entity hosted by UNOPS, the document sets out an agenda for action focused on three aims: i) giving agency to the people at the centre of the climate crisis, ii) protecting human rights unconditionally whether people move or stay, and iii) localising adaptation efforts to meet specific needs.

The [CliC:ME project](#) (Climate Change: Migration and Economics), responds directly to these principles. Our aim was to build a comprehensive model that projects future macroeconomic and demographic pathways under various climate scenarios, with a special focus on climate migration. The project reflects these principles in three ways. First, it is local: we developed a cutting-edge model of the world economy at a resolution of 5×5 km pixels (small areas of land representing local economies). This allows detailed local analysis of the macroeconomic, demographic and migratory

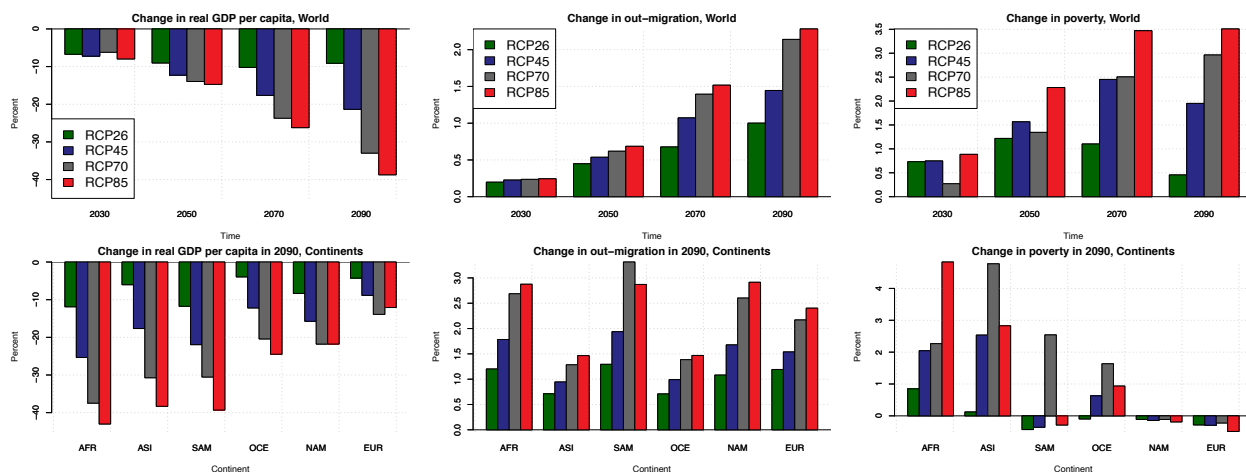
consequences of climate hazards under different emission scenarios throughout the 21st century. All projections are freely available through an open-access online dashboard (clicme.liser.lu) that presents the outputs in a user-friendly way. Second, it focuses on people: the model distinguishes 24 socio-demographic groups by age, gender and education. People decide to move when they find it beneficial, and these individual decisions scale up and shape the macroeconomic environment (labour markets, production, international trade). Third, it goes beyond describing climate migration: in addition to simulating the flows of international and internal climate migrants between origins and destinations, we test adaptation policies that give people incentives to move (and we quantify their cost and effectiveness).

[Figure 1](#) illustrates our main findings on the prospects for climate migration, which we summarise as follows:

1. Climate change severely damages global economic growth prospects, measured by changes in gross domestic product (GDP) per capita. The CliC:ME model projects that climate change will reduce the world's average income by 10% to 35% by the end of the century, compared with a reference scenario without climate change. These losses are very uneven across continents and geographic areas: in the benchmark SSP3-RCP7.0 scenario (Shared Socioeconomic Pathways - Representative Concentration Pathway) developed regions lose less than 20% of GDP per capita, while the developing world loses more than 40%.
2. In the benchmark SSP3- RCP7.0 scenario, the CliC:ME model projects that more than 400 million people will move voluntarily and permanently over the course of the 21st century for economic reasons triggered by climate hazards.¹ This corresponds to 0.5%, 1.5%, and 2% of the global population in 2050, 2070, and 2090 respectively. For reference, as of 2020, 3.5% of the global population were international migrants and an estimated 10% were internal migrants.
3. Most climate-induced moves take place within the developing world: internal migration within countries of the Global South and international migration between them dominate. Only 20% of climate migrants cross a border, and less than a third of those head for developed countries.

¹ This includes 50 million in 2050, 130 million in 2070, and 220 million in 2090.

Figure 1 – Global impacts of climate change for economic prosperity, out-migration of people, and poverty



Note: SSP1-RCP2.6 indicates a low-emissions, sustainability scenario, SSP2- RCP4.5 is a medium-emissions, middle-of-the-road scenario, SSP3- RCP7.0 is a high-emissions, regional rivalry scenario (consensus benchmark case), while SSP5-RCP8.5 indicates a very-high-emissions, fossil-fuelled development scenario. AFR refers to Africa, ASI to Asia, SAM is South America, OCE indicated Oceania, NAM is North America and EUR is Europe

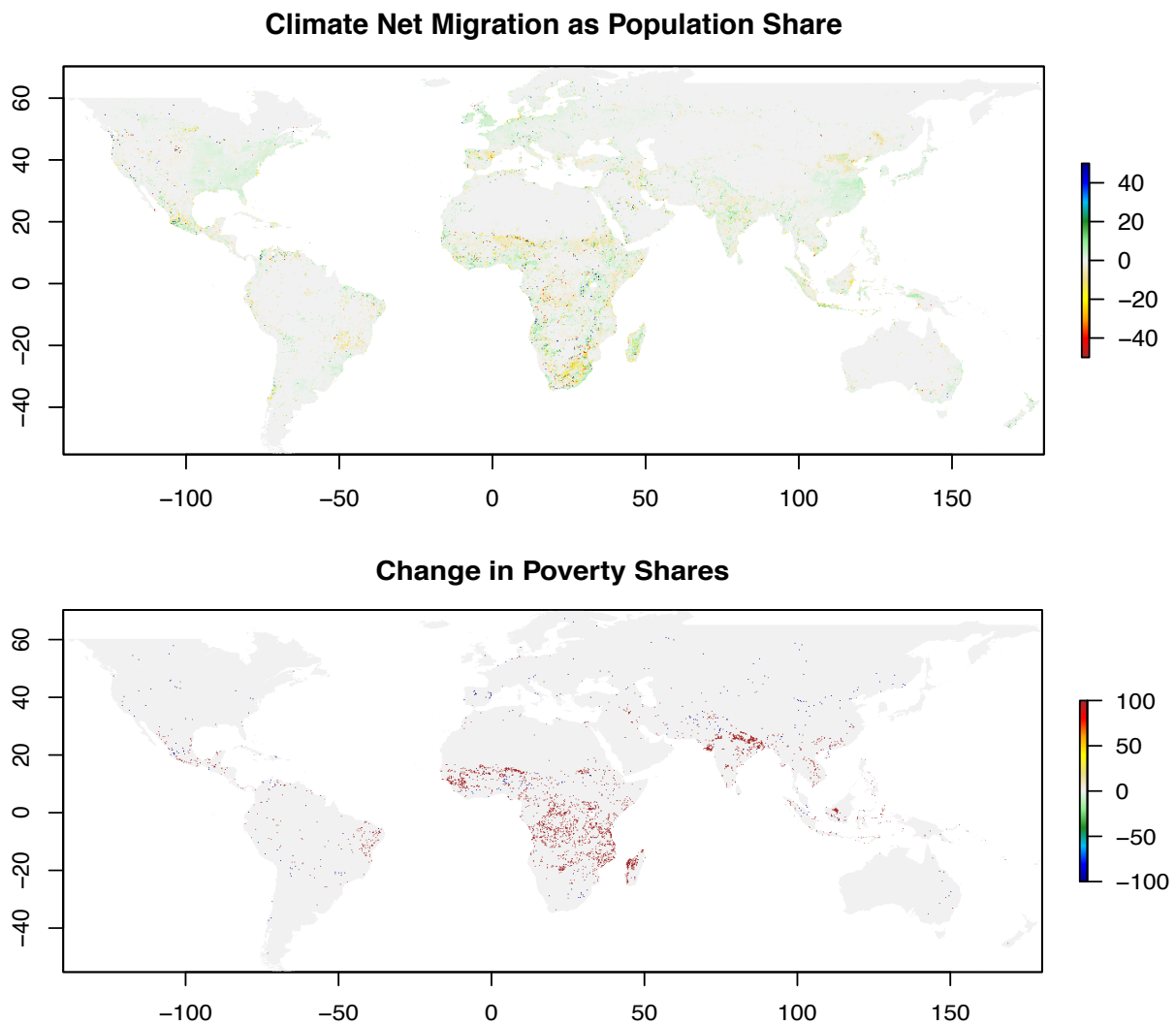
4. Although the number of permanent climate migrants is very large, migration is a solution for only a minority of people living in affected areas. Most people who are likely to suffer severe climate-induced losses do not move. This climate immobility, or insufficient climate mobility, is a key driver of climate-induced poverty. According to our projections, climate hazards alone will push 1.5%, 2.5%, and 3% of the world's adult population in 2050, 2070, and 2090, respectively (a total of 450 million people over the 21st century, with more than 200 million in 2090 only) below the poverty line (US\$2.15 a day in purchasing power parity terms) by the end of the century. For reference, the global extreme poverty rate fell from almost 40% to about 10% over the past 30 years.
5. At the end of the century, poverty is projected to rise most sharply in Africa and Asia, with notable impacts in Oceania and South America.

According to the CliC:ME projections, many areas of Sub-Saharan Africa, Southeast Asia and Latin America are likely to face significant economic losses from climate hazards. [Figure 2](#) shows the spatial distribution of net climate migration (in-migration minus out-migration) by pixel in 2090 under the benchmark SSP3-RCP7.0 scenario. Many low-income countries contain hotspots of both out-migration and in-migration, because climate damage often varies over short distances. Many regions of the most affected countries, mainly not flooded urban areas at the coasts, are projected to gain population as a result of climate

change, since most movement is internal. However, as the second panel of [Figure 2](#) shows, climate out-migration without policy support is not enough to keep people from falling below the poverty line. The CliC:ME model gives a clear indication of where the most vulnerable communities are located and where interventions should be targeted. With CliC:ME, we also tested numerous schemes to encourage migration by lowering the cost of moving for people in the most affected regions, for example through direct monetary transfers. The results are disappointing: the barriers to migration are so high that these schemes change little, which is consistent with the strong barriers to migrate and attachment to place observed in actual data. This negative result supports the GCCM's emphasis on the right to stay and argues for shifting the debate on climate migration from 'providing the means to move' to 'enabling local adaptation'.

Luxembourg is one of the world's leading providers of targeted development aid to the poorest regions, focusing on a small set of long-term partner countries, which allows for a significant local impact (OECD, 2025). It spends roughly 1% of its gross national income on aid, primarily financing vocational training and providing basic social services. About 70% of this aid is bilateral and 30% multilateral; the UN system receives a little over half of the multilateral share, led by the World Food Programme, UNDP and UNFPA. Luxembourg's formal partner countries, each with a multi-year cooperation programme, are now Cabo Verde and Laos. Cabo Verde has been the largest recipient, followed by Niger,

Figure 2 – Climate impacts in 2090 for RCP 7.0-SSP3 scenario



Senegal and Laos, although Luxembourg has decided to scale back in the Central Sahel (Burkina Faso, Mali and Niger), where humanitarian assistance remains important. Ukraine has also joined the top ten recipients, and the increase in Luxembourg's aid in 2025 was driven by support for Ukraine and humanitarian spending. By sector, the money goes mainly to health, education, vocational training and employment, water and sanitation, and local development, complemented by inclusive finance projects.

Climate adaptation is funded in two ways. Within the aid budget, 13.4% of Luxembourg's bilateral aid had an adaptation focus in 2022–23, compared with 7.1% for mitigation, and the Cabo Verde programme is explicitly framed as 'Development – Climate – Energy' and includes local-level climate action planning. Separately,

Luxembourg keeps its international climate finance outside its aid figures, with a budget of EUR 220 million over five years from its Climate and Energy Fund.

Allocating resources is necessary for aid to make an impact, but it is not sufficient: the resources must also be deployed effectively. This requires, on the one hand, targeting the people in greatest need and, on the other, evaluating the effectiveness of each intervention by measuring its impact on people's lives, decisions and living conditions. The CliC:ME model is well suited to helping policymakers map the need for climate adaptation action across space and socio-demographic groups. Such ex-ante analysis identifies the populations likely to be vulnerable to climate hazards in the coming decades. Because the CliC:ME projections are openly accessible, stakeholders can see both the overall picture and the local specifics of climate impacts.

Complementing this, field experiments on planned policies have become increasingly standard practice in development work. Among other institutions, J-PAL (the Abdul Latif Jameel Poverty Action Lab at MIT) has scaled up development aid mainly by making rigorous testing a normal step before programmes are expanded (J-PAL, 2026). Its method is the randomised evaluation: a programme is given to a randomly chosen group, and outcomes are compared with a similar group that did not receive it, so the difference can be attributed to the programme itself. J-PAL then works with governments and NGOs to act on the results, and says policies informed by its researchers' evidence have reached over 600 million people since 2003. Its climate work runs through the King Climate Action Initiative (K-CAI, 2026), launched in 2020 with a \$25 million gift from King Philanthropies. Adaptation is one of the initiative's four focus areas, alongside mitigation, pollution reduction and energy access. Across these areas, the initiative has funded 45 randomised evaluations, nearly 50 pilots and 16 scale-ups, which J-PAL says informed programmes reaching nearly 33 million people. For the aid value chain, this adds an evidence stage between idea and large-scale funding: small pilots, then larger trials, then 'path-to-scale' grants for what worked. Donors can therefore direct money to programmes with measured effects and drop those without.

An effective approach to climate adaptation policy should combine political engagement, rigorous evidence and continuous learning. The first step is to define policy priorities, build consensus among stakeholders, and bring together academic expertise and knowledge from the field. For example, in the context

of climate migration, the GCCM can play an important role in facilitating this dialogue, engaging high-level decision-makers and promoting shared solutions through its Principles.

Once the objectives are agreed, modelling and field experiments can work hand in hand. Models such as CliC:ME can identify the populations most exposed to climate risks and areas where interventions are most needed. Field experiments can then establish which interventions work, for whom, and at what cost. Feeding these insights back into the models makes it possible to anticipate the broader effects of scaling up successful interventions, including their indirect and economy-wide consequences. This allows policymakers to compare alternative strategies before committing substantial resources.

The final step is to monitor and rigorously evaluate interventions implemented at scale, measuring their effects on individuals and communities as well as on aggregate outcomes. These findings can, in turn, improve the models and inform future policy decisions.

By combining policy dialogue, predictive modelling and experimental evidence in an iterative process, this approach can help direct scarce adaptation resources where they are most needed, strengthen the resilience of vulnerable populations, and limit the impact of climate change on extreme poverty. Making this combination of rigorous modelling, field experimentation and local knowledge a standard part of climate adaptation and development policy would be a major step towards more effective, evidence-based action.

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