https://doi.org/10.1038/s41558-025-02506-8

Future-making beyond (im)mobility through tethered resilience

Bishawjit Mallick, Lori Mae Hunter, Brooke Ackerly, Rup Priodarshini, Ilan Kelman, Ingrid Boas, Brianna Castro, Mathias Czaika, Bayes Ahmed, Md. Nasif Ahsan, Mariana Fajardo Arboleda, Ajay Bailey, Mucahid M. Bayrak, Kelsea Best, Amanda Carrico, Jamie Draper, Benjamin Etzold, Carol Farbotko, Animesh Kumar Gain, Tuhin Ghosh, Jonathan M. Gilligan, Marco Helbich, S. M. Labib, Dora Martins Sampaio, Mostafa Naser, Kei Otsuki, Balgah Roland, Oishi Rani Saha, Patrick Sakdapolrak, Gopa Samanta, Klara Schmock, Harald Sterly, Zakia Sultana, Kees van der Geest, Anna Viani & Julia van den Berg

Adaptation to climate change goes beyond the migration–non-migration divide. Families and communities combine mobility with rootedness, drawing on cultural ties, intergenerational learning, and lived knowledge to navigate risks and shape long-term futures.

Rising seas, scorching heatwaves and intensifying storms are no longer distant threats; they are reshaping where and how people live. Faced with these pressures, individuals and communities must navigate a fundamental question: should they move, or should they stay and adapt? To what extent do they have a choice? Much of the climate change–mobility literature frames this as a simple dichotomy: migration versus non-migration[1], voluntary versus involuntary[2]. These distinctions emphasize the external drivers of mobility, often neglecting that the decision to migrate or stay is not merely a reactive response to external pressures, but is often a proactive, context-specific negotiation of opportunities, aspirations and identities in which people negotiate their futures (Box 1). Thus, migration and staying are not opposites; they can coexist as complementary strategies within broader 'future-making'[3]. Future-making encompasses the choices and practices through which people pursue life aspirations shaped by cultural and personal imaginaries of success, security and a fulfilling life[3]. Recent research has begun to move beyond rigid binaries, exploring translocal livelihoods[4], the thresholds of habitability[5] and the importance of supporting stayers[6]. But it seldom investigates how these mobility decisions are inextricable from broader future-making aspirations and strategies and how migration and staying can be complementary practices embedded therein (Box 1). To address this gap, we propose a new concept of 'tethered resilience' that captures the simultaneous rootedness and mobility through which people negotiate risk and shape their futures.

Tethered resilience as future-making

Tethered resilience explains the interconnected nature of individuals and their broader sociocultural and institutional networks, and how this shapes their interest and ability to move, remain in place, or both, despite adverse conditions, as the cases in Box 1 illustrate. Tethered resilience captures two key insights: one, being 'tethered' is a resource that can strengthen individual and community resilience in the face of change; and two, being tethered shapes people's imagination regarding future-making possibilities.

Individuals and communities face risks in their current environment, prompting them to assess the quality of life where they live. Climate change influences both slow-onset changes to livelihoods and living conditions and rapid-onset changes such as to cyclones. Other forces also lead to change and uncertainty — sociopolitical conditions can make people reassess their livelihoods and even life prospects. The impact of climate change on the likelihood of migration varies widely, often being secondary to economic, social, cultural and demographic variables[2]. Altogether, at the place of risk, people experience the impacts of (1) climate change (natural and anthropogenic); (2) livelihood change (for example, localized environmental changes and market forces); and (3) sociopolitical uncertainty (for example, unrest, inequity, instability, interpersonal and local-level conflict) (Fig. 1).

We can better explain the dynamic nature of adaptation to such changes by moving beyond the dichotomy of migration versus non-migration to consider individuals and communities as making adaptation decisions in light of the fact that they are tied to a particular place. At its core, this is an active process rooted in the dynamic interplay between potential and chosen adaptive responses and context. Our proposed conceptual model illustrates how households develop strategies to deal with uncertainty and change by relying on three key, interconnected sources of knowledge: (1) learning through lived experiences; (2) learning intergenerationally within families and communities; and (3) learning through informal cultural norms and formal or legal institutions (Box 2). These diverse sources of knowledge may complement one another by reinforcing adaptive strategies, converge by reproducing shared values across generations, or conflict when institutional arrangements and cultural norms diverge from locally embedded experiences and aspirations. Importantly, the acquisition and interpretation of knowledge from all these sources is mediated by intersecting social attributes such as age, gender and class. Households draw on these sources of knowledge to proactively plan for their future in the face of uncertainty and change, and the risks they pose.

In light of these three ways that knowledge, and subsequently resilience, is tethered to place, we describe four key ways demonstrating how the concept of tethered resilience advances the understanding

BOX 1

Examples of future-making beyond the migration–staying divide in the face of climate change risk

Across the world, people engage both migration and non-migration in flexible ways to adapt to climate change risk and work towards their future needs and aspirations:

- Despite climate change threats, women in rural Bangladesh remain more tied to their places of origin due to traditional gender roles and limited access to mobility. Yet, they often engage in emplaced resilience-building activities such as community farming or home-based enterprises[10].
- African students living in Chinese cities such as Guangzhou and Wuhan view migration to China as opening new aspirational futures for both themselves and their families in the face of climate change-related stressors such as extreme heat and resource scarcity at home — but some later undertake onward journeys as they lose hope in China because their aspirations are costly and they become frustrated[11].
- In Surakarta, Indonesia, a culturally infused 'kirab boyongan' (relocation parade), the culmination of local riverbank dwellers' resettlement negotiations, functioned as a symbolic event of hope, while framing migration and relocation as performative expressions of civic belonging[11].
- Anchored by tradition and place attachment, families in Fiji voluntarily stay in climate-vulnerable coastal areas, but they also actively plan for 'generational retreat' where, in time, their children will move inland and build homes on higher ground[12].
- Mobile pastoralism is an embedded migration practice whose inherent dynamism supports the resilience of Fulani herders in Ghana — but this Indigenous lifestyle is increasingly supported by more place-based activities such as planting and shelter-building to adapt to changing climate conditions[8].
- In Niger, the aspiration for future resettlement serves as an intentional 'temporal border', encouraging would-be migrants to remain — but many later contest this when promises falter, often due to climate change-influenced impacts such as droughts, soil degradation or water scarcity exacerbating socioeconomic pressures[3].
- In Kenya, where prolonged droughts, floods and land degradation undermine livelihoods and drive displacement, refugees within Kakuma Refugee Camp actively use available facilities such as private schools to prepare for life beyond the camp, while also pooling resources and knowledge to support collective resettlement efforts[3].
- In mountainous regions of central Mexico, increasing climate risks drive rural households to combine strategic circular migration by some members with the revival of in situ traditional agricultural practices[9].
- In Guatemala, where climate change intensifies risks of drought and crop failure, youth increasingly see non-migration — notably, through local economic initiatives such as remittance-based co-ops and community enterprises — as a deliberate future-making strategy to create sustainable, dignified lives at home[13].
- In Tuvalu, migration is part of an expansive Indigeneity: in a changing climate, migration for economic reasons is now accompanied by strong aspirations for a Tuvaluan population to stay in the islands and adapt to the challenges of sea-level rise if possible, rejecting a vision of Tuvaluans as untethered 'climate refugees'[12].

of future-making beyond a migrating–staying dichotomy. At the same time, it deepens insights into adaptive behaviours, helping to enhance understanding of resilience by integrating the roles of institutional, intergenerational and interpersonal knowledge.

First, households construct resilience by combining inherited knowledge, cultural ties and livelihood diversification — for example, moving from farming to urban work while retaining rural land as security — showing that adaptation is negotiated across the past, present and future rather than linearly defined by (im)mobility. By blending ancestral practices with innovation, people can build adaptive strategies that are neither purely migratory nor static. Tethered resilience advances the view that adaptation is a fluid, multi-scalar process in which households balance rootedness with mobility — through remittances, translocal ties and return migration — transforming reactive responses into deliberate, future-oriented strategies[4]. For instance, remittances often sustain the resilience of those who stay, while return migration enables knowledge transfer for future adaptation. This processual view reveals that resilience is not a fixed outcome, but an evolving interaction between agency, resources, socioenvironmental conditions and governance structures that shape future-making.

Second, adaptive strategies are deeply shaped by structural inequities, as intersecting identities of age, gender, class, religion, race, nationality, ethnicity and more mediate access to resources and power in scenarios of social and environmental change[7]. Women may build emplaced resilience and youth may pursue education-linked mobility, requiring context-specific strategies that empower marginalized groups. By addressing structural inequities, tethered resilience enables tailored adaptative strategies that empower marginalized groups. Such an approach can foster inclusive resilience that integrates movement and stability, ensuring that future-making is equitable, dynamic, flexible and universally reflective of complex social realities.

Third, cultural values mediate adaptation. Staying can be an active assertion of identity and continuity. Blending traditional practices with innovative approaches allows communities to preserve their cultural integrity while responding to evolving risks. For instance, Indigenous groups resisting displacement may adopt hybrid adaptive strategies to stay, integrating modern infrastructure while preserving traditional knowledge[8]. Conversely, migration may be seen as a temporary strategy undertaken to mitigate risks through livelihood diversification, and thus ultimately to sustain cultural heritage, rather than an indefinite severance from one's homeland[9]. By aligning local practices with broader resilience frameworks, tethered resilience empowers individuals and communities to sustain their history and heritage. This synergy

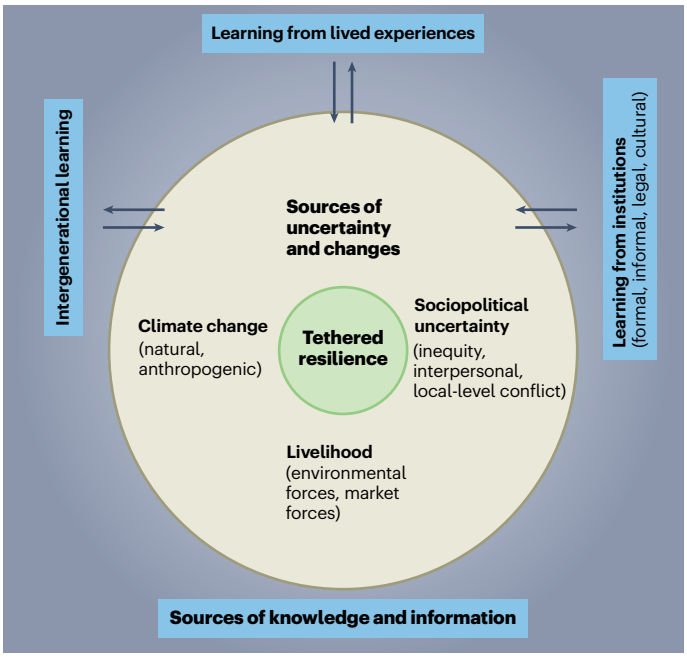

Fig. 1 | Concept of tethered resilience as future-making, useful in understanding (im)mobility under risk. It illustrates how sources of knowledge and information (blue) and sources of uncertainty and changes (cream) intersect, with their interaction at the centre explaining tetheredness.

fosters innovative adaptation that balances the preservation of cultural identity with pragmatic shifts in livelihood strategies.

Fourth, institutions and governance structures can enable or constrain tethered resilience. Supportive policies such as adaptive infrastructure, land rights, access to credit, and livelihood incentives make staying viable, whereas governance failures and 'uninhabitability' narratives may push communities into involuntary migration, calling for alignment of institutional frameworks with community-led adaptation[3]. For example, inadequate flood risk reduction policies may force relocation from at-risk places, whereas investment in localized adaptive strategies can strengthen resilience and enable staying. By integrating institutional frameworks with community-led adaptation, tethered resilience can ensure that migration and staying remain interconnected choices supported by governance structures rather than dictated by structural vulnerabilities. Furthermore, by attending to intersectionality and structural inequities, institutions can be modified such that they do not exacerbate injustice by informally excluding some people.

Outlook

Tethered resilience reorients adaptation into a dynamic, proactive process that transcends the limitations of the migration–staying dichotomy. By embedding adaptation in people's wider future-making aspirations and actions, it rehabilitates the agency, subjectivity and imagination of people living with risk, whose lives are often reduced to the problems they face. Investigating adaptation through the analytical lens of tethered resilience will help scientists and policymakers design inclusive adaptation strategies that recognize migrating and staying as interconnected, dynamic processes of future-making shaped by governance structures, intersectional identities and experiences, and intergenerational knowledge. It has the potential to enhance social equity and local adaptation capacities with a long view for future-making amid environmental change, sociopolitical uncertainty and other global and local challenges. In doing so, it can transform reactive responses into purposive, forward-thinking strategies, empowering communities to navigate shifting uncertainties and construct resilient, thriving futures.

BOX 2

Sources of learning under tethered resilience

Lived experiences, including observation of various changes over time — and of how self and others have dealt with changes — gives individuals and communities an expertise on their locale over others, shaping and delimiting their responses to change. Crucially, lived experience is shaped by one's unique social positionality. Intersectionality is a tool for understanding the way different social attributes (for example, age, gender, class, ethnicity, sexual orientation) affect lived experiences. An intersectional lens accounts for overlapping forms of social (dis)advantage that interact uniquely to contour power dynamics, access to resources and vulnerability to risk[7]. Thus, resilience capacity and the ability to take up adaptive strategies can be differentiated by the factors of wealth, gender, age and more, which accumulate to produce thresholds of (im)mobility.

Intergenerational knowledge is insight relating to how one's own family or community has handled comparable pressures in past generations. Learning from inherited knowledge is a vital strategy for increasing resilience to climate change and other sociopolitical risks[14]. Aspirations and adaptive strategies are transferred, negotiated or altered across generations of migrants and/or non-migrants in a multidirectional exchange. This intergenerational dynamism highlights how past, present and anticipated future conditions influence choices, shaping a society's trajectory through individual decisions. Recent advances in adaptation scholarship have begun incorporating historical dimensions of mobility, highlighting how adaptive strategies evolve across generations to bolster resilience.

Cultural norms and institutions encompass a community's knowledge about how best to respond to certain risks. Cultural norms influence collective values and dictate permissible or desirable behaviour, shaping adaptation goals, behaviours and the willingness to embrace change[15]. Institutions and governance structures provide — or fail to provide — the frameworks, resources and policies to mediate these adaptation opportunities, balancing local traditions with broader climate change resilience objectives. Thus, norms and institutions together affect how individuals or communities adapt to environmental changes — including through im(mobility) — while maintaining their attachment to place. Some cultural norms and institutions encourage staying, for example, in local storm shelter systems. Conversely, people may tend towards migration if norms of discrimination make them more vulnerable during disasters.

Bishawjit Mallick[1] ✉, Lori Mae Hunter[2], Brooke Ackerly[3], Rup Priodarshini[4], Ilan Kelman[5], Ingrid Boas[6], Brianna Castro[7], Mathias Czaika[8], Bayes Ahmed[5], Md. Nasif Ahsan[9], Mariana Fajardo Arboleda[10], Ajay Bailey[1], Mucahid M. Bayrak[11], Kelsea Best[12], Amanda Carrico[13], Jamie Draper[14], Benjamin Etzold[15], Carol Farbotko[16], Animesh Kumar Gain[17], Tuhin Ghosh[18], Jonathan M. Gilligan[19], Marco Helbich[1], S. M. Labib[1], Dora Martins Sampaio[1], Mostafa Naser[20], Kei Otsuki[1], Balgah Roland[21], Oishi Rani Saha[9], Patrick Sakdapolrak[22], Gopa Samanta[23], Klara Schmock[1], Harald Sterly[22], Zakia Sultana[24], Kees van der Geest[25], Anna Viani[26] & Julia van den Berg[27]

[1]Department of Human Geography and Spatial Planning, Faculty of Geosciences, Utrecht University, Utrecht, The Netherlands. [2]Institute of Behavioral Science, University of Colorado Boulder, Boulder, CO, USA. [3]Department of Political Science, Vanderbilt University, Nashville, TN, USA. [4]Independent Consultant, London, UK. [5]Institute for Risk and Disaster Reduction, University College London (UCL), London, UK. [6]Environmental Policy Group, Wageningen University & Research, Wageningen, The Netherlands. [7]School of the Environment, Yale University, New Haven, CT, USA. [8]Department for Migration and Globalisation, University of Continuing Education Krems, Krems, Austria. [9]Economics Discipline, Khulna University, Khulna, Bangladesh. [10]Institute of the Environment and Sustainability, University of California Los Angeles, Los Angeles, CA, USA. [11]Department of Geography, National Taiwan Normal University, Taipei City, Taiwan. [12]Department of Civil Environmental and Geodetic Engineering, Ohio State University, Columbus, OH, USA. [13]Department of Environmental Studies, University of Colorado Boulder, Boulder, CO, USA. [14]Department of Philosophy and Religious Studies, Faculty of Humanities, Utrecht University, Utrecht, The Netherlands. [15]Bonn International Center for Conflict Studies (BICC), Bonn, Germany. [16]Griffith Centre for Social and Cultural Research, Griffith University, Brisbane, Queensland, Australia. [17]School of Environmental and Conservation Sciences, Murdoch University, Perth, Western Australia, Australia. [18]Department of Oceanography, Jadavpur University, Kolkata, India. [19]Department of Earth & Environmental Sciences, Vanderbilt University, Nashville, TN, USA. [20]School of Business and Law, Edith Cowan University, Perth, Western Australia, Australia. [21]College of Technology, The University of Bamenda, Bambili, Republic of Cameroon. [22]Department of Geography and Regional Research, University of Vienna, Vienna, Austria. [23]Department of Geography, The University of Burdwan, Bardhaman, India. [24]Copernicus Institute of Sustainable Development, Faculty of Geosciences, Utrecht University, Utrecht, The Netherlands. [25]Environment & Migration Division, United Nations University-Institute for Environment and Human Security (UNU-EHS), Bonn, Germany. [26]Department of Environmental Biology, Faculty of Sciences, Utrecht University, Utrecht, The Netherlands. [27]Faculty of Law, University of Amsterdam, Amsterdam, The Netherlands.
✉e-mail: b.mallick@uu.nl

Published online: 25 November 2025

References

1. Hunter, L. M., Luna, J. K. & Norton, R. M. *Annu. Rev. Sociol.* **41**, 377–397 (2015).
2. Farbotko, C., Dun, O., Thornton, F., McNamara, K. E. & McMichael, C. *Nat. Clim. Change* **10**, 702–704 (2020).
3. Scharrer, T., Lambert, L., Millar, S., Pekşen, M. & Laakkonen, V. *Comp. Migr. Stud.* **12**, 54 (2024).
4. Sakdapolrak, P. et al. *Proc. Natl Acad. Sci. USA* **121**, e2206185120 (2024).
5. Sterly, H. et al. *Glob. Environ. Change* **90**, 102953 (2025).
6. Iyer, M. V. & Schewel, K. *Georget. Immigr. Law J.* **38**, 207 (2024).
7. Erwin, A. et al. *World Dev.* **138**, 105282 (2021).
8. Napogbong, L. A., Ahmed, A. & Derbile, E. K. *Clim. Dev.* **13**, 201–214 (2021).
9. Cascone, N., Peña del Valle Isla, A. E. & Milan, A. in *Migration, Risk Management and Climate Change: Evidence and Policy Responses* (eds Milan, A. et al.) 63–83 (Springer, 2016).
10. Tonmoy Islam, T. M. & Kotikula, A. *Asian Dev. Rev.* **40**, 79–111 (2023).
11. Bunnell, T., Gillen, J. & Ho, E. L. E. *Ann. Am. Assoc. Geographers* **108**, 35–51 (2017).
12. McMichael, C., Farbotko, C., Piggott-McKellar, A., Powell, T. & Kitara, M. *Populat. Environ.* **43**, 82–107 (2021).
13. Briana, N. *J. Refugee Stud.* https://doi.org/10.1093/jrs/feae034 (2024).
14. García-Hernández, C., Ruiz-Fernández, J. & González-Díaz, B. *Geogr. Res.* **57**, 189–203 (2019).
15. Few, R. et al. *WIREs Clim. Change* **12**, e687 (2021).

Competing interests

The authors declare no competing interests.