

Risk Index for Climate Displacement (RICD)

METHODOLOGY



Context and Problem Statement

Asia and the Pacific is the global epicentre of disaster- and climate-related displacement. Between 2014 – 2023, the region accounted for almost three-quarters of all disaster displacements worldwide, with 177 million movements reported, primarily from rapid-onset hazards alone.¹ The IPCC² reports that internal displacement is projected to increase due to the intensification of both slow-onset and rapid-onset climate-related hazards.³ Climate change is expected to exacerbate this trend, with projections suggesting that over 89 million people in the region could be displaced by 2050 due to slow-onset hazards under a high emissions scenario.⁴

Displacement creates urgent humanitarian needs and can also undo years of development progress for individuals, communities, and countries. This highlights the need for solutions that go beyond emergency response to include prevention and long-term recovery.

To address these challenges, the International Organization for Migration (IOM)'s Climate Mobility Innovation Lab (CMIL), the University of the Philippines Resilience Institute (UP RI), and the Asian Institute of Technology (AIT) are jointly leading the development of the Risk Index for Climate Displacement (RICD), in collaboration with a network of partners across the region and globally, including academic institutions, and government agencies.

- 1 IDMC and ADB, (2024) "Harnessing Development Financing for Solutions to Displacement: in the context of disasters and climate change in Asia and the Pacific: [Harnessing Development Financing for Solutions to Displacement in the Context of Disasters and Climate Change in Asia and the Pacific](#)."
- 2 Intergovernmental Panel on Climate Change (IPCC).
- 3 PCC, 2022: Summary for Policymakers [H.-O. Pörtner, D.C. Roberts, E.S. Poloczanska, K. Mintenbeck, M. Tignor, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem (eds.)]. In: Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 3–33, doi:10.1017/9781009325844.001.
- 4 Clement, Viviane; Rigaud, Kanta Kumari; de Sherbinin, Alex; Jones, Bryan; Adamo, Susana; Schewe, Jacob; Sadiq, Nian; Shababat, Elham. 2021. Groundswell Part 2: Acting on Internal Climate Migration. © World Bank, Washington, DC. <http://hdl.handle.net/10986/36248> License: CC BY 3.0 IGO.



Overview of the RICD Approach

The RICD is a decision support tool that quantifies the risk of climate-induced displacement in Asia and the Pacific by examining both:

- **Drivers of displacement** – underlying factors that increase or decrease the likelihood of people being displaced.
- **Triggers of displacement** – immediate causes of displacement.

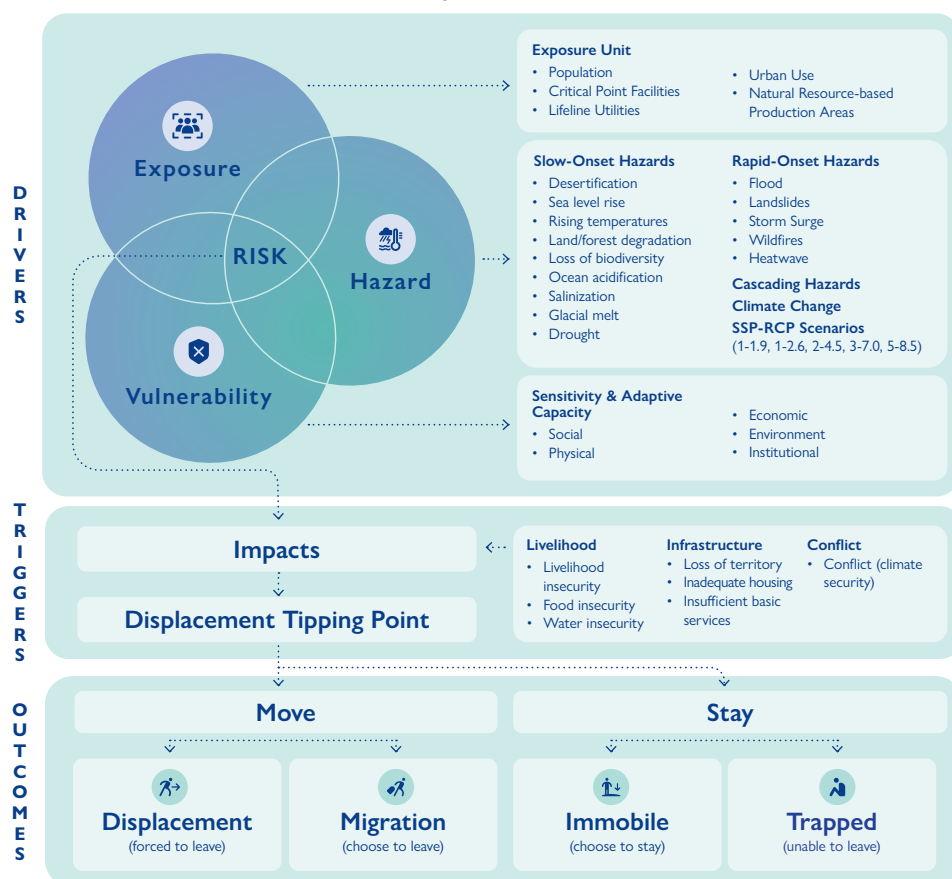
RICD operates at two levels

- **Macro-Level** – quantifying physical risks and identifying climate hotspots.
- **Micro-Level** – analyzing displacement tipping point and thresholds.

The RICD has been piloted in Indonesia and the Philippines and will soon expand to Fiji and Vanuatu, with the goal of scaling to other countries across Asia and the Pacific. The insights generated from the RICD inform the design of targeted interventions to reduce the future risk of climate-related displacement.



Conceptual Framework



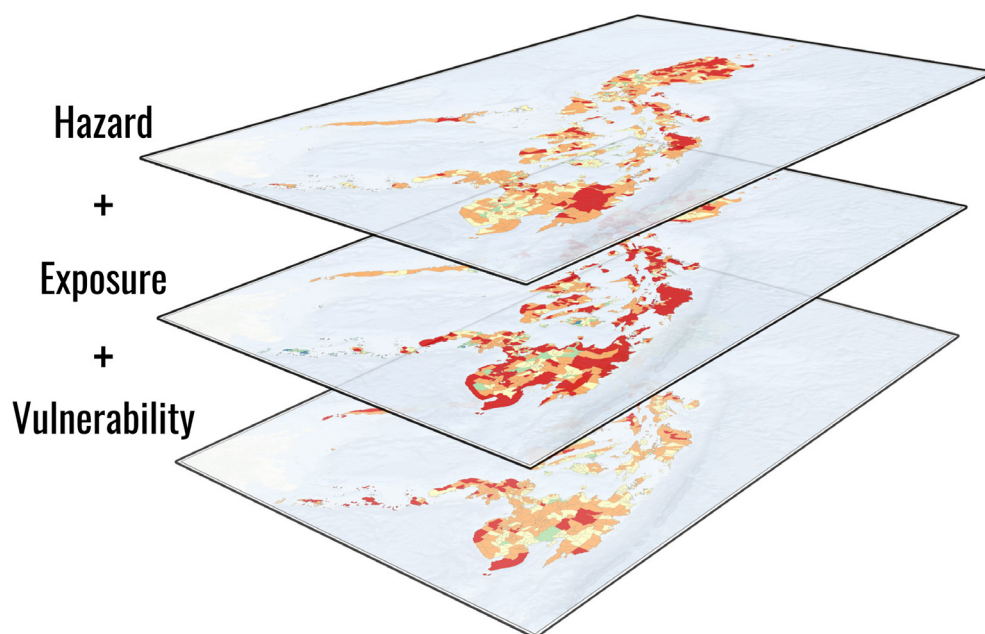
RICD Framework

MACRO AND MICRO RISK ANALYSIS

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RICD macro-level focuses on 'drivers' of displacement
 - Uses geospatial and national-level data to identify displacement 'hotspots'
 - Risk is assessed and cross-validated with historical displacement data
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RICD micro-level focuses on 'triggers' of displacement
 - Integrates local data and community insights
 - Combines quantitative and qualitative data with predictive analytics

Macro-Level Analysis

The macro-level analysis examines the underlying drivers of displacement by quantifying climate and disaster risk – a combination of **hazard**, **exposure**, and **vulnerability**. This follows the IPCC AR5⁵ framework, which defines risk as the interaction of hazard intensity and frequency, exposure of populations and assets, and the vulnerability of affected systems.



Hazard Assessment

The hazard assessment focused on flooding, given its strong association with displacement across Asia and the Pacific. Floods were selected for two countries – Indonesia and the Philippines – as an entry point, with the methodology designed to be expanded to other hazards over time.

In Indonesia, hazard assessment was based on the frequency of historical flood events (2002 – 2018). Each city and regency was scored according to how often floods occurred during that period.

In the Philippines, flood hazard was modelled using 100-year return period rainfall that simulated areas exposed to flood risk. Each municipality was scored based on the overlap between simulated flood extent and populated areas.

These assessments yield hazard maps highlighting areas with high flood risk.

5 Fifth Assessment Report (AR5).

Exposure Assessment

Exposure analysis focused on the concentration and density of people living in flood-prone areas. Analyses in both Indonesia and the Philippines combine population density data with flood extents to estimate how many people are at risk. Cities/regencies in Indonesia and cities/municipalities in the Philippines were assigned an exposure index score.

This component captures both the scale (number of people at risk) and spatial concentration of exposed populations to floods.

Vulnerability Assessment

Vulnerability assessment examines both:

- **Sensitivity** – the degree to which populations will be affected by the hazard due their inherent characteristics (based on indicators such as poverty, age, housing conditions, and household composition).
- **Adaptive capacity** – the degree to which populations are able to cope with the hazard (based on indicators such as access to water, healthcare, education, electricity, and infrastructure).

Both countries used similar approaches, adapting the indicators to fit local data and context. The final vulnerability score reflects the combined effects of sensitivity and adaptive capacity of communities to climate hazards.

Risk Scoring and Classification

The final risk index was calculated by combining the outputs of the hazards, exposure, and vulnerability assessments. Each component was given equal weight in the final score. Each administrative unit was then classified into different risk categories.

This composite risk index highlights areas at risk of flood events. Future work will expand the analysis to include additional hazards such as rain-induced landslides, storm surges, and drought.

To assess how well the risk scores aligned with observed displacement, the macro-level outputs were compared with historical displacement data as an initial validation step. This comparison highlighted that while macro-level analysis provides an understanding of displacement drivers, it captures only part of the picture. The specific triggers and threshold conditions that ultimately lead to displacement remain beyond the scope of this level of analysis and require more granular, community-level approach.

For more information on the macro-level analysis, refer to the Macro Factsheet and the individual macro-level reports for the Philippines and Indonesia.

From Macro to Micro

The micro-level analysis builds on the macro hotspot identification by investigating four high-risk areas – two in Indonesia and two in the Philippines. It combines household surveys and qualitative interviews with macro-level analysis to understand the triggers (housing damage, livelihood impact and access to essential services) and thresholds of (im)mobility.

The locations for data collection were selected through a three-tiered selection process:

- **Level 1:** High climate risk (as identified in the macro-analysis)
- **Level 2:** Clear evidence of historical displacement
- **Level 3:** Feasibility assessed through IOM field presence, data availability, and accessibility
- **Validation:** Through local stakeholder consultation



Micro-Level Analysis

The first step of the micro-level analysis adopts a localized and people-centred lens to capture insights into the community's lived experiences and the factors that influence their decisions to move. The micro-level analysis complements the macro-level analysis by grounding displacement risk in the lived experiences of households affected by climate impacts and displacement. It uses a mixed-methods approach, combining empirical data on displacement dynamics gathered through a combination of fieldwork (household surveys and interviews) as well as statistical modelling to build on these empirical findings and model climate displacement risk on a regional scale.

FIELD DATA COLLECTION

The field data collection focused on gathering empirical data on community's displacement experiences in the face of climate hazards and the factors contributing to their displacement.

The surveys were administered to two distinct groups – those who have been displaced due to climate impacts and those who have not. Both displaced and non-displaced households were sampled to identify key factors influencing climate-induced displacement and to understand the full spectrum of vulnerability, resilience, and (im)mobility. This comparative approach strengthens our analysis and supports the development of predictive displacement models and the design of targeted interventions to reduce displacement risk.

These were complemented with key informant interviews (KIs) and focus group discussions (FGDs) with governmental stakeholders and community leaders. This allows us to triangulate findings, capture institutional perspectives, and contextualize household-level data within broader governance, policy, and community narratives.

Site	Bagamanoc	Rodriguez	Bandung	Makassar	All
Country	Philippines	Philippines	Indonesia	Indonesia	Both countries
Survey Sample Size	Displaced households: 263 Non-displaced households: 280 Total: 543	Displaced households: 221 Non-displaced households: 211 Total: 432	Displaced households: 213 Non-displaced households: 220 Total: 433	Displaced households: 161 Non-displaced households: 241 Total: 402	Displaced households: 858 Non-displaced households: 952 Total: 1,810
KIs & FGDs	 KIs: 6  FGDs: 2	 KIs: 6  FGDs: 2	 KIs: 5  FGDs: 2	 KIs: 7  FGDs: 1	 KIs: 24  FGDs: 7
Average Household Size	 4.5	 5.4	 4.5	 5.1	 4.8
Average Monthly Household Income	USD \$181	USD \$216	USD \$182	USD \$273	USD \$213
Proportion of Households with Home Ownership	53%	54%	81%	71%	65%
Top 3 Primary Livelihood Sources	Agriculture and Crop Farming (29%) Fisheries/Aquaculture (15%) Construction/Skilled Labour (13%)	Construction/Skilled Labor (39%) Home-based Enterprises (9%) Formal and Informal Services (8%)	Home-based Enterprises (14%) Manufacturing (13%) Agriculture and Crop Farming (11%)	Construction/Skilled Labor (13%) Informal/Household-based Sources (13%) Public Services (11%)	Construction/Skilled Labor (17%) Agro-Processing (12%) Unemployed/No Regular Livelihood (7%)

The main themes of the surveys and interviews were:

- Climate hazards impacting communities
 - Spatial and temporal changes in climate hazards
 - Impacts of hazards on key sectors e.g., housing, livelihoods, and access to essential services
- History/experience with past displacement
 - Spatial and temporal dimensions of displacement
 - Past displacement triggers and thresholds
 - Mobility types (e.g., pre-emptive evacuation (<7 days), temporary displacement, permanent relocation, returnees, trapped)
 - Volition of movement (whether displacement was forced or voluntary)
- Adaptation strategies, resilience, and support systems
- Climate risk perception and future migratory aspirations
- Socioeconomic profile of households

Data Analysis

The survey data was analyzed in three stages:

- Descriptive statistics were used to profile displaced and non-displaced households across key variables such as demographics, exposure to climate hazards and mobility types
- Bivariate analysis was conducted to identify statistically significant differences between the two groups, highlighting potential predictors of displacement
- Multivariate regression models were developed to estimate the likelihood of displacement based on factors like income, tenure, asset ownership, and hazard exposure.

These quantitative findings were complemented by qualitative analysis of KIIs and FGDs to contextualize household data and identify common themes across communities.



Next Steps

The next stage of the micro-level analysis will be focused on establishing the mechanism through which hazards and climate change impacts lead to displacement, in terms of the factors that trigger displacement (e.g. housing damage, livelihood disruptions, and accessibility to services) as well as thresholds and tipping points associated with these factors.

Building on the insights gathered from the field data collection, we seek to model the impacts of hazards and climate change on key sectors identified (e.g., housing, livelihood, and access to essential services) under various climate change scenarios. We will then quantify the risk of displacement based on displacement triggers and thresholds identified from field data. This will allow us to spatially map the displacement hotspots – areas most at risk of climate displacement – and inform where to prioritize interventions to reduce displacement risk and build adaptive capacity.

Outputs and Applications

The outputs from RICD will provide a foundation for informed action through the Climate Catalytic Fund (CCF) as well as inform policymaking by governments.

- **Quantitative output** (to guide CCF target locations):
 - Estimated number of people at risk of climate-induced displacement
 - Identification of displacement hotspots
- **Qualitative output** (to guide CCF intervention types):
 - Understanding of displacement factors and tipping points, including their ranking and trade-off
 - Analysis of general displacement dynamics, encompassing social, cultural, and personal factors that are significant to understanding displacement more broadly
 - Insights on key sectors in which to target interventions

In the future, these are some possible applications:

- RICD seeks to provide insights that support or underpin disaster preparedness and risk reduction efforts as well as development and resilience-building programmes.
- RICD provides governments, international organizations, climate finance entities, civil society, private sector, and academia with essential information to identify and prioritize at-risk areas and populations, facilitating more effective and targeted responses.