

PERSPECTIVE ARTICLE

Climate change, migration, and displacement:
Advancing a risk-informed approach for
sustainable solutionsShingirai Mugambiwa^{1,2*}  and Patience Sibanda¹ ¹Department of Community Studies, Faculty of Social Sciences, Midlands State University, Gweru, Midlands Province, Zimbabwe²Department of Social Work, Faculty of Humanities, School of Social Sciences, University of Limpopo, Mankweng, Limpopo Province, South Africa**Abstract**

Climate change has become a crucial factor driving migration and human displacement. High temperatures lead to higher incidences of phenomena such as extreme weather, rising sea levels, and altered environmental conditions that threaten governance, human security, and sustainable development. This paper seeks to establish the intersections of climate change and migration vis-à-vis displacements and sociopolitical challenges to address them. The research methodology included a secondary research approach that began with a detailed search of relevant literature from databases such as Web of Science, JSTOR, Google Scholar, ScienceDirect, and SpringerLink. The paper establishes the importance of risk management in advancing climate justice, resilience, and migration policies with respect to sustainable development. The paper concludes with some policy recommendations aimed at promoting favorable strategies to address climate-driven migration and displacement.

Keywords: Climate change; Migration; Displacement; Risk-informed approach; Governance; Sustainable development

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1. Introduction

Climate change is significantly influencing the trends and patterns of human mobility (Ahsan, 2019). As the natural environment deteriorates and catastrophes become more common, society is likely to see more environmentally induced migration and displacement (Mugambiwa & Makubele, 2023). Based on an estimation done by the United Nations High Commissioner for Refugees (UNHCR), climate change contributes to the large-scale movement of people from their homes, particularly in regions of high risk or vulnerability such as Sub-Saharan Africa, South Asia and small islands (Black, 2001; UNHCR, 2022). The interconnections between climate change, the movement of people, and displacement pose a big challenge to policymakers, international agencies, and local communities (Alverio *et al.*, 2024).

There is a great likelihood that many people will be forced to abandon their homes due to climate changes, especially in regions that are already vulnerable, such as the

low-lying coastal, dry regions, and small island countries. For instance, in 2023, catastrophic floods resulted in 1,700 deaths, the destruction of 2 million homes, and the forced displacement of about 8 million people (UN News, 2023). Migration is becoming a more relatable consequence of climate change and ecological problems, rather than the economic, political, and social issues, which were its main drivers before (Neef *et al.*, 2023). A risk-informed approach would seek to tackle not just the factors forcing people out of their homes but also the vulnerability aspect, building the capacity of disadvantaged societies to withstand climate change impacts (Clement *et al.*, 2021). Such an approach would put the emphasis on proactive responses, such as promoting sustainable development, eliminating risks, utilizing disaster risk reduction strategies, and developing adaptive capacities so that there is no requirement for high levels of involuntary resettlement. By creating such linkages between climate change and migration policies, governments and agencies would be in a position to take full control of the emerging challenges of climate change without depending on migration as a maladaptive option.

The Climate Risk Index 2021 indicates that the effects of climate change are prevalent globally but disproportionately impact developing nations. These repercussions jeopardize lives, livelihoods, and human security, thereby hindering progress toward the realization of the 2030 development Agenda (Eckstein *et al.*, 2021). The susceptibility of physical environments, particularly from rising sea levels, strong storms, wildfires, and other extreme weather phenomena intensified by climate change, jeopardizes interpersonal and locational interactions and may instigate significant displacement (Mach & Siders 2021). Numerous urban regions in developing countries are significantly ill-equipped to handle swift surges of migrants, as many cities already suffer from insufficient social services, expensive housing, less accessible transportation, and threatened public safety for current inhabitants (Brueckner & Lall, 2015). UN-Habitat (2022) indicates that approximately 70% of the urban populace in developing nations is now inadequately provided by municipal services, encompassing piped water and fundamental sanitation services. To comprehend how urban settings will adjust to the increasing population of city residents, it is essential to analyze urban vulnerabilities and their impact on migrants. Although migration may strain essential infrastructures, communities can leverage the infusion of human capital to foster economic development (Alverio *et al.*, 2024).

Among the diverse potential responses to the impacts of climate change, migration has garnered increasing attention from researchers and policymakers (Aid, 2007; Warner *et al.*, 2009). Many of these reports operate under

the premise that climate-related migration fundamentally signifies a failure to mitigate climate change and/or a failure to adapt, collectively yielding concerning estimates of the potential volume of migration stemming from these shortcomings. This matter is also imbued with political and ethical implications. Climate-related calamities disproportionately render individuals homeless in impoverished nations of the Global South, despite the Global North being chiefly accountable for anthropogenic climate change (Roberts and Parks, 2007; Mugambiwa & Makhubele, 2021). The resultant global injustice raises both ethical and practical policy issues, as climate change negotiators in the Global South increasingly recognize the challenges that migration poses for states in the Global North and newly industrializing nations, potentially influencing international environmental negotiations significantly (Alverio *et al.*, 2024). Migration has become a fundamental component of the climate change debate. Nonetheless, its significance within the climate change discourse is perpetually evolving and subject to ongoing reconfiguration.

2. Methods

The research methodology employed a secondary research method. The study commenced with a focused literature search which sought to improve its accuracy as well as its comprehensiveness through the use of Boolean search techniques. A wide array of Boolean operators was employed across different academic databases, which include Web of Science, JSTOR, Google Scholar, ScienceDirect, and SpringerLink. The search strings used entailed keyword combinations such as “climate change,” “migration,” “displacement,” “risk-informed approach,” and “sustainable solutions.” This method resulted in the collection of a plethora of articles regarding the conflict of climate change, migration, and displacement. For the first 60 articles, keywords were employed to further filter the articles based on their relevance, time of publication, and whether they were published in peer-reviewed journals and were in line with the rest of the study objectives. The newly compiled articles were then sieved further down to 30 that were highly relevant using this method. Data were analyzed using discourse analysis and thematic analysis. Using both discourse and thematic analysis together enabled a comprehensive analysis of language and framing employed in academic discussions while recognizing major patterns and important claims. The method provided insights and constructed the principal narratives, and relationships pertaining to climate migration. The analysis underscored the many ways in which the stakeholders view the issues of climate risks and migration scenarios along with the solutions they suggest in the attempt to

address the climate change problem. In addition, discourse analysis enabled the assessment of the dispersal of climate risks and migration tendencies, together with the possible directions of sustainable measures proposed in the academic discourses regarding the issues under discussion. As a result of combining Boolean search strategies and discourse analysis, this method provided a nuanced yet thorough understanding of the relationship between climate change, migration, and sustainable solutions.

3. Relationship of climate change with migration and displacement

3.1. Climate change as a key factor for migration and displacement

It has been found that the climate change-induced migration of women is more common in the developing world than in developed countries (WHO, 2008; Mugambiwa, 2021). The impacts of climate change in the developing world are largely manifested as slow-onset events, such as gradually worsening desertification, drought, and rising sea levels, as well as sudden-onset disasters such as flooding and hurricanes (Mugambiwa, 2024). Due to the high reliance on productive land for a variety of economic activities, along with the natural season changes, most communities will be left with no alternative but to move and search for better conditions for habitation if these events occur. Migration is commonly triggered by a few causes, but climate change also serves as an important driver for other factors that contribute to migration such as poverty, conflicts, and resource depletion (Alverio *et al.*, 2024). In the context of climate change, most families would opt for migration because their activities become no longer sustainable by the environmentally inferior conditions they were put into.

Migration is consistently becoming synonymous with climate change, especially in a world where the environment is changing for the worse and people cannot cope with the changes (Berlemann & Steinhardt, 2017). As the world gets warmer, organic systems are being altered frequently and radically, causing alterations in the effect of precipitation, increased extreme weather events, and increasing water levels (IPPC, 2013; Dell *et al.*, 2014). These environmental changes affect agricultural yields, water resource availability, and the habitability of whole climatic regions, pushing people and communities to seek better living conditions. For instance, in Sub-Saharan Africa, desertification resulted in land loss, forcing people to look for job opportunities in cities and towns (Mpandeli *et al.*, 2020; Mugambiwa & Makhubele, 2023). While people consider climate change a contributor to aggravating existing vulnerabilities, such as poverty, improper governance, and resource scarcity, the impacts of climate

change on migration tend to be indirect (Suckalla *et al.*, 2016). Moreover, rapid-onset climatic disasters, specifically floods and storms, and their severe consequences such as cyclones, are among the frequent causes of displacement from the home for affected individuals. With a regular cycle, Mother Nature welcomes warmer, cooler, wetter, or more dry seasons in a sequential fashion every year. However, human activities have significantly altered these patterns, toward the more extreme end of the spectrum, leading to large-scale displacement of people, with Hurricane Katrina in 2005 devastating the Gulf Coast of the United States (Sastry & Gregory, 2014) and the Pakistan floods in 2022 forcing millions to desert their homes due to submerged vast lands (Nanditha *et al.*, 2023) as notable examples. Desertification, sea-water encroachment, and glacial melting are considered slow-onset climate events causing slow migration, whereas quick-onset disasters lead to a speedy forced relocation (Mugambiwa & Makhubele, 2023). For instance, people may be displaced for several days to drought-affected areas within regions that are not directly experiencing drought. However, once these people return home, their attempts to sustain their livelihoods would have failed due to the devastating effects of other gradual environmental changes.

3.2. Vulnerabilities and displacement patterns

Vulnerable populations, particularly the underprivileged in many developing countries, face climate-induced displacement in much larger proportions (Brzoska & Frohlich, 2016). For instance, most rural farmers and aboriginals who depend on rainfall for their crops may not possess the appropriate means and capacity to adapt to the shift in the environment, making them more susceptible to involuntary relocation (Mpandeli *et al.*, 2020). Displacement patterns are neither linear nor one-dimensional. Some individuals may decide to internally migrate with the intention of settling in urban centers while others may attempt to move abroad to seek safety.

Migration due to the consequences of climate change or eviction as a result of certain elements of the environment constitute the major environmentally induced migration trends (Suckalla *et al.*, 2016). The majority of these migration trends are found in areas vulnerable to climatic hazards such as droughts, flooding, and rising sea levels. Vulnerability tends to exist within the confines of certain socioeconomic features including poverty, as well as the absence of infrastructure, good governance, health care, and education, which leave individuals and communities incapable of adapting to climate change (Giovanni *et al.*, 2015). For example, in Africa and Asia, rural farmers dependent on agriculture that relies heavily on rainfall, tend to migrate when droughts due to climate change are

expected to last long or become disturbing, as their means of comfortable living through farming is jeopardized due to destruction of the environment (Laube *et al.*, 2012; Lewin *et al.*, 2012).

Forced migration usually subjects marginalized populations to new threats such as poverty, marginalization, and conflict (Alverio, *et al.*, 2024). Urban areas that encounter a high influx of displaced individuals often find it hard to support them, resulting in the establishment of oversubscribed slums (Ahsan, 2019). These shelters, which are often situated along riverbanks, flimsy hills, or flood plains, are also vulnerable to the impacts of climate change, once again placing the displaced populations due to conflicts and wars at increased risk of displacement if their new shelters are affected by climate change. People displaced by the effects of climate change such as shifting weather patterns may also add to the increasing competition over land and water resources and sometimes lead to erosion of social peace and stability among the already displaced populations (Islam *et al.*, 2006). The patterns of involuntary resettlement differ in complexity depending on the type of climate event, sociopolitical context, and resources available. With natural catastrophes that occur within short time frames such as in the case of floods or hurricanes, in most cases, displacements would only last for a brief period and occur within certain geographic limits (Gray & Mueller, 2012). People who are more financially stable may be able to choose when to relocate and find safer places away from areas affected by climate change, while those poor or marginalized are left behind in increasingly hostile conditions (Mpandeli *et al.*, 2020). In some cases, these underprivileged groups might lack the resources to emigrate altogether and therefore may face confinement in miserable zones as the effects of climate change become more severe. Bettini & Gioli (2015) argue that these persistent inequalities in displacement highlight the need for all stakeholders to put a preventive policy in place to address the disproportionate factors that make people vulnerable to climate change, to democratize migration or adaptation in the face of climate change regardless of their social class.

4. The need for a risk-informed approach

Addressing climate migration through risk assessment involves reconceptualizing migration as a phenomenon that results from the prevailing vulnerability. It acknowledges that climate change amplifies the already existing risk factors of poor health, insecurity, lack of food and water, and loss of livelihood, all of which are causes of migration. These risk factors should be considered in the broader national and international discussions on migration to

formulate a unified response that is preventive rather than merely reactionary to the impacts of climate change.

4.1. Strategies for disaster risk reduction

Strategies for disaster risk reduction are associated with increasing the resilience of populations whose regions have potential risks for sudden disasters such as floods, cyclones, and landslides (Warner, 2012). Some of the key strategies include early warning systems, emergency preparedness plans, and community-based disaster management programs where communities have the means and know-how to tackle disasters when they happen. However, in some regions, early warning systems for floods and cyclones worked by alerting people to move away from the areas of forecasts so that they would not be displaced further away from their origin of residence (Peters *et al.*, 2022). Building both social and institutional resilience is fundamental because it enables vulnerable populations to cope with the effects of climate change. This calls for the need to improve the existing governance systems, enhance the educational and health services available to the people, and enable people at the community level to take part in the decision-making regarding climate change adaptation. Social resilience emphasizes developing networks among communities to enable them to help each other during critical periods. This can be exemplified by local cooperatives or social organizations playing an important role in providing support to the people affected by climate change.

4.2. Strengthening migration governance

Policies that deal with migration need to be adaptive to the impacts of climate change. Most migration policies of states give little to no consideration to environmental factors such as migration drivers (Ahsan, 2019). This leaves those who are marginalized by climate events vulnerable. For governance, this would mean developing strategies that incorporate protective measures for climate change refugees and other vulnerable groups. Frameworks such as the Global Compact for Safe Orderly and Regular Migration (GCM) and the Paris Agreement are useful for addressing the displacement of people by climate conditions (Bufalini, 2019). Further, Mugambiwa & Makhubele (2023) assert that enhancing migration governance is necessary for efficiently responding to the effects of climate change. A number of migration governance frameworks seem to focus only on sanctioned economic migrants and refugees of conflict or war, addressing issues facing climate-induced forcibly displaced people in a limited manner (Gemenne, 2021). The lack of features such as proper legal definitions or instruments of protection within the climate migrant legal framework creates a void in which many persons

are stuck somewhere in between. To fill these voids, it is essential for migration governance to transform and include climate-related migration within its paradigm and assist in providing legal protection for climate migrants under the existing international legal instruments. This will entail the addition of provisions in the refugee law, such as the 1951 Refugee Convention, to address the issue of environmental refugees, which is currently lacking.

On a national scale, migration policies should become more flexible and responsive toward climate displacement migration (White, 2011). For example, addressing migration due to climate-induced adverse conditions should involve establishing consistent migration governance regimes. It could mean upholding measures that encourage the movement of people within the country during periods of environmental shocks such as droughts or floods temporarily with an option for permanent displacement if there are no substantial improvements subsequently. For example, New Zealand has already set up a climate migration visa for Barbadian people who are facing an increasing risk of climate change (Dempster & Ober, 2020). Creating legal channels for climate migrants and stability in the region can thus be achieved through the imposition of such policies more widely with specific legal provisions in place. International partnerships must therefore be reinforced. It is recognized that migration resulting from climate change is a problem of global dimensions (Warner *et al.*, 2009). For this reason, it is essential for nations to come up with burden-sharing mechanisms and other measures that will help provide capacity building and resources to countries facing overwhelming changes in climate. Specifically in the area of climate migration, fostering frameworks such as the GCM and the Paris Agreement is necessary but must be backed with more tangible pledges and resources. Besides, increasing the scope of the mandate of international bodies such as UNHCR concerned with the issue of forced migration to also include climate refugees will ensure that relief is available to such groups.

In the same vein, migration governance must safeguard the fundamental rights of climate migrants above all, making sure that these persons are treated properly during the entire process of being displaced (Mianabadi *et al.*, 2022; McLeman, 2018; Burrows and Kinney, 2016). That includes meeting their basic needs such as health care, education, and housing provision along with the preservation of their legal protections in the host country's government. Governments and international organizations should seek the removal of migratory discrimination among the existing groups and help to resettle the displaced people to target regions without creating social disintegration

(Foresight, 2011). A rights-based approach to migration governance enables the climate migration actors to not only cater to the urgent humanitarian aspects of climate migrants but also to address the long-term and more structural changes needed to address the concerns about climate change.

5. Toward a coherent policy framework

5.1. Integrating climate and migration policies

A multilevel policy approach and a host of policy integration measures help to succeed in a complex policy environment. Policies on migration and climate change should be mainstreamed in the relevant national development, national disaster management, and state housing policies (Sarkar & Danda, 2023). This holistic approach would ensure that climate migrants are not seen as a physical force, whose needs are separate and therefore needs to be addressed individually. Policymakers ought to take migration as an adaptation approach and help in facilitating it by strengthening livelihood management (Eckstein *et al.* 2021). For instance, such trends as temporary migration or seasonal labor migration can provide households with an opportunity to enhance the range of possible sources of income further and diminish the households' dependencies on environmentally induced stress.

This increasing overlap between climate change and migration gives rise to the requirement of combining climate and migration policy to promote a wider, risk-aware policymaking approach (Mugambiwa & Makhubele, 2023). Climate change has epistemically expanded beyond simply being an environmental issue because its impacts are now sociologically, economically, and politically engendered, influencing migration patterns among people (Martin, 2010). However, most existing economies do not integrate climate change and migration policies as two sides of the same coin, causing inadequate intervention to address challenges that drive displacement. To engender better responses, policymakers need to shift to a unitary framework that appropriately combines climate adaptation and migration governance in a manner that ensures optimum protection of at-risk populations. In the process of incorporating migration policy into climate strategies, mainstreaming is a fundamental step of climate risk assessment in ascertaining when and where such planning occurs, whether at the national, regional, or even international level (McAdams, 2011). Governments and the international community should, in particular regions of climate variability and change, make an effort to ascertain populations that are expected to be displaced, and who, therefore, need security against the effects of climate

change. This means that there is a need to establish national and/or regional early warning systems and mechanisms for collecting information on migration trends and climate impacts to mitigate loss in real-time instead of waiting for adverse events to occur.

5.2. Policy recommendations

As the climate crisis worsens, so will the mass exodus of at-risk groups of people. It is necessary to take an integrated risk management approach to climate-related migration and displacement so that vulnerable populations are protected. Since migration as a new way of coping with changing environmental conditions is inevitable, it is crucial to factor climate change into migration policies for strengthening vulnerable populations' communities and international collaboration. Policies that are anticipatory and focused more on human security and sustainable development rather than reactionary policies are what policymakers must implement bearing in mind that the effects of climate change on migration will be large and complicated. National, regional, and international migration policies encompassing climate risk and responsive mechanisms that respond to climate-induced displacement should be developed. The need to develop legal frameworks that assist with climate change displacement should be undertaken with respect to their settlement and resettlement. Laws and regulations about climate migration and those who are displaced by climate effects must be the top priority for policymakers. For communities displaced as a result of climate change, resilience-building initiatives such as sustainable farming and infrastructural development are essential.

The government and international bodies should target their support and resources to programs that boost the delicate coping ability of poor populations especially through promoting climate-smart agriculture mode that reduces the effects of climate change, enhances soils, and safeguards food security. Furthermore, higher-income countries and international funding agencies should provide a greater amount of financial assistance toward promoting adaptation programs in the poorer countries that are more vulnerable to the impacts of climate change. This enables these countries to enhance their adaptive capability and minimize the likelihood of displacements. The nexus between climate change, migration, and displacement is one of the more challenging areas among the global issues that need the most attention and coordination of efforts. By developing effective and harmonized responses, the global society will be able to address the issue of displaced persons due to climate change and use it to enhance the state of the society and prevent its fragmentation.

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References

- Aid, C. (2007). Human Tide: The Real Migration Crisis. Available from: <http://www.christian-aid.org.uk> [Last accessed on 2025 Mar 20].
- Ahsan, R. (2019). Climate-induced migration: Impacts on social structures and justice in Bangladesh. *South Asia Research*, 39(2):184-201.
<https://doi.org/10.1177/0262728019842968>
- Alverio, G.N., Sowers, J., & Weinthal, E. (2024). Climate change, conflict, and urban migration. *Environment and Security*, 2(1):1-12.
<https://doi.org/10.1177/27538796241259242>
- Asavanant, J., Ioualalen, M., Kaewbanjak, N., Grilli, S.T., Watts, P., Kirby, J.T., et al. (2008). Numerical simulation of the December 26, 2004: Indian Ocean Tsunami. In: Bock, H.G., Kostina, E., Phu, H.X., & Rannacher, R. (eds). *Modeling, Simulation and Optimization of Complex Processes*. Berlin, Heidelberg: Springer.
https://doi.org/10.1007/978-3-540-79409-7_5
- Berleemann, M., & Steinhardt, M.F. (2017). Climate change, natural disasters, and migration—a survey of the empirical evidence. *CESifo Economic Studies*, 63(4):353-385.
- Bettini, G., & Gioli, G. (2015). Waltz with development: Insightson the developmentalization of climate-induced migration, *Migration and Development*, 7(1):1-19.

- <https://dx.doi.org/10.1080/21632324.2015.1096143>
- Black, R. (2001). Environmental Refugees: Myth or Reality? UNHCR Working Paper 3434, New Issues in Refugee Research. Geneva: UNHCR.
- Brueckner, J.K., & Lall, S.V. (2015). Cities in developing countries: Fueled by rural urban migration, lacking in tenure security, and short of affordable housing. In: Duranton, G., Henderson, J.V., & Strange, W.C. (eds.). *Handbook of Regional and Urban Economics*. Vol. 5., Ch. 21. Netherlands: Elsevier. p1399-1455.
- Brzoska, M., & Frohlich, C. (2016). Climate change, migration and violent conflict: Vulnerabilities, pathways and adaptation strategies. *Migration and Development*, 5(2):190-210.
<https://doi.org/10.1080/21632324.2015.1022973>
- Buafalini, A. (2019). The global compact for safe, orderly and regular migration: What is its contribution to international migration law? *QIL, Zoom-In*, 58(1):5-24.
- Burrows, K., & Kinney, P.L. (2016). Exploring the climate change, migration and conflict nexus. *International Journal of Environmental Research and Public Health*, 13(4):4.
<https://doi.org/10.3390/ijerph13040443>
- Clement, V., Rigaud, K.K., De Sherbinin, A., Jones, B., Adamo, S., Schewe, J., et al. (2021). Groundswell Part 2: Acting on Internal Climate Migration. United States: The World Bank.
- Dell, M., Jones, B.F., & Olken, B.A. (2014). What do we learn from the weather? The new climate-economy literature. *Journal of Economic Literature*, 52(3):740-798.
<https://doi.org/10.1257/jel.52.3.740>
- Dempster, H., & Ober, K. (2020). New Zealand's "Climate Refugee" Visas: Lessons for the Rest of the World. Center for Global Development. Available from: <https://www.cgdev.org/blog/new-zealands-climate-refugee-visas-lessons-rest-world> [Last accessed on 2024 Oct 11].
- Eckstein, D., Vera, K., & Laura, S. (2021). Global Climate Risk Index 2021. Germanwatch. Available from: https://www.germanwatch.org/sites/default/files/global%20climate%20risk%20index%202021_2.pdf [Last accessed on 2024 Nov 10].
- Foresight. (2011). Migration and Global Environmental Change. Final Project Report. London: The Government Office for Science.
- Gemenne, F. (2021). Reference paper for the 70th anniversary of the 1951 refugee convention forced displacement related to the impacts of climate change and disasters. In: Zickgraf, C. (ed.). Elodie HUT and Tatiana Castillo Betancourt the Hugo Observatory. Belgium: University of Liège.
- Giovani, B., Steel, E., Anthoine, G., Blumel, S., Cruz, M. L & Unger, J. G. (2015). Euphresco: An opportunity for phytosanitary research coordination and funding in the EPPO region and abroad. *Bulletin OEPP/EPPO Bulletin*, 45(2):252-256.
<https://doi.org/10.1111/epp.12207>
- Gray, C.L., & Mueller, V. (2012). Natural disasters and population mobility in Bangladesh. *Proceedings of the National Academy of Sciences of the United States of America*, 109(16):6001-6005.
<https://doi.org/10.1073/pnas.1115944109>
- IPPC. (2013). Causes of Climate Change Impacts and Vulnerability, Responses Strategies, Mitigation and Adaptation. Working Group I Contribution to the IPCC Fifth Assessment Report, Climate Change: The Physical Science Basis.
- Islam, N., Mahbub, A., & Nazem, N.I. (2006). Slums of Urban Bangladesh: Mapping and Census, 2005. Dhaka: Centre for Urban Studies and National Institute of Population Research and Training.
- Jessoe, K., Manning, D., & Taylor, E.J. (2018). Climate change and labour allocation in rural Mexico: Evidence from annual fluctuations in weather. *Journal of Economics*, 128(608):230-261.
<https://doi.org/10.1111/econj.12448>
- Laube, W., Schraven, B., & Awo, M. (2012). Smallholder adaptation to climate change: Dynamics and limits in Northern Ghana. *Climatic Change*, 111:753-774.
<https://doi.org/10.1007/s10584-011-0199-1>
- Lewin, P., Fisher, M., & Weber, B. (2012). Do rainfall conditions push or pull rural migration? Evidence from Malawi. *Agricultural Economics*, 43(1):191-204.
<https://doi.org/10.1111/j.1574-0862.2011.00576.x>
- Mach, K.J., & Siders, A.R. (2021). Reframing strategic, managed retreat for transformative climate adaptation. *Science*, 372(6548):1294-199.
<https://doi.org/10.1126/science.abh1894>
- Martin, S.F. (2010). Climate Change and International Migration, Background Paper for the Transatlantic Study Team on Climate Change and Migration. Washington, DC: German Marshall Fund.
- McAdams, J. (2011). Climate Change Displacement and International Law: Complementary Protection Standards. Legal and Protection Policy Research Series. Geneva: United Nations High Commissioner for Refugees.
- McLeman, R. (2018). Thresholds in climate migration. *Population and Environment*, 39(4):319-338.
<https://doi.org/10.1007/s11111-017-0290-2>
- Mianabadi, A., Davary, K., Kolahi, M., & Fisher, J. (2022). Water/climate nexus environmental ruralurban migration and coping strategies. *Journal of Environmental Planning and Management*, 65(5):852-876.
<https://doi.org/10.1080/09640568.2021.1915259>
- Mpandeli, S., Nhamo, L., Hlahla, S., & Naidoo, D. (2020). Migration under climate change in Southern Africa: A nexus planning perspective. *Sustainability*. 12:4722,
<https://doi.org/10.3390/su12114722>

- Mugambiwa, S. (2024). Water governance and agricultural livelihoods: Navigating human-ecological systems and farmer strategies in Rural Zimbabwe. *Edelweiss Applied Science and Technology*, 8(6):949-959.
<https://doi.org/10.55214/25768484.v8i6.2188>
- Mugambiwa, S., & Makhubele, J. (2021). Anthropogenic flash floods and climate change in rural Zimbabwe: Impacts and options for adaptation. *Technium Social Sciences Journal*, 21:809-819.
<https://doi.org/10.47577/tssj.v21i1.3977>
- Mugambiwa, S., & Makhubele, J. (2023). Rethinking the nexus of food insecurity, climate change and migration in the developing world: A case of Sub-Saharan Africa. *International Journal of Research in Business and Social Science*, 12(1):249-253.
<https://doi.org/10.20525/ijrbs.v12i1.2083>
- Mugambiwa, S.S. (2021). Multilevel approach to climate change adaptation in rural Zimbabwe: A well-articulated framework devoid of effective implementation. *African Journal of Development Studies*, 11(4):159.
<https://doi.org/10.31920/2634-3649/2021/v11n4a8>
- Nanditha, J.S., Kushwaha, A.P., Singh, R., Malik, I., Solanki, H., Chuphal, D.S., et al. (2023). The Pakistan flood of August 2022 causes and implications. *Earth's Future*, 11(3):e2022EF003230.
<https://doi.org/10.1029/2022EF003230>
- Neef, K., Jones, E., & Marlowe, J. (2023). The conflict, climate change, and displacement nexus revisited: The protracted Rohingya Refugee Crisis in Bangladesh. *Journal of Peacebuilding and Development*, 18(3):231-247.
<https://doi.org/10.1177/15423166231190040>
- Peters, L.E.R., Clark-Ginsberg, A., McCaul, B., Caceres, G., Nunez, A.L., Balagna, J., et al. (2022). Informality, violence, and disaster risks: Coproducing inclusive early warning and response systems in urban informal settlements in Honduras. *Frontiers in Climate*, 4:1-20.
<https://doi.org/10.3389/fclim.2022.937244>
- Sarkar, S., & Danda, A.A. (2023). Climate-induced Displacement and Migration: A Proposed Framework for the G20 for Collaboration. *Journal of Infrastructure Development*, 15(1):73-80.
<https://doi.org/10.1177/09749306241247109>
- Sastry, N., & Gregory, J. (2014). The location of displaced New Orleans residents in the year after Hurricane Katrina. *Demography*, 51(3):753-775.
<https://doi.org/10.1007/s13524-014-0284-y>
- Suckalla, N., Fraserb, E., & Forsterc, P. (2016). Reduced migration under climate change: Evidence from Malawi using an aspirations and capabilities framework. *Climate and Development*, 8(1):1-14.
<https://doi.org/10.1080/17565529.20161149441>
- Roberts, T. J. & Parks, B. C. (2007). *A Climate of Injustice: Global Inequality, North-South Politics, and Climate Policy*. Cambridge: MIT Press.
- UN Habitat. (2022). *World Cities Report 2022 Envisaging the Future of Cities*. Available from: https://unhabitat.org/sites/default/files/2022/06/wcr_2022.pdf [Last accessed on 2024 Nov 10].
- UN News. (2023). *UN Continues to Support Pakistan Flood Response*. Available from: <https://news.un.org/en/story/2023/03/1134302> [Last accessed on 2024 Nov 10].
- UNHCR. (2022). *More Than 100 Million People are Forcibly Displaced*. Available from: <https://www.unhcr.org/refugeestatistics/insights/explainers/100-million-forcibly-displaced.html> [Last accessed on 2024 Nov 10].
- Warner, K. (2012). Human migration and displacement in the context of adaptation to climate change: The Cancun Adaptation Framework and potential for future action. *Environment and Planning C: Government and Policy*, 30(1):1061-1077.
<https://doi.org/10.1068/c1209j>
- Warner, K., Ehrhart, C., De Sherbinin, A., Adamo, S.B., & Onn, T.C. (2009). *In Search of Shelter: Mapping the Effects of Climate Change on Human Migration and Displacement*. Bonn: United Nations University Institute for Environment and Human Security.
- White, G. (2011). *Climate Change and Migration: Security and Borders in a Warming World*. Oxford: Oxford University Press.
- WHO. (2008). *Gender Inequities in Environmental Health*. 25th Session of the European Environment and Health Committee. (EUR/5067874/151). Switzerland: WHO.