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## Preparing Cities for Climate Displacement:

# Insights from Anticipating Futures in Viet Nam and Pakistan

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Extreme weather events and rising sea levels are having an increasing impact on human mobility,[2] especially within specific countries. In 2022, for example, there were 32.6 million disaster-induced displacements around the world, the highest figure seen in a decade, and 70 percent of these took place in Asia-Pacific regions.[3] Policy actors need to anticipate and prepare for future human mobility patterns exacerbated by the effects of climate change to ensure that those who move have their human rights protected and can contribute meaningfully to the communities in which they arrive. Knowing how to anticipate, invest and act on these futures now and needing to react to immediate priorities is, however, challenging. This paper outlines the promise of an anticipatory policy design approach that blends predictive analytics with qualitative foresight to provide the data and space that stakeholders need to effectively adapt and anticipate such events. The approach is introduced here as part of an initiative to analyse the scale and effects of migration to Ho Chi Minh City, Viet Nam and Karachi, Pakistan by 2050 as a result of the effects of climate change.

## Background

Without significant action to address climate change, the world could see 143 million internal 'climate migrants' by 2050.[4] A failure to plan for the scale and effects of such movements can exacerbate existing inequalities and create new challenges for social services, livelihoods and housing, among others. For instance, migrants in cities regularly find themselves living in informal settlements exposed to new risks (many climate-related) and with limited resources, as infrastructure and services are unable to cope with the high numbers of new arrivals. Many are among the most socio-economically marginalized, often lacking in specific skills or financial means that would ease the transition to urban life.[5] They may also find themselves at risk of secondary exposure to climate-related hazards.[6,7]

However, human mobility has been an integral part of human development, a principal adaptation strategy in the face of risks,[8] and, when well-

managed, it can support developmental outcomes in both the place of origin and the destination. Human capital, a critical driver of economic progress, is enriched in places of destination, with migrants meeting labour demands and bringing diverse skills, knowledge and expertise. Migrant remittances, a substantial source of financial inflow to some places of origin, can play a transformative role in enhancing local economies, improving access to education, healthcare and other essential services. More broadly, people on the move drive cultural exchange, fostering the transfer of ideas and perspectives that enrich host societies and can stimulate innovation.

It is against this backdrop that UNDP has explored new models for anticipating the opportunities and challenges of climate-related human mobility for sustainable development in Asia-Pacific regions. The work has prioritized two countries that are disproportionately impacted by climate change, Pakistan and Viet Nam, with complex and extensive internal human mobility patterns and fast-growing urban centres, especially around Karachi and Ho Chi Minh City.

Viet Nam is shaped by the convergence of climatic stresses and rapid urbanization. Almost 20 percent of Hanoi's and Ho Chi Minh City's populations are classified as internal migrants, 2.7 times higher than the national average.[9] The interaction of climate change and rural-urban migration patterns is particularly apparent in Ho Chi Minh City, a city of 9 million people, and the bordering Mekong Delta region. Similarily, Pakistan sees significant internal migration patterns, with about 13 percent of its population classified accordingly.[10] However, this share is likely to be substantially higher in key urban centres such as Karachi. In fact, the latter continues to grow at rates of more than 2 percent annually, i.e. some 400,000 people, despite its population of more than 17 million.[11]

The initiative has blended predictive analytics with strategic foresight to model how many people will move to Karachi and Ho Chi Minh City by 2050 accounting for the effects of climate change. This can guide anticipatory planning based on the impact such in-migration may have on key social, political, economic, spatial and environmental variables under different scenarios.

The focus has been to elucidate:

- Possible future hotspots for climate-induced internal in- and out-migration by 2050;
- Cascading impact across sectors, particularly on spatial/urban development, including housing and land rights; climate change and disaster risks; jobs/livelihoods and food security, including social protection; accessibility of healthcare, education and other key services; and social cohesion;
- Immediate and longer-term implications, to inform decisions that address urgent needs without compromising development potential and equity for populations in years to come;
- Insights on the political economy, governance, cultural and other underlying drivers of change.

As policymakers face increasingly complex trade-offs given the uncertainty triggered by the collision of more novel and interconnected risks in the Anthropocene, there is much to be learned from processes that can complement the value derived from more linear, predictive or quantitative forms of data, with that derived from more qualitative, values-driven, participatory or political economy and theoretical perspectives.

## Process design and outcomes

The approach to this research was designed with a view towards both the benefits and limitations of predictive modelling and qualitative foresight, such that each could build on the insights and help overcome the constraints of the other. The key components of each are described below.

**Quantitative modelling**, derived from a gravity-based spatial allocation-type framework developed by Prof. Bryan Jones, has yielded results on the scale and spatial distribution of the predicted human mobility flows into Ho Chi Minh City and Karachi by 2050 resulting from the effects of climate change.[12] To characterize the uncertainty in outcomes across alternative climate (RCP 2.6 and 7[13]) and socio-economic developments (SSP 1 and 3[14]), two different scenarios were developed for each city:

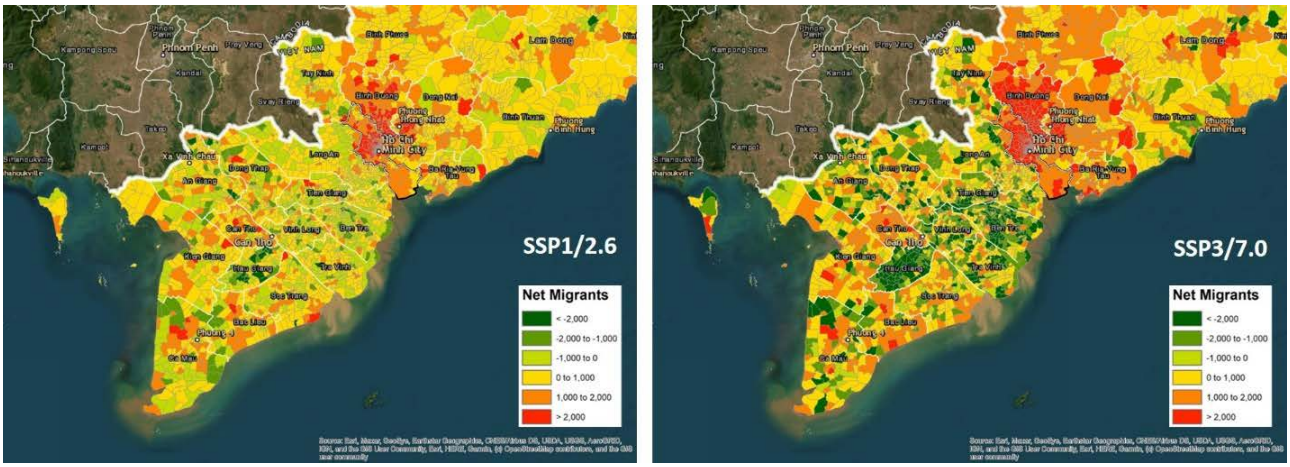
- Scenario 1: RCP2.6/SSP 1, in which climate impacts are swiftly reduced on a global scale and there is a fairly rapid convergence towards higher levels of development in both countries, and
- Scenario 2: RCP 7.0/SSP 3, in which climate change impacts are high, and significant challenges to socio-economic development are present across low/middle income countries.[15]

Using Ho Chi Minh City (HCMC) and the Mekong Delta as an example, results for Scenario 1 (RCP2.6/ SSP 1) suggest that where climate change impacts are high, there is significant out-migration from the Mekong Delta, and larger numbers of in-migrants to HCMC than in the alternate scenario. In Scenario 2 (RCP7.0/SSP 3), the population loss in the Mekong Delta to out-migration is offset somewhat by higher fertility rates, which restock the pool of potential out-migrants in the region, thus reinforcing the migratory pathway between Delta communities and HCMC that slows under the lower fertility RCP2.6/ SSP1 scenario. In both scenarios, regional centres across the Mekong Delta act as in-migration hubs, suggesting that there are opportunities to divert migration to more secondary hubs like these through continued industrial and other development initiatives to alleviate capacity constraints in HCMC.

## Figure 1: Flowchart of Modelling Steps


*Source: Jones, B. (2023). UNDP Predictive Analytics, Human Mobility and Urbanization Project: Preliminary Result and Analysis [Internal paper]. UNDP.*

## Figure 2: Projected net climate-induced migration at the commune level in Greater Ho Chi Minh City and the Mekong Delta, 2050




*Source: Jones, B. (2023). UNDP Predictive Analytics, Human Mobility and Urbanization Project: Preliminary Result and Analysis [Internal paper]. UNDP.*

The model further projects that 2.2 and 2.7 million migrants will move to HCMC over the next 30 years under the lower climate change impact (RCP2.6/SSP 1) and high impact (RCP7.0/SSP 3) scenarios, respectively. About 0.22 million of these are climate-induced in the optimistic future, but this number rises almost 3.5 times to 0.76 million in the pessimistic future. The larger number of climate migrants under the lower climate impact scenario coupled with the larger total national-level population projected under this scenario offset the lower rate of urbanization, leading to a larger population in HCMC by 2050, some 18.6 million as compared to 16.5 million under RCP2.6/SSP1. In both cases, however, the projections represent significant population growth within the city, nearly doubling the existing population under the lower climate impact scenario and adding roughly 10 million people in the higher emissions world. This introduces significant urban planning challenges for HCMC in the years to come.

**Figure 3: Projected climate in-migrants, total migrants, and total population; Ho Chi Minh City, 2030-2050**

| | | 2030 | 2040 | 2050 |
|---|---|---|---|---|
| **Climate Migrants** | SSP1/2.6 | 31,220 | 96,190 | 218,480 |
| | SSP3/7.0 | 174,233 | 382,679 | 759,492 |
| **Total Migrants** | SSP1/2.6 | 806,285 | 1,358,814 | 2,213,881 |
| | SSP3/7.0 | 964,953 | 1,589,568 | 2,754,859 |
| **Population** | SSP1/2.6 | 12,581,183 | 15,361,680 | 16,508,736 |
| | SSP3/7.0 | 12,126,366 | 15,513,913 | 18,615,048 |

*Source: Jones, B. (2023). UNDP Predictive Analytics, Human Mobility and Urbanization Project: Preliminary Result and Analysis [Internal paper]. UNDP.*

These results are useful to:

- Explore spatial dynamics by highlighting geographic areas that merit additional investigation to determine how migration may impact quality of life for migrants, host communities and in areas left behind;
- Examine variations/convergence across scenarios as indicators of how policies designed to steer society towards different climate and/or socioeconomic futures might impact human mobility;
- Assess the impact of climate or societal factors on migration propensity; and
- Use the variations/convergence across scenarios as indicators of how climate scenarios might impact the relative attractiveness of different locations over time. This can help inform policymakers to prepare for rises in migration to specific areas to support continued provision of basic services.

**However, these results also have limitations, which are underpinned by assumptions that require further scrutiny.** These include: not accounting for cross-border mobility; difficulties associated with separating climate-driven from other forms of migration; limited accounting of temporary or seasonal migration; not capturing 'trapped populations'; estimating macro-level spatial population change rather than accounting for micro-level individual agency; limited ability to capture the effects of future mitigation/adaptation; and significant uncertainty in local-level climate outcomes. **In addition, the findings benefit from validation and contextualization, such as by considering future disruptions or novel forms of risks or emergent development trends.** Perhaps most importantly, the modelling cannot indicate much about what can realistically be done in response to these projected futures. This is why it is valuable to complement this information with participatory foresight processes as part of a continuing policy analysis that can build on as well as challenge the insights of such models.

**Participatory foresight analysis:** Whereas the quantitative modelling draws from a specific technical expertise, the foresight component applies a highly participatory approach. The Regional Bureau for Asia and the Pacific foresight team ran country-specific foresight processes with UNDP, Viet Nam and Pakistan country offices and counterparts from a range of sectors and roles, to make sense of the modelling findings, including the scale and dynamics of likely mobility patterns through an anticipatory and risk lens.

The exercises helped expand upon the key insights from the quantitative models, build out their possible implications in looking at a near-term future (2030) and elaborate on the policy exigencies suggested by the emergent risks,

contextual realities and opportunities, particularly in looking at areas with many interdependencies. A combination of foresight and systems analysis methods were adapted to serve this purpose: namely, light horizon scanning research as a baseline for discussion, essentially treating the high-level outcomes of the predictive scenarios as the signals or drivers of change to be examined; light scenario-building based on these insights, asking participants to imagine the Viet Nam or Pakistan climate mobility and development situation in the year 2030 if a hybrid of both quantitative scenarios came to pass (noting one is no more likely than the other, but just an articulation of different possible futures); and a futures implications analysis of key risks, opportunities, interdependencies and uncertainties. This provided a baseline of key change levers to inform some initial futures-informed strategy options.

The value added in using foresight approaches like these include the ability to stress-test the findings of the simplified projections of the model in relation to the messy realities of decisions to migrate and policy-making environments. The process also helps reveal the deeply multi-sectoral nature of such insights, the social and governance dimensions influencing and influenced by the climate-migration nexus and the complexity of responding effectively to future mobility patterns. Integrating modelling and foresight helps to ensure that decisions can be prioritized based on potential impact over time, not just by what is already well known or has occurred in the past.

Limitations: As is evident from the above list, the foresight process addresses many of the limitations of quantitative modelling. However, it has become apparent that co-creation of actionable anticipatory policy for municipalities requires supplementary futures research. It also requires analysis and validation exercises with a diverse mix of stakeholders to complement the initial insights with a variety of data sources and reduce potential biases when deriving implications from the findings. This additional research and validation were conducted in collaboration with analysts from multiple UNDP Country Offices.

## Towards more balanced and integrated decision-making

Designing an innovative approach that effectively blends quantitative and qualitative, as well as historical and speculative data, which is typically applied in isolation, is only part of the challenge. Synthesizing the resulting insights takes different forms and represents varying degrees of certainty. This is premised on differing assumptions and intentions for use, and requires a broad analytical mindset, creativity and learning. To encourage this, the project sought to present the findings in a way that would give equal weight to all insight sources. This included mitigating value judgements or bias when deriving implications from different scenarios – in other words, by not framing one future scenario as more 'positive' or 'likely', but evaluating them as all being within the realm of possibility for what the future might hold.

In filtering the climate projections through the participatory foresight process, the following themes emerged as influential for both locales: **navigating water scarcity; feeding a changing world; labour mobility as a pathway to sustainable futures; the future of cities; building resilience in a future of risk; and shifting views towards development and migration.** Further research looking at existing policies and literature that give insights into emergent trends and risks helped unpack the following questions:

- **Are there tipping points within this thematic area that might steer climate migration towards one scenario over another?**
- **How will climate migration impact this area and vice versa?**
- **Where is there more/less uncertainty about future outcomes?**
- **What are the major threats and opportunities of climate mobility for development progress?**

Some examples of the types of findings and recommendations that emerged using the '**the future of cities**' as an illustrative area of focus, include:

- Understanding the **drivers of reverse migration** is equally important to determining long-term policy trade-offs in understanding the climate-related drivers that attract people to urban hotspots. Some key drivers for urban-to-rural mobility include: growth in informal settlements and unequal access to social protection exacerbated by migrant influx to cities, with cascading risks to social cohesion. *While targeting data collection and policies to better equip cities for anticipated migrant influx, particularly linked to social insurance, housing and basic service accessibility, investments in secondary cities (hubs outside of primary urban centres) to also act as a buffer between urban centres and rural areas should be considered.*

- The future of urban development is intertwined with rural development. Some adaptation trends seen in connection to reverse migration, such as **people moving out of cities to reconnect with land and traditional knowledge**, including ecologically sustainable ways of life, can be harnessed to advance both rural development and the impact of climate change and mobility on cities. *This includes investing in nature-based solutions and rural livelihoods and infrastructure, which will have positive effects on cities. These include better agricultural production and food availability for the region, which will reduce rapid urbanization trends as more rural areas become viable living alternatives and harness opportunities for climate-smart agriculture, green job creation and other investments to mitigate future climate change impacts.*
- Through its impact on lifestyles and livelihoods, climate mobility-driven urbanization may exacerbate challenges related to the integration of internal migrants' diverse ethnic, religious and cultural backgrounds. Disruption to **social cohesion** may be aggravated in the absence of policy that is not cognizant of cultural pluralism, heterogeneity among migrant population, and the importance of traditional knowledge in local sustainable development. *Key areas of focus include addressing language in multilingual societies; labour market inclusion; educational opportunities; political and civic participation; and access to equitable resources and utilities.*

Additionally, several findings addressed emergent opportunities and risks for implementation of such policies, recognizing that evidence alone does not guarantee anticipatory decisions and investments. For example, long-term trends related to **shifting views and understanding of development** have ramifications for Pakistan and Viet Nam's access to financing, technology and political support to advance the needed mitigation and adaptation measures. Several recommended anticipatory pathways, therefore, relate to further research to understand, for example, global climate justice movements or shifting paradigms regarding rights for nature. The definition of a climate migrant may influence both policy opportunities and the landscape of risks locally.

## Making sense of the findings: What's different and where do they fit?

Among the benefits of this blended process was that it enabled the examination of more socio-economic and equity dimensions of likely mobility pattern impacts, as well as drivers of migration, than quantitative analytics alone could capture. For example, across the themes, findings underscored the need for more policy solutions that: 1) address barriers to local migrant registration processes, education and schooling, and access to social benefits and healthcare, which is interlinked with issues of perception and acceptance of migrants; 2) position climate migration as a portfolio of interventions cutting across transportation, registration, social services, etc. and achieve buy-in for such multisectoral plans; 3) recognize that urban development cannot proceed without rural development, as both are intrinsically linked and must evolve together; 4) take into account local terrain that would impact how quickly a person can physically move and how that terrain might shift over time.

These insights should be applied as a compass for hotspots, issue areas, and evolving risks to be continually monitored and assessed, rather than viewed as static or blanket recommendations. They are not avenues to predict or reduce migration numbers, but rather to support cities to prepare for possible future migration patterns that *could* result from different combinations of trends and policy actions in ways that maximize their development potential while addressing associated challenges. In particular, this form of research, complementary to what is already well known about climate migration impacts, can help to better position the issue as sitting at the intersection of many current and future sources of human insecurity. This is key for driving responses that do not treat environmental, migration, urbanization and various local and global socioeconomic trends in isolation, thereby perpetuating not only inefficiencies but potentially deleterious gaps, which are rooted in a thorough understanding of trade-offs and cascading effects across development domains.

This project is still ongoing and the application of its findings by policymakers and researchers in Viet Nam and Pakistan continue to unfold. A full report with detailed results for both countries and cities is expected in early 2024. The process thus far, however, suggests important benefits of anticipating and preparing for future human mobility patterns

by blending predictive analytics with qualitative foresight methods. In particular, it may prove to be a useful reframing and political will-generating tool to help bridge the gaps between what is known about climate migration and what is currently prioritized. Robust data that can effectively tell the story of 'why' integrated approaches matter from many angles, including what may happen in the future depending on the current actions taken or missed, is especially vital. Whether historical data, futures-oriented horizon scanning, linear trend projections, speculative scenarios, immediate and long-term time frames, or broad-based participatory analysis, no single method or data source will promise the most effective actions. It is in designing for more convergence in the collection and triangulation of their insights that decision-makers can move towards a more future-fit policy approach to human mobility.[16]

# Endnotes

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2 Human mobility is used as an umbrella term for the full spectrum between voluntary migration and forced displacement. The report also sometimes uses terms such as 'climate(-induced) migration' for ease of reading and in order not to assume voluntariness in migration decisions.

3 Internal Displacement Monitoring Centre (2023). *Global Report on Internal Displacement 2023*. Geneva: IDMC.

4 World Bank. (2018). *Groundswell: Preparing for Internal Climate Migration*. Washington, DC: World Bank.

5 Adger, W.N., Crépin, A.S., Folke, C., Ospina, D., Chapin III, F.S., Segerson, K., Seto, K.C., Anderies, J.M., Barrett, S., Bennett, E.M. and Daily, G., (2020). Urbanization, migration, and adaptation to climate change. *One Earth*, 3(4), pp.396-399.

6 Adger, W.N., et al. (2020). MacManus, K., Balk, D., Engin, H., McGranahan, G. and Inman, R., 2021. Estimating population and urban areas at risk of coastal hazards, 1990–2015: How data choices matter. *Earth System Science Data*, 13(12), pp.5747-5801.

7 Bryan Jones (2023). *United Nations Development Program Predictive Analytics, Human Mobility and Urbanization Project: Literature Review and Draft Model.*

8 World Bank. (2018). *Groundswell.*

9 UNFPA. (n.d.). Migration and Urbanization in Viet Nam.

10 Alverio et al. (2023). Displaced to cities: Conflict, climate change, and rural-to-urban migration.

11 Macrotrends. (2023). Karachi, Pakistan Metro Area population 1950-2023.

12 Bryan Jones (2023). United Nations Development Program Predictive Analytics, Human Mobility and Urbanization Project: Preliminary result and analysis [Internal paper].

13 RCPs, or Representative Concentration Pathways, are scenarios of a greenhouse gas concentration (not emissions) trajectory adopted by the IPCC. Four pathways were used for climate modelling and research for the IPCC fifth Assessment Report (AR5) in 2014. The pathways describe different climate futures, all of which are considered possible depending on the volume of greenhouse gases emitted in the years to come.

14 SSPs, or Shared Socioeconomic Pathways, are scenarios of projected socioeconomic global changes up to 2100. They are used to derive greenhouse gas emissions scenarios with different climate policies. The scenarios are: SSP1: Sustainability (Taking the Green Road); SSP2: Middle of the Road; SSP3: Regional Rivalry (A Rocky Road); SSP4: Inequality (A Road Divided); and SSP5: Fossil-fueled Development (Taking the Highway).

15 In the model, changes in the spatial distribution of the population as driven by migration are a function of the relative attractiveness of different subnational points in space. Relative attractiveness is influenced and represented in the model by socio-economic and demographic characteristics of populations, economic conditions and livelihoods, history and existing connections, political systems and stability, geographic characteristics, and importantly, climate impacts. Estimates of future climate-induced migrants and their locations are derived from comparing population distributions that incorporate climate impacts with a scenario based solely on a development trajectory. Climate and development migrants are disaggregated to further investigate the impacts of climate on spatial patterns of population change. A preliminary data inventory was developed based on known drivers of both climate-induced and non-climate-related migration and globally available datasets. This was then supplemented through a literature review process and consultations with regional experts and tested in separate models for Viet Nam and Pakistan. Datasets on 22 variables, ranging from crop yields and water availability to political stability, corruption and types of urban settlements, proved statistically and practically significant and were included in the models for the two countries.

16 If you are interested in replicating the approach presented in this paper, please contact the Bangkok Regional Hub focal points listed above.

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