



Climate-induced rural–urban migration in India: Livelihood vulnerability, urban adaptation and policy responses

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DOI: <https://doi.org/10.66856/ijhssr.2026.12.4.12369>

Abstract

Climate-related hazards alter livelihoods, mobility aspirations and household capacities across rural India, but the resulting population movements cannot be explained by climate exposure alone. This review examines how drought, rainfall variability, heat stress, agricultural uncertainty and resource insecurity intersect with rural–urban migration, and how Indian cities might accommodate mobile populations without transferring vulnerability from villages to hazardous urban settlements. It critically synthesizes peer-reviewed Indian empirical studies, major conceptual reviews and official reports, with particular attention to heterogeneous migration responses, livelihood adaptation, urban informality and policy coherence. Evidence from Indian household panels and city-level mixed-methods research associates drought and weather shocks with particular types of migration while demonstrating that irrigation, local non-farm income, migration costs, skills and social networks mediate mobility. Migrants may diversify household income through remittances, yet insecure labour, low-quality housing, heat exposure and limited service portability can generate new risks at destination. The review proposes a linked origin–corridor–destination framework integrating climate-resilient livelihoods, rights-based mobility and migrant-inclusive urban adaptation. It identifies priorities for subnational longitudinal evidence, causal evaluation of adaptation measures, smaller-city research, gender-sensitive analyses and interoperable social protection. Migration should be treated neither as inevitable climate displacement nor as a universally successful adaptation strategy, but as one possible outcome within a broader opportunity-and-constraint system.

Keywords: Climate change, rural–urban migration, livelihood vulnerability, adaptation, urban resilience, India, internal migration, social protection

Introduction

Climate change increasingly interacts with existing patterns of economic inequality, agricultural dependence and demographic transformation in India. Variability in monsoon rainfall, recurrent drought, episodic flooding and extreme heat can influence crop output, farm wages, water access and household debt. Their implications for migration, however, depend on access to irrigation, assets, credit, local employment and institutional support. The IPCC (2022) concludes with high confidence that climatic disruption to agricultural and other rural livelihoods can generate migration, while also emphasizing that climatic conditions may increase, decrease or redirect mobility rather than producing one uniform response.

The distinction matters because internal migration is already integral to India's rural–urban economy. People move temporarily, seasonally, circularly and permanently for employment, education, marriage and family reasons. Some workers seek construction, manufacturing, domestic service or retail opportunities, while others diversify risk across rural and urban labour markets. Such flows long predate anthropogenic warming. Black *et al.* (2011) ^[1] therefore argue for a multi-driver explanation linking environmental change with economic, social, political and demographic processes, rather than assigning a single environmental cause to complex human decisions.

Indian empirical evidence makes this point concrete. Dallmann and Millock (2017) ^[5] link origin-state drought frequency to increased interstate movement using historical

Census and climate data, although they find especially strong effects for rural–rural migration. Sedova and Kalkuhl (2020) ^[15], using the India Human Development Survey (IHDS) and weather reanalysis, find that adverse weather can shift rural residents toward cities in other states while favourable conditions may finance longer-distance movement. These apparently differing results reveal that destination, time period, household selection and exposure measure change the estimated climate–migration relationship.

Urban destinations are not automatically safer. Migrants may arrive in areas with informal employment, insecure tenure, poor drainage and severe outdoor heat exposure. The systematic review by Chung *et al.* (2022) emphasizes the interaction of climate mobility with urban labour markets, informality and public policy. The World Bank (2025) ^[21] similarly identifies the large scale of India's future urban infrastructure needs and the importance of climate-resilient planning. The question is thus not only why households leave climate-stressed rural locations, but whether moving alters their long-term capabilities and risk.

This article brings together three typically separated literatures: (i) climatic shocks and agrarian livelihood vulnerability; (ii) internal migration as adaptation, constrained choice or displacement; and (iii) urban adaptation and social protection at receiving destinations. Its purpose is analytical and policy-oriented. It does not present new household observations or statistical estimates and does not label climate-related movement as a direct, uniquely

attributable effect of climate change without appropriate evidence.

Review Objectives and Guiding Questions

The review has four objectives: to interpret evidence on climate-related rural livelihood shocks and mobility in India; to compare migration as a coping strategy, longer-term adaptation and involuntary immobility; to examine the economic and environmental vulnerabilities faced by migrants in receiving cities; and to assess policy responses across rural origins, migration pathways and urban destinations.

The guiding questions are: (1) Through which livelihood pathways do climatic hazards influence rural mobility decisions? (2) Why do similarly exposed households display different migration and immobility outcomes? (3) What factors determine whether migration improves welfare or reproduces vulnerability in cities? (4) Which policy combinations are best aligned with observed mechanisms and existing governance institutions?

Materials and Review Approach

This paper adopts a structured critical narrative review, not an independently conducted systematic review or meta-analysis. Publications were selected purposively for relevance to Indian climate–migration relationships, comparative migration theory, urban climate mobility and government policy. Priority was given to peer-reviewed work with identifiable study designs and publisher-verifiable DOIs, supplemented by official reports of the Intergovernmental Panel on Climate Change (IPCC), World Bank and Government of India. The review privileges empirical evidence over speculative projections when describing observed migration.

The synthesis distinguishes four evidence categories: (a) causal or quasi-causal Indian household and state-level analyses; (b) observational mixed-methods city and village studies; (c) international evidence syntheses and theoretical frameworks; and (d) scenario projections and policy documents. Claims are compared by exposure measure, migration definition, unit of analysis, destination and

identification strategy. Because a comprehensive reproducible database search, formal risk-of-bias assessment and documented inclusion flow were not performed for this manuscript, no PRISMA counts, effect-size pooling or completeness claims are made. These would be necessary if the article were converted into a formal systematic review.

Geographic relevance is assessed carefully. Findings from Pune or drought-prone farm households cannot be assumed to apply identically to coastal Odisha, the Himalayan foothills or all secondary Indian cities. Similarly, modelled future movement under a given warming scenario must not be interpreted as an observed count or an India-specific prediction when the source reports South Asia as a whole (IPCC, 2022; World Bank, 2021) ^[20].

Conceptual Framework: From Climate Risk to Mobility Outcomes

1. Environmental stress, livelihood sensitivity and adaptive capacity

The first analytical step distinguishes the hazard from its livelihood effect. A precipitation deficit is a physical hazard; crop loss depends on irrigation, soil properties, crop calendar and cultivation practices; income loss depends additionally on labour opportunities, debt obligations, procurement arrangements and household assets. Two households exposed to the same drought may therefore experience very different pressure to move. Black *et al.* (2011) ^[1] situate environmental drivers among five interacting families of migration drivers, while Cattaneo *et al.* (2019) ^[3] show that fast-onset disasters and slow-onset processes can generate different, sometimes opposing, movement patterns.

A stylized causal chain is useful: climatic hazard → agricultural or resource shock → earnings, food-security and debt stress → household aspiration and capacity to move → movement or immobility → origin- and destination-side livelihood outcomes. Each arrow is conditioned by non-climatic institutions. This diagram is an interpretive framework rather than a fitted empirical causal model.

Table 1: Conceptual framework for climate–livelihood–mobility linkages (author synthesis)

Stage	Key mechanisms	Intervening conditions
Climate exposure	Drought, heat, variable rainfall, flood or coastal stress	Hazard intensity, duration and local geography
Livelihood impact	Crop and wage loss, reduced water access, rising debt and food insecurity	Irrigation, land tenure, savings and access to markets
Mobility decision	Seasonal/circular, rural–urban, interstate movement or remaining in place	Aspirations, social networks, mobility cost, gender and skills
Destination outcome	Employment, remittances, service access and exposure to urban risks	Housing, worker protection, urban infrastructure and social protection

2. Migration as adaptation, constraint and immobility

Migration may function as *ex ante* risk diversification where one member enters a non-farm labour market before a major agricultural loss, or as *ex post* coping after crop failure. It can also become distress movement when depleted savings and debt leave little meaningful choice. Tacoli (2009) ^[19] argues that mobility should be integrated into adaptation policy rather than treated automatically as failure, whereas Zickgraf (2021) ^[22] warns that slow-onset impacts and intrahousehold inequality produce highly context-specific responses.

The aspiration–ability distinction offers a second key insight. Carling and Schewel (2018) ^[2] show that a desire to migrate does not guarantee the resources or opportunities required to do so; others may have the means yet prefer to remain. Accordingly, households with the deepest livelihood losses may become involuntarily immobile because they cannot fund transportation, housing deposits or time spent searching for work. The IPCC (2022) identifies such immobility as a significant risk condition. It follows that a decline in migration following a severe shock is not necessarily evidence of improved well-being.

3. Scale and attribution

The term “climate-induced migration” is convenient but demands caution. Weather variation can be estimated as a determinant of observed mobility, but isolating the share specifically caused by anthropogenic climate change requires an additional attribution step. Individual migrants may report multiple proximate reasons—employment, debt, crop loss and household obligations—while these reasons are partly interconnected. Hoffmann *et al.* (2020) ^[8], in a meta-analysis of country-level research, document substantial heterogeneity in effects and methods, undermining simplistic global rules. This review therefore uses “climate-related” for multi-causal observed mobility and retains “climate-induced” in the title as a broad substantive research field rather than a claim of exclusive causation.

Climate-Related Vulnerability in Rural India

1. Drought and rainfall variability

Rainfed agricultural production can be particularly sensitive to the timing and distribution of rainfall. Delayed onset, dry spells during key growth stages, and rainfall extremes influence planting decisions, labour demand, and cash flow. Dallmann and Millock (2017) ^[5] construct drought indicators from climate series matched to 1991 and 2001 migration patterns and find that more frequent origin-state drought increases interstate movement. Importantly, the largest estimated pathway in their analysis is rural–rural interstate migration, illustrating why rural–urban narratives alone can miss other relevant responses.

At household scale, Sreekumar and Mandal (2024) ^[17] employ IHDS panel data and a difference-in-differences design to investigate repeated drought among Indian farm households. They report evidence consistent with drought-induced out-migration but find no statistically significant drought effect among households with non-farm business activity or irrigation access. This is important for causal interpretation: migration is conditioned by the economic alternatives available at origin, and a climate shock need not result in movement when livelihoods are buffered.

2. Temperature, agriculture and multidimensional deprivation

Heat stress affects rural workers through labour productivity, water requirements, crop development and heat-related health risk. Yet translating a temperature anomaly into migration requires evidence on local crop exposure, household income and feasible mobility pathways. Cattaneo *et al.* (2019) ^[3] distinguish slow-onset stresses from sudden hazards, while the IPCC (2022) assesses livelihood deterioration as an indirect pathway to population mobility. Agricultural losses can also amplify pre-existing inequalities: land-poor households have fewer assets, insecure tenants may face weak incentives to invest in adaptation, and households with limited savings may be less able to migrate strategically.

Social vulnerability is not a synonym for climate exposure. Access to safe water, health services, transport, formal credit, schooling and public employment may substantially modify the consequences of the same hazard. This distinction helps avoid identifying an entire drought-prone district as uniformly “destined to migrate.” For empirical work, the appropriate unit may be the farm household or

village rather than a district-average climate metric. Gender-differentiated workloads, unpaid care, and unequal decision-making similarly warrant explicit measurement rather than assumptions about all women’s or men’s experiences.

3. Local diversification as an alternative or complement to migration

The relationship between diversification and mobility is potentially non-linear. Local non-farm work can reduce pressure for distress migration by stabilizing earnings. It can also finance a better-planned move if the household chooses to pursue opportunities elsewhere. Sreekumar, Mandal, and Drall (2024) ^[18], using weather and household information in Indian agroecological regions, find that local non-farm income moderates the association between climate-related crop loss and migration. The evidence supports flexible livelihood portfolios rather than a policy objective of eliminating migration itself.

Empirical Evidence on Climate-Related Rural–Urban Movement

1. State-level and panel evidence

Sedova and Kalkuhl (2020) ^[15] combine ERA5 climate reanalysis with the IHDS panel and estimate linear probability and multinomial logit models. Their results show that adverse weather can push less-educated members of agriculturally dependent households towards cities outside their state, whereas positive weather shocks facilitate international and within-state urban movement. In their study context, approximately 8% of rural–urban moves during 2005–2012 are statistically attributable to weather anomalies. This is a model-based estimate for that dataset and period; it is not a direct census of climate migrants or a timeless national share.

The difference between the Sedova and Kalkuhl (2020) ^[15] results and the strong rural–rural drought channel in Dallmann and Millock (2017) ^[5] is not necessarily contradictory. Their units of observation, historical periods, migration destinations and climatic indicators differ. One study focuses on an historical macro-flow relationship; the other uses household-panel observations and destination classifications. A rigorous synthesis must therefore retain destination specificity rather than reduce both studies to the assertion that climate “always pushes people to cities.”

2. City-level evidence from Pune

Karutz and Kabisch (2023) ^[10] apply a mixed-methods design to Pune, linking a household survey with weather information and qualitative interviews among selected migrants from rural backgrounds. They find that drought is implicated in the mobility experiences of particular migrant subgroups, especially recent arrivals and rural-origin migrants, but that climate operates predominantly through economic livelihood channels. Their interpretation also situates migration in an aspirations–capabilities framework: a household must both wish to move and have an attainable destination pathway.

Pune offers valuable detail on urban reception and informal settlement experience, but as one metropolitan case it cannot establish identical patterns for medium-sized municipalities, peripheral industrial towns or all coastal destinations. Comparative research should test whether housing-market conditions, informal employment specialization, transport links and welfare administration alter the climate–mobility relationship by city size and administrative capacity.

3. Evidence matrix and design limitations

Table 2: Selected evidence on climate change, migration and adaptation

Study	Evidence / method	Relevant contribution	Principal limitation
Dallmann & Millock (2017) ^[5]	State migration flows linked to 1991/2001 census and climate	Origin drought frequency associated with interstate migration; strong rural–rural channel	Historical aggregate flows may conceal household selection
Sedova & Kalkuhl (2020) ^[15]	IHDS panel + ERA5; migration regressions	Adverse weather redirects movement across destinations and skills groups	Estimates specific to historical panel, shocks and mobility definitions
Karutz & Kabisch (2023) ^[10]	Pune mixed-methods survey, weather linkage and interviews	Drought affects rural-origin mobility via economic pathways	Single-city context; selection and recall challenges
Sreekumar & Mandal (2024) ^[17]	IHDS panel; difference-in-differences	Irrigation and non-farm business buffer drought-related out-migration	Treatment definitions and context affect external validity
Sreekumar <i>et al.</i> (2024) ^[17]	ICRISAT-linked household data and weather; econometric analysis	Local non-farm income moderates climate-related mobility	Applies to selected regions and agricultural livelihoods
Chung <i>et al.</i> (2022)	Interdisciplinary systematic review	Urban informality and labour markets central to climate mobility	Broad international literature, uneven city coverage
Hoffmann <i>et al.</i> (2020) ^[8]	Meta-analysis of 30 country-level studies	Environmental migration estimates vary across context and design	Cross-study harmonisation and ecological inference challenges

The table is deliberately selective rather than an exhaustive inventory. Its function is to compare mechanisms and inferential strengths. Panel designs are more suited to testing temporal changes than one-off interviews, while qualitative interviews reveal decision sequences and meanings not captured in aggregate regression coefficients. Neither approach alone fully resolves anthropogenic attribution or the long-term welfare effects of migration.

Rural–Urban Migration as Livelihood Adaptation

1. Household portfolios, remittances and risk sharing

Migration can diversify earnings across climatic zones and sectors. A household may retain cultivation while a member works periodically in construction, transport, retail or services, transferring part of earnings home. These flows potentially smooth consumption, repay debt, finance education and fund farm investments. They may also create costs: travel, housing, wage non-payment, caregiving separation and loss of agricultural labour at origin. Sedod and Shilpi (2021) ^[16] stress that rural–urban mobility offers potentially substantial returns but also high direct and indirect costs. Judging adaptation success therefore requires net welfare measurement rather than counting migrants or remittance receipts alone.

A strong research design should examine remittance stability through lean and non-lean agricultural seasons, debt repayment, dietary diversity, schooling continuity and women’s control over resources. It should distinguish strategic circular migration—where households retain substantial choice—from distress mobility, which may transfer risk to workers without improving their bargaining power. Tacoli (2009) ^[19] emphasizes that mobility is already an important strategy under conditions of high livelihood uncertainty and should not be automatically stigmatized as a governance failure.

2. Who can migrate, who remains and who returns?

Better-resourced households may undertake higher-return migration because they can pay upfront relocation costs and rely on networks. Poorer households may engage in lower-cost seasonal or circular migration, but some remain trapped under severe constraints. The aspiration–ability framework

(Carling & Schewel, 2018) ^[2] helps distinguish voluntary staying, chosen mobility and involuntary immobility. A complete analysis should also capture return migration after health shocks, job loss, seasonal demand changes or the end of drought episodes.

Migration pathways are often structured by labour contractors, kin networks, transport access and linguistic connections. These factors create strong selection effects. Observing larger migration flows after a drought does not establish that all affected residents moved, nor that the movers were the most vulnerable. This is particularly important when designing targeting criteria: destination-based welfare eligibility cannot depend exclusively on proving a causal link between one climatic event and one move.

Urban Adaptation, Employment and New Vulnerabilities

1. Labour markets, informality and skill mismatch

Many rural-origin migrants enter low-entry-barrier occupations in which work is casual, wages fluctuate and protection against occupational hazards is uneven. Skill mismatch and lack of documents or local contacts may extend job search. Climate-related earnings losses at origin can also weaken migrants’ bargaining positions, as households urgently require remittances. Sedova and Kalkuhl (2020) ^[15] indicate that adverse-weather urban migrants may be less educated and originate in agricultural households, supporting the need for targeted skill recognition and accessible labour-market intermediation.

Urban heat presents an important interaction: a person migrating partly because of declining rural agricultural productivity may enter outdoor construction or informal vending, where heat stress can undermine productivity and health. Thus migration need not eliminate exposure to climate hazards; it can replace drought exposure with heat, flood or occupational risks. Urban adaptation must include informal workers in heat-alert dissemination, water access, rest provisions and safe work arrangements, not just investments in roads or large drainage systems (IPCC, 2022; World Bank, 2025) ^[21].

2. Housing, public services and socio-spatial exclusion

The costs of secure urban housing can push newcomers towards overcrowded rental arrangements or high-risk settlements close to waterways, industrial land or poorly drained peripheries. These outcomes depend on housing markets and municipal policy, not migrants' origins alone. Chung *et al.* (2022) identify the transformation of urban informality as an underexamined component of climate mobility. The policy implication is to study tenure security, rental affordability, disaster risk and access to electricity, sanitation, water and public transport jointly.

Health vulnerabilities can be cumulative: physically demanding work, limited access to clinics and unstable accommodation may interact with pre-existing rural poverty. Kusuma and Babu (2018) ^[11], in a systematic review of internal migrant health in India, document gaps in healthcare access and occupational exposure. Urban-service provision should therefore count circular and seasonal migrants, who may not be recognized as usual residents in local administrative systems.

3. Urban growth and the secondary-city question

It is analytically inaccurate to attribute the growth of Indian cities solely to rural–urban migration. Natural increase, reclassification of settlements and boundary expansion also contribute. Pradhan (2013) ^[14] documents the important role of newly designated census towns and dispersed in situ urbanization. Future studies of climate mobility should therefore distinguish observed migration from the administrative processes that raise urban population counts. This is especially relevant for secondary cities, where institutional capacity, housing supply and data systems may lag behind population and service demand.

The World Bank (2025) ^[21] projects substantial urban population and infrastructure growth for India and makes a strong case for climate-resilient planning. Its urban-population projection is not a forecast of climate migrants specifically. Smaller receiving cities may provide employment and access advantages for some populations, but their absorptive capacity must be assessed empirically through municipal budgets, labour demand, risk-sensitive land use and service coverage rather than assumed to be either inherently weak or inherently promising.

Policy Landscape in India

1. Rural resilience and avoidance of avoidable distress

India's National Action Plan on Climate Change (NAPCC), launched in 2008, includes missions on sustainable agriculture, water and sustainable habitat, among other areas (Department of Science and Technology, n.d.). Its sectoral structure provides a foundation for interventions affecting mobility indirectly: improved water management and agricultural resilience can reduce livelihood losses; meanwhile, urban planning can reduce hazards at destination. State Action Plans on Climate Change vary in priorities, but few migration programmes are designed as a seamless rural-to-urban resilience pathway.

The Mahatma Gandhi National Rural Employment Guarantee scheme is intended to enhance rural livelihood security through guaranteed unskilled wage work. Related assets can support local water conservation and employment during agricultural slack periods (Ministry of Rural Development, n.d.). However, an employment programme should not be described as automatically eliminating climate migration. Studies by Sreekumar and Mandal (2024) and Sreekumar *et al.* (2024) ^[17] suggest that irrigation and non-farm livelihood opportunities moderate drought-related out-migration; their evidence supports strengthening choices rather than legally or economically constraining mobility.

2. Mobility-compatible social protection

The One Nation One Ration Card (ONORC) initiative enables National Food Security Act beneficiaries to access entitled food grains across participating fair-price shops without changing their original ration cards (Department of Food and Public Distribution, n.d.). This portability is directly relevant to circular migrants because food security benefits need not remain territorially fixed at origin. Implementation quality still depends on eligible registration, authentication infrastructure and the circumstances of individual households; portability of one service should not be mistaken for comprehensive welfare inclusion.

The e-Shram initiative establishes a national database for unorganized workers, including migrant and construction workers, and is designed to facilitate recognition and access to social security arrangements (National Informatics Centre, n.d.). Potential benefit depends on how registration translates into effective entitlements across employers and states. Data systems should protect privacy, avoid penalizing non-registered workers and support grievance redress. Climate adaptation and worker-protection policies can be connected without requiring every migrant to be labelled a “climate migrant.”

3. Urban resilience and receiving-city preparedness

Climate-resilient urban development requires more than accommodating extra residents. The World Bank (2025) ^[21] calls for investment in infrastructure, heat and flood risk management and improved urban finance. For migrants, the critical intersection is whether new investment reaches low-income settlements and employment areas. Municipal climate plans should incorporate exposure mapping, affordable rental housing, secure water services, safe transport, early warning and support for informal livelihoods.

A joined-up architecture also needs fiscal coordination. Origin districts face livelihood and water investment needs; destination municipalities bear costs of sanitation, transport, health and housing; and mobile households routinely use both sets of places. A policy framework that finances only source-area adaptation or only destination infrastructure risks displacing vulnerability between jurisdictions. Implementation should be assessed with equity indicators, including service coverage among newly arrived and circular migrants, not only aggregate urban expenditure.

An Integrated Origin–Corridor–Destination Policy Framework

Table 3: Policy responses linked to observed risk pathways

Policy scale	Priority actions	Proposed monitoring indicators
Rural origin	Water security, resilient cropping, irrigation equity, rural non-farm employment, risk finance	Dry-season earnings; livelihood diversification; food insecurity; irrigation access
Mobility corridor	Affordable transport, labour recruitment oversight, portable documents and grievance systems	Recruitment costs; wage disputes; access to documentation; safe travel
Urban destination	Affordable rental housing, heat-safe work, water and sanitation, health and skilling	Secure housing rate; heat illness; access to clinics; regularity of earnings
Intergovernmental	Portability of food and social protection, shared migration data, climate-sensitive urban grants	Benefit uptake after relocation; exclusion errors; seasonal population coverage
Research and evaluation	Panel surveys, city comparisons, climate linkage, spatial analysis and intervention evaluation	Comparable exposure measures; migration duration; destination; welfare over time

The recommended sequence is to preserve meaningful choices: strengthen in-place resilience where viable; reduce the financial and informational costs of voluntary movement where desired; and improve safety, rights and inclusion wherever migrants settle. This follows the IPCC (2022) distinction between adaptive mobility, involuntary displacement, planned relocation and immobility, and the evidence on migration barriers surveyed by Selod and Shilpi (2021) ^[16]. A rights-based approach should not treat reduced migration counts as a universal success measure. A household remaining safely in a viable rural livelihood and another household migrating voluntarily to secure employment can both represent successful adaptation.

Research Gaps and Future Agenda

1. Data architecture and attribution

First, India needs linked origin–destination data that identifies climatic exposure, household earnings, migration purpose, duration, destination and eventual welfare. Censuses provide broad migration information but are not built to measure event-specific climatic triggers or short circular spells perfectly. Multi-wave household panels and appropriately geocoded weather observations are better suited to tracing mechanisms. Researchers should report whether their estimates reflect weather shocks, long-term climatic trends or anthropogenic climate-change attribution; these estimands are not interchangeable.

2. Better counterfactual evaluation

Second, evaluation of adaptation measures requires credible counterfactuals. Households with irrigation and non-farm work differ systematically from those without them; simply observing less migration in irrigated villages is not sufficient to claim a causal protective effect. Sreekumar and Mandal (2024) ^[17] advance causal analysis through difference-in-differences, but replication with finer-scale treatment timing, comparable districts and pre-trend tests remains worthwhile. Natural experiments from programme rollout, matched longitudinal data and mixed-methods process tracing can test whether resilience programmes reduce distress, improve voluntary mobility or both.

3. Destination differentiation and welfare

Third, future research should distinguish metropolitan regions, medium-sized cities, census towns and industrial clusters. Destination selection may depend on costs, kinship networks, sector-specific demand and transport corridors. Longitudinal outcome measurement should extend beyond

migration occurrence to wages, housing, health, remittances, schooling, land retention and household debt. Careful welfare accounting would reveal when migration is genuinely adaptive and when it merely redistributes risk.

4. Gender, caste, age and immobility

Fourth, aggregate household migration indicators can conceal within-household inequalities. Women who stay may assume greater farm and care burdens; female migrants may confront distinct employment and housing constraints; young people may use education-linked mobility; older persons may be unable or unwilling to move. Research should measure decision authority, care responsibilities, safety, identity documents and social-network access alongside economic resources. The IPCC (2022) and Zickgraf (2021) ^[22] caution against ignoring non-migration and involuntary immobility.

5. From policy presence to implementation outcomes

Finally, policy reviews must evaluate actual uptake rather than merely list schemes. An intervention's formal portability or climate-resilience objective does not establish that seasonal migrants can claim benefits smoothly. Useful designs would measure enrolment, benefit continuity, grievance resolution and the distribution of urban adaptation investment across neighborhoods. The impact of rural adaptation schemes on migration must be interpreted cautiously: reducing involuntary distress and enabling safer economic mobility are complementary rather than competing objectives.

Discussion

The central synthesis is that climate-linked mobility in India is economically mediated and socially selected. Climate shocks can diminish rural earnings; yet the ability to respond through migration varies by capital, networks, skills and prior employment diversification. This reconciles evidence that drought increases some out-migration (Dallmann & Millock, 2017; Sreekumar & Mandal, 2024) ^[5, 17] with findings that adverse weather may redirect flows across destination types and that favourable conditions can finance mobility (Sedova & Kalkuhl, 2020) ^[15]. Migration may reflect increased vulnerability or increased capability depending on the mechanism. Aggregate movement counts cannot distinguish the two.

Equally important, arrival in a city is not the end of the adaptation process. Rural climate exposure may be exchanged for insecure informal work, high rents, poor

sanitation or urban heat. The wider literature highlights the importance of city institutions, migrant health and urban informality (Chung *et al.*, 2022; Kusuma & Babu, 2018) ^[11]. Research and policy must therefore follow a household over time and across locations. Static categories—“rural victim” and “urban destination”—miss circulating workers, translocal livelihoods and families whose residence and economic activities span multiple places.

An integrated policy agenda should address both climate vulnerability and the opportunity structure of movement. Origin investments in irrigation, resilient livelihoods and local non-farm work improve the range of feasible choices. Corridor measures reduce exploitative movement costs. Destination investments in housing, public health and decent work determine whether migration yields lasting benefits. Social protection portability helps connect these scales. This approach is consistent with the IPCC’s emphasis on agency and with the World Bank’s call for timely urban resilience planning (IPCC, 2022; World Bank, 2025) ^[21].

Three caveats constrain generalization. First, city- and household-level studies are concentrated in selected regions and periods; their results cannot mechanically represent all of India. Second, correlations with weather anomalies are not identical to the total migration impact of anthropogenic climate change. Third, climate-related migration is not always rural–urban; rural–rural movement, temporary mobility and remaining in place can dominate under different conditions. These are not peripheral methodological details but core determinants of appropriate policy.

Conclusion

Climate-induced rural–urban migration in India is best understood as part of a multidimensional process of livelihood adjustment, economic inequality and urban transformation. Peer-reviewed evidence establishes associations between drought and particular forms of movement, while also identifying irrigation, non-farm opportunities, skills and migration costs as powerful moderators. The literature does not support a universal one-directional movement from every climate-stressed village into cities, nor the claim that migration is always maladaptive or always beneficial.

An effective policy response must simultaneously protect rural livelihoods, preserve voluntary mobility, address involuntary immobility and build inclusive, hazard-resilient destinations. The article therefore recommends an origin–corridor–destination approach that brings agricultural adaptation, social protection portability, worker rights and municipal climate planning into a single analytical framework. Future Indian research should use longitudinal and spatially detailed evidence, compare destination types, assess policy implementation and measure the long-term welfare of mobile and non-mobile households. The relevant policy outcome is not the number of movements prevented or encouraged, but the expansion of safe, equitable and sustainable livelihood choices.

Declarations and Review Limitations

Funding: Not specified; author(s) should complete before submission. Competing interests: To be declared by the author(s). Data availability: No new primary dataset was generated for this review. Ethical approval: Not applicable

to a review of publicly available publications. Limitations: This is a structured critical review based on a selective, verifiable literature corpus, not a systematic review satisfying PRISMA. Article-level claims from individual studies have not been independently re-estimated; detailed database screening and formal quality scoring would be necessary for a full systematic review. Author affiliation and correspondence details should be inserted before submission.

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