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CLIMATE CHANGE AND MIGRATION: EMERGING TRENDS AND URBANISATION DYNAMICS

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Abstract: Climate change is rapidly becoming a crucial global threat to human security, particularly in developing countries, and India is no exception. One of its critical repercussions is the displacement of people, which can result from various slow-onset effects such as sea-level rise, desertification, and declining agricultural yields. Although predicting the exact number of people displaced by climate change is challenging, several studies have attempted to estimate the scope of this issue. The terms "environmental refugees," "ecological migrants," "climate refugees," and "environmentally displaced people" have emerged over recent decades to describe individuals and communities forced to leave their habitual homes due to environmental changes, particularly those exacerbated by climate change. While usually used interchangeably, these terms differ in scope, legal standing, and implications, reflecting the complex interplay between human mobility and environmental degradation (Tripathy, 2024).

The investigation covering the period from 2015 to 2024 provides a critical lens through which we need to examine this phenomenon, as it coincides with heightened global awareness of climate change, increased frequency of extreme weather events, and significant advancements in data collection on displacement. This paper explores the definitions, trends, challenges, and broader implications of environmental displacement over this decade, drawing on the wider contextual insights.

Keywords: Climate-induced displacement, Internal migration, Urbanisation, Environmental stressors

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Introduction

Migration in Asia and the Pacific occurs due to a diverse set of factors, including economic opportunities, armed conflict, civil unrest, income diversification, family reunification, labour mobility, social and cultural expectations regarding destination regions, environmental degradation, and, most notably, the escalating impacts of climate change and natural disasters, which have increasingly displaced vulnerable populations across the region.

One of the challenges in mitigating environmental migration is the lack of a universally recognised definition. This gap has continued unabated, notwithstanding numerous endeavours by scholars, policymakers, and international organisations, culminating in confusion about the terminology used to describe displaced individuals because of environmental factors.

Various terms, including "environmental refugees," "ecological migrants," "climate refugees," and "environmentally displaced people," have been frequently employed in academic discourse and media narratives to encapsulate what is often assumed to be a singular and homogenous reality, even though these categories encompass a wide range of migration dynamics that differ in nature, scale, and underlying factors (Tripathy, 2024a).

The ambiguity in the definition of environmental migration is a semantic issue that has been deeply interlinked with broader conceptual frameworks and classification systems. These components influenced how environmental migration is conceived, estimated, and forecasted, and the policy measures devised to mitigate it at national and international levels. Moreover, conceptual inconsistencies have further heightened the debate. This is because different scholars and organisations interpret environmental migration through varied lenses. Often, scholars argue from various perspectives on voluntary migration, forced displacement, and temporary relocations. Long-term resettlements under a single overarching term are ultimately transforming environmental migration into an all-encompassing concept that obscures the diverse and context-specific realities of human mobility in response to environmental change.

Environmental displacement dates back to 1976 when Lester Brown coined the term "environmental refugee," followed by Essam El-Hinnawi's 1985 definition of those forced to flee due to environmental disruptions jeopardising their livelihoods. Over time, terms evolved: "climate refugees" focus specifically on climate change-induced displacement (e.g., sea-level rise,

droughts), "ecological migrants" encompass broader ecological degradation (e.g., deforestation, soil erosion), and "environmentally displaced people" serve as a catch-all for those impacted by both sudden-onset disasters (e.g., hurricanes) and slow-onset processes (e.g., desertification). The International Organisation for Migration (IOM) defines environmental migration as movement prompted by sudden or gradual environmental changes that adversely affect living conditions, whether temporary or permanent, internal or cross-border.

Despite these definitions, no term has achieved universal legal recognition under international law. The 1951 Refugee Convention, which governs refugee status, limits protection to those fleeing persecution based on race, religion, nationality, political opinion, or social group membership, excluding environmental factors. "This gap leaves environmentally displaced people in a legal limbo, often categorised as 'migrants' rather than 'refugees,' thereby denying them the protections granted to conventional refugees under international law. The UNHCR favours the term 'persons displaced in the context of disasters and climate change' to distinguish them from legally protected categories, highlighting the ongoing debate over terminology and rights.

In the Indian context, climate-induced migration encompasses internal displacement, rapid urbanisation, and socio-economic vulnerabilities, necessitating strong policy measures to tackle these issues and stimulate climate resilience. In the Global framework, climate-induced migration highlights the need for financial investments, reveals worsening gender disparities, and demands coordinated efforts to manage displacement and adaptation effectively.

Objectives

The objectives of this paper are to:

- analyse climate-induced migration trends in India, focusing on internal displacement, urbanisation, and policy measures to mitigate socioeconomic vulnerabilities and enhance climate resilience.
- assess global climate-induced migration, emphasising financial investments, gender disparities, and the need for coordinated international frameworks to manage displacement and adaptation strategies.

Methodology

This study relies on secondary sources, including reports from international organisations, academic literature, and policy documents. A systematic review of publications from 2015 to 2024 explores definitions, trends, legal frameworks, and socioeconomic impacts of climate-induced displacement, focusing on regional and global perspectives.

Table 1: Estimates and Forecasts of Global Environmentally Induced Migration

Source	*Current Estimates*	*Forecasts by 2010*	*Forecasts by 2050*
El-Hinnawi (1985)	30 million	50 million	150 million
Myers (1993, 2002)	25 million	150 million, then	200 million
Myers and Kent (1995)	25 million	50 million	212 million
Stern (2007)			200 million
Christian Aid (2007)	25 million		300 million

Source: Current estimates, Forecasts by 2010, Forecasts by 2050

Note: The estimates and projections include migrants displaced by climate impacts and other environmental disruptions.

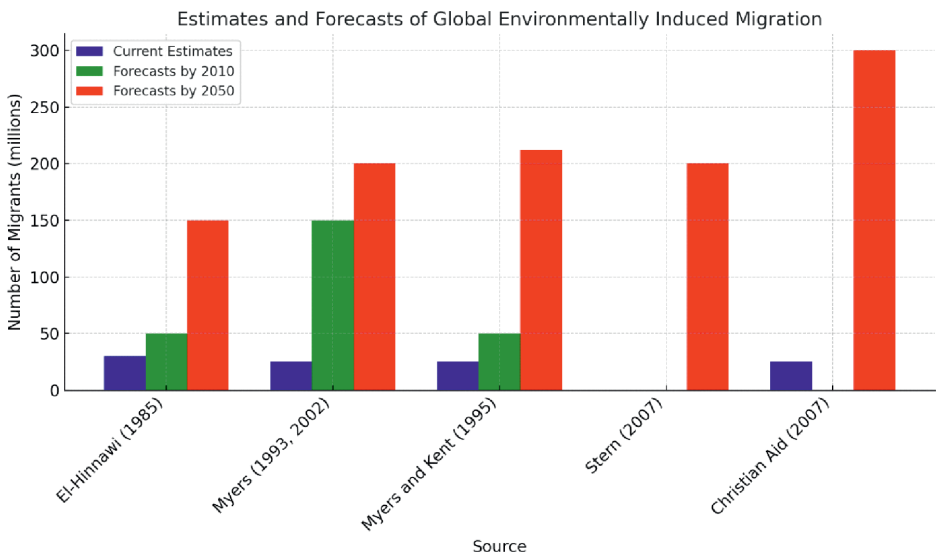

Figure 1: The estimates and forecasts of global environmentally induced migration from different sources

The bar chart in Figure 1 visualises the estimates and forecasts of global environmentally induced migration from different sources.

In 2020, the global number of displaced individuals soared to an unprecedented 89.4 million, reflecting a significant rise from the 84.8 million reported in 2019. These individuals, referred to as displaced people, include those compelled to leave their homes due to conflict, violence, or disasters, encompassing refugees, asylum seekers, and those internally displaced within their own countries. The data highlighted in the UN's World Migration Report 2022, exploring a troubling trend, indicates that about 1.1% of the global population currently faces displacement.

Among the worldwide displaced population, an estimated 34%, or 30.5 million individuals, sought refuge outside their home countries as refugees (26.4 million) or asylum seekers (4.1 million) by the end of 2020. Moreover, another 3.9 million displaced Venezuelans who did not seek formal refugee or asylum status were residing outside Venezuela during this period. A significant majority, 55 million people, were dealing with internal displacement within their nations, primarily due to conflict, violence, or environmental catastrophes (Tripathy, 2024a).

Table 2: Estimated number of people displaced by climate change by 2050

Region	*Estimated number of people displaced*
Sub-Saharan Africa	86 million
South Asia	40 million
Latin America	17 million

Source: Rigaud et al., 2018

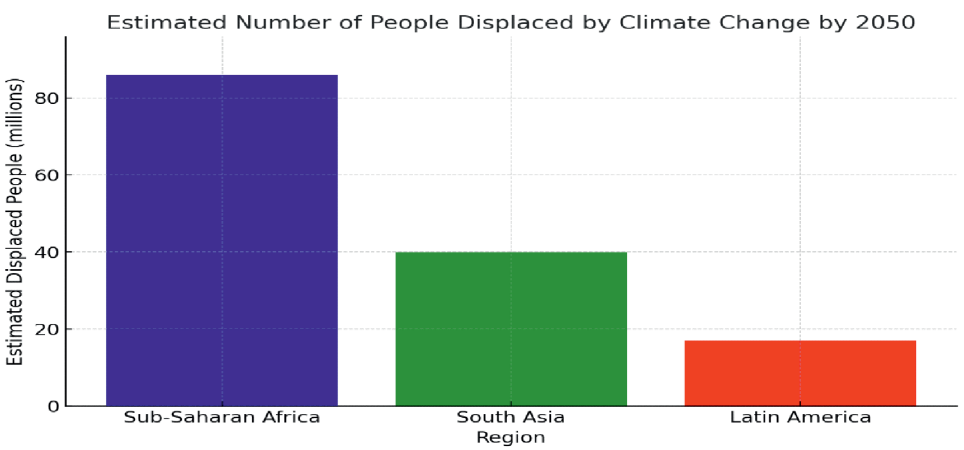

Figure 2: Estimated Number of People Displaced by Climate Change by 2050

The given bar chart in Figure 2 visualises the estimated number of people displaced by climate change by 2050 for different regions.

According to a World Bank report, by 2050, over 143 million people in Sub-Saharan Africa, South Asia, and Latin America may be compelled to migrate within their countries due to the slow-onset effects of climate change, including rising sea levels, water scarcity, and reduced crop productivity (Rigaud et al., 2018). The report anticipates that Sub-Saharan Africa will be the hardest-hit region, with around 86 million people expected to be displaced, followed by South Asia with 40 million and Latin America with 17 million.

Table 2 above outlines the projected number of individuals displaced by climate change in Sub-Saharan Africa, South Asia, and Latin America by 2050. The data indicate that the highest displacement figures will be in Sub-Saharan Africa, where 86 million people are expected to be affected. This region is particularly vulnerable to climate change impacts due to its reliance on rain-fed agriculture, high poverty levels, and weak governance (IPCC, 2014).

South Asia is projected to be the second most affected region, with 40 million people expected to be displaced by 2050. This region's heavy dependence on agriculture and high population densities exacerbates the impact of climate change. Moreover, South Asia is prone to extreme weather events, such as floods and cyclones, which can displace people and devastate infrastructure (Tripathy, 2024a).

Table 3: Environmental Migration in Asia and the Pacific (2015–2023)

Year	*Weather-Related Displacements (Millions)*	*Geophysical Displacements (Millions)*	*Total New Displacements (Millions)*	*Key Events/Notes*
2015	14.7	4.9	19.6	Typhoon Koppu (Philippines), Nepal Earthquake
2016	18.5	0.4	18.9	El Niño floods (Philippines), Typhoon Haima
2017	13.8	0.6	14.4	Monsoon floods (India), Typhoon Hato (China)
2018	13.2	0.3	13.5	Typhoon Mangkhut (Philippines), Japan floods
2019	19.8	0.5	20.3	Cyclone Fani (India), Australian bushfires
2020	24.5	0.3	24.8	China floods, Super Typhoon Goni (Philippines)

Year	*Weather-Related Displacements (Millions)*	*Geophysical Displacements (Millions)*	*Total New Displacements (Millions)*	*Key Events/Notes*
2021	18.9	0.4	19.3	Henan floods (China), Cyclone Tauktae (India)
2022	25.8	0.5	26.3	Pakistan floods, Typhoon Noru (Philippines)
2023	20.1	0.3	20.4	India heatwaves, Typhoon Doksuri (Philippines)

Table 3 provides a snapshot of environmental migration in Asia and the Pacific, reflecting the region's status as the global epicentre of disaster-driven displacement.

The data focuses on new internal displacements caused by environmental factors, primarily weather-related disasters (e.g., floods, storms, wildfires, droughts) and geophysical events (e.g., earthquakes, volcanic eruptions), as these are the most consistently tracked metrics by organisations like the Internal Displacement Monitoring Centre (IDMC). Comprehensive data isolating cross-border "environmental migrants" or "climate refugees" is limited, so the table emphasises internal displacement, which dominates the statistics in this region.

Weather-related disasters remain the primary drivers of displacement globally, with Asia and the Pacific accounting for approximately 70–80% of new displacements each year. This region's exposure to monsoons, typhoons, and floods makes it particularly vulnerable, as seen in 2022 when catastrophic flooding in Pakistan displaced over 8 million people, contributing to a peak of 25.8 million weather-related displacements worldwide. Other major displacement hotspots include the Philippines, India, China, and Bangladesh, where recurring typhoons and floods force millions from their homes. While geophysical disasters such as earthquakes, tsunamis, and volcanic eruptions are less frequent, they remain significant in tectonically active regions like Indonesia, Japan, and the Philippines.

Annual displacement figures fluctuate based on disaster severity, with notable spikes in 2019 due to Cyclone Fani, devastating bushfires, and 2022 following record-breaking floods in Pakistan. Total new displacements, combining weather-related and geophysical events with yearly variation, highlight the mounting impact of climate-related disasters. While most

displacements are internal, cross-border movements, such as those from Bangladesh to India due to flooding, are underreported due to data limitations. More minor, localised disasters also contribute significantly but usually receive inadequate attention.

Conceptualising the Climate Change–Migration Nexus: A Theoretical Model for Climate-Induced Migration

Classical models and migration theories barely address environmental change as a driver for migration. However, literature covering environmental migration has produced a specific explanatory model, first proposed by Richmond (1994) and later systematised by Hugo (1996). The model encompasses all types of environmental migration, of which climate-induced migration is a subset. It is one of the few models developed explicitly to resolve ecological migration. It is based on the importance of understanding the dynamic and complex interaction of the multiple causes that trigger environmental migration.

The model acknowledges that some environments and contexts are more likely to generate migration than others-fragile environments, areas at risk of natural disaster, or poorer areas and/or countries where people have less resilience to environmental change and fewer possibilities to adapt. Therefore, the predisposing factors are not solely ecological but are economic and social. These predisposing factors are more present in developing countries and can be understood as variables of social vulnerability.

The second element in the chain of migration is the precipitating event, which can be any environmental change or a wide range of changes. Richmond (1994) advocates that the precipitating event and the predisposing factors are not independent; whether a precipitating

event triggers migration depends on the predisposing factors. This argument relates to theories of natural disasters and vulnerability outlined above. It echoes the structural theory of refugee movements: the precipitating event does not create a migration flow unless it coincides with predisposing factors (Zolberg et al., 1989). Migration is also influenced by constraints and/or facilitators, such as links and networks' preexistence or organised evacuation. These constraints and facilitators shape the migration flow.

Finally, feedback on the area of origin is of utmost importance for understanding migration flows. Migration can produce this feedback, alleviating the pressure on natural resources and, thus, reducing the

likelihood of a disaster. The input can take the shape of environmental policies implemented after a disaster, which can also influence migration.

Climate Change and Migration: Patterns

Climate change has emerged as a critical component influencing migration patterns across India, particularly as environmental disruptions such as rising sea levels, extreme flooding, coastal erosion, and food and water insecurity continue to displace vulnerable populations, forcing them to relocate in search of safer living conditions and sustainable livelihoods. According to projections, climate-induced displacement in India has already surpassed three million individuals during the period 2020–2021, with estimates suggesting that by 2050, approximately 45 million people may be displaced due to worsening environmental conditions, including the inundation of coastal settlements, the depletion of freshwater sources, and the declining agricultural productivity triggered by erratic weather patterns, thereby emphasising the urgent need for policy interventions and adaptive strategies to mitigate the socioeconomic consequences of climate-driven migration.

While much of the global discourse on climate change and migration has predominantly centred around international migration, it is essential to recognise that historically, most environmentally induced migration has occurred within national borders. Given current trends, climate-induced mobility is expected to remain primarily an internal phenomenon rather than a cross-border one, particularly in regions such as Asia and the Pacific, where climate variability and environmental stressors are increasingly shaping migration patterns.

Before investigating the specific migration trends observed across different regions of Asia and the Pacific, it is crucial to highlight several universal patterns that have emerged over time. Economic development and infrastructural improvements have expanded mobility opportunities, allowing more of the population to utilise migration to cope with changing environmental conditions or enhance their socioeconomic standing (Tripathy, 2023a, 2023b, 2024b). Simultaneously, there has been a significant rise in female mobility, with women often outnumbering men in several migration flows, redefining traditional gender roles in labour migration and household decision-making processes.

Furthermore, migration patterns-both, internal and international increasingly become concentrated toward urban centres, vast metropolitan

areas, resulting in rapid urbanisation, with the proportion of the urban population in Asia and the Pacific rising from a mere 17% (230 million) in 1950 to 39% (1.5 billion) in 2005, and projections indicating that urban dwellers will constitute nearly half of the region's population by 2025. This growth of urbanisation has been accompanied by a parallel increase in both permanent and temporary mobility, with circular migration. In such situations, individuals leave rural areas to work in urban centres before returning to their native regions, becoming a widespread phenomenon, reinforcing rural-urban linkages and transforming economic and social dynamics. A particularly striking feature of this urbanisation process has been the rise of "megacities," sprawling urban agglomerations housing over 10 million residents, which are often classified as "mega-urban regions" due to their extensive geographical coverage and their ability to subsume numerous smaller cities into a single interconnected urban network, presenting both opportunities and challenges for sustainable urban planning, resource allocation, and climate resilience in the face of mounting environmental pressures.

Table 4: Growth and Projected Growth of Asian Mega Cities, 1950–2025 (in millions)

City	*Population (2005)*	*City*	*Population (2025)*
Tokyo	35.3	Tokyo	36.4
Mumbai	18.2	Mumbai	26.4
Delhi	15.1	Delhi	22.5
Shanghai	14.5	Dhaka	22.0
Calcutta	14.3	Calcutta	20.6
Dhaka	12.6	Shanghai	19.4
Karachi	11.6	Karachi	19.1
Osaka-Kobe	11.3	Manila	14.8
Manila	10.7	Beijing	14.5
Beijing	10.7	Jakarta	12.4

Source: United Nations 2008.

Table 4 highlights significant population growth in Asian megacities between 2005 and 2025, with the most rapid increases projected in Mumbai, Delhi, and Dhaka. Tokyo remains the largest city, though its growth is relatively slow. Indian cities, particularly Mumbai and Delhi, are experiencing substantial expansion, reflecting broader urbanisation trends. Rapid urban growth in Dhaka and Karachi indicates challenges with mounting infrastructure, housing, and services. Shanghai and Beijing also show notable increases,

emphasising China's ongoing urbanisation. The data suggest that South Asian and Southeast Asian cities are expected to encounter intensified socioeconomic and environmental pressures due to rapid population expansion.

Table 5: East Asia Projected Totals at Risk Allowing for Multiple Hazards ('000)

Geographic Area	*2000*	*2020*	*2030*	*2050*	*Percentage Change 2000–2050*
PRC (People's Republic of China)	224,947	443,848	516,237	602,893	168.0%
Japan	84,537	67,527	67,471	64,178	(24.1%)
Republic of Korea	7,191	8,301	8,368	7,613	5.9%
Macao, China	237	523	543	524	120.8%

Source: Calculated from hot spot analysis and United Nations projections.

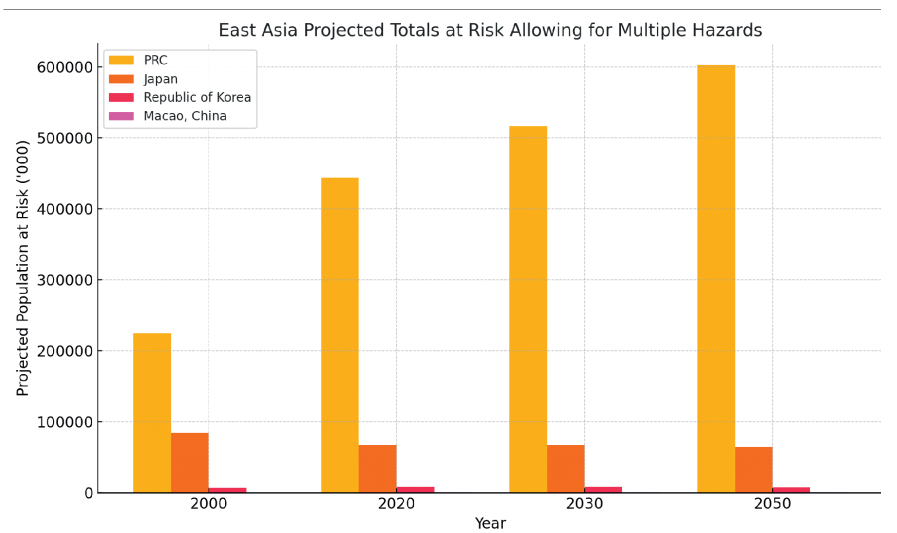

Figure 3: Projected Totals at Risk in East Asia due to Multiple Hazards (2000 to 2050)

The bar chart in Figure 3 visualises the projected totals at risk in East Asia due to multiple hazards from 2000 to 2050.

While the large populations projected to reside in climate-sensitive hotspots should not be interpreted as an exact representation of the number of people who will inevitably migrate or even be at immediate risk of displacement, it remains an undeniable reality that climate change will exert a profound influence on migration patterns across the country, necessitating urgent policy responses to mitigate the potential socioeconomic disruptions associated with environmental hazards. In this context, the People's Republic

of China (PRC) stands out as having the highest number of urban dwellers-nearly 80 million people living in cities situated at elevations of less than 10 metres above the current sea level. This figure is nearly three times greater than India's, which ranks second with an estimated 30 million people residing in similarly vulnerable coastal urban regions.

Although a significant proportion of the population in these climate-sensitive hotspots within the PRC remains rural at present, the ongoing trend of rapid rural-to-urban migration suggests that, by as early as 2020, urban populations in these vulnerable regions will have expanded substantially, thereby intensifying the risks associated with climate change-induced disasters such as rising sea levels, storm surges, and coastal flooding. Given these projections, it is indispensable that major coastal cities undertake proactive adaptation measures to prepare for the inevitable impacts of climate change, with exclusive attention accorded to identifying and protecting the most at-risk populations.

The vulnerability in urban areas is disproportionately concentrated among low-income households, who are the least equipped to withstand the direct and indirect consequences of climate change due to multiple factors, including the substandard quality of their housing, their settlement in the most ecologically fragile and disaster-prone parts of cities, and their limited capacity to relocate when environmental threats become imminent.

Within these marginalised groups, the most vulnerable subpopulations include the elderly and children, who face compounded risks as they often lack the financial resources, physical resilience, and social safety nets necessary to cope with illness, injury, or the loss of income, livelihoods, and property, making them particularly susceptible to the cascading effects of climate-induced displacement and economic instability.

Table 6: Projected Urban Population in Southeast Asia at Risk of Multiple Hazards ('000)

Country	*2000*	*2020*	*2030*	*2050*	*Per cent Change 2000–2050*
Cambodia	2,046	5,358	7,682	13,361	553.0%
Indonesia	80,897	139,977	164,536	201,284	148.8%
Malaysia	4,225	8,616	9,937	11,940	182.6%
Myanmar	5,112	17,247	21,458	28,976	466.8%
Philippines	26,137	78,625	93,872	117,851	350.9%
Thailand	17,967	23,644	28,341	36,139	101.1%
Viet Nam	22,158	35,275	46,159	68,383	208.6%

Source: Calculated from hot spot analysis and United Nations projections.

Climate Vulnerability, Migration, and Economic Disruptions in Thailand and South Asia

It is critically important to recognise that the extent to which climate change affects populations residing in vulnerable regions will not solely be determined by the nature and severity of climatic events but will also be shaped by the ability of these populations to mobilise resources and implement adaptive strategies to mitigate its adverse effects, making broader socioeconomic vulnerability a crucial determinant of resilience in climate-sensitive hotspots. In the case of Thailand, where climate change poses multiple risks-including a pronounced shift in rainfall patterns from north to south, an increase in the frequency and intensity of extreme weather events, and rising sea levels that will significantly impact densely populated coastal regions, particularly in and around Bangkok-the potential for migration will not only be influenced by increased pressures to leave origin areas but also by the changing dynamics in major destination areas that currently host substantial migrant populations.

Unlike the prevailing discourse on climate-induced migration, which primarily emphasises the out-migration of vulnerable populations from high-risk areas, Thailand presents a unique case where climate change will also affect over two million immigrants, predominantly from neighbouring Cambodia, Lao PDR, and Myanmar, who rely on employment opportunities in sectors such as agriculture, fishing, and, to a lesser extent, forestry-industries that are expected to face severe disruptions due to climatic shifts. These sectors, already characterised by labour shortages due to the reluctance of local workers to engage in jobs perceived as dirty, low-status, and poorly paid, will experience further instability as climate change diminishes productivity and increases livelihood insecurity.

The limited capacity of origin countries to cope with climate change-related challenges exacerbates the problem, as demonstrated by the devastating impact of Cyclone Nargis in Myanmar, which highlighted the vulnerabilities of low-income populations to extreme weather events. In Cambodia, rising instances of flooding, prolonged droughts, and intensified cyclones are expected to amplify migratory pressures, forcing many individuals and households to relocate, either permanently or temporarily, in search of safer and more viable living conditions outside climate-sensitive hotspots.

Table 7: South Asia Projected Population at Multiple Risks from Climate Change, 2000–2050 ('000)

Country	2000	2020	2030	2050	% Change (2000–2050)
Afghanistan	21,500	40,500	52,500	78,000	(263.5%)
Bangladesh	137,000	193,500	218,000	254,000	(85.5%)
India	860,500	1,175,500	1,283,500	1,413,500	(64.3%)
Nepal	22,000	34,500	40,000	49,500	(124.2%)
Pakistan	137,000	202,500	234,000	284,500	(107.3%)
Sri Lanka	19,000	20,000	20,000	19,000	(-1.1%)

Source: Calculated from hot spot analysis and United Nations projections.

The projected population trends in South Asian climate hot spots during the period spanning 2000 to 2050, as indicated in Table 7, highlight the concerning reality that, except Sri Lanka, all countries in the region are expected to experience substantial population growth, with Afghanistan, Nepal, and Pakistan witnessing more than a doubling of their respective populations, while India is anticipated to have approximately 1.4 billion people residing in areas adversely affected by climate change impacts, thereby raising serious concerns about the potential consequences of environmental stress on human settlements, livelihoods, and migration patterns. Moreover, by 2050, the populations in climate-vulnerable hot spots in both Bangladesh and Pakistan are projected to exceed 250 million, emphasising the scale of exposure to climate-induced risks and the pressing need for adaptation strategies, as while the majority of affected populations are likely to attempt *in situ* adaptation, the sheer magnitude of environmental pressures suggests that migration will emerge as a significant form of population redistribution, both within national borders and beyond.

Climate-Induced Migration: Challenges, Gendered Impacts

While migration has historically been an essential adaptive strategy for communities facing environmental and economic hardships, the growing scale and frequency of climate-induced displacement emphasise the need for significant financial investments to ensure that migration can be effectively utilised as an adjustment or coping mechanism in response to climate change. In this context, bilateral and multilateral frameworks must be developed to facilitate the orderly planning of migration, minimise the adverse socioeconomic consequences associated with displacement, and prevent potential geopolitical

tensions arising from poorly managed cross-border migration, particularly as many developing nations currently lack the institutional capacity and resources to curb large-scale population movements effectively and sustainably.

Furthermore, climate-induced migration exhibits precise gendered dimensions. The UN report highlights the plight of the most vulnerable groups, particularly impoverished women, who often lack the financial means and social support systems necessary to migrate, thereby forcing them to remain in high-risk areas despite escalating environmental hazards. Although uncertainties remain regarding the precise scale and localised impacts of climate change, it is evident that climate-induced migration will continue to grow in magnitude and complexity, evolving into different forms depending on policy responses.

The decisions and frameworks established today will ultimately determine whether migration serves as a proactive adaptation strategy or merely represents a survival mechanism of last resort. However, the absence of an international cooperation mechanism to regulate these migration flows, and the inadequacy, fragmentation, and poor coordination of existing protection and assistance programs, highlight the urgent need to tackle climate-induced migration as a global phenomenon rather than merely a localised challenge.

Climate Change, Migration, and Resource Scarcity: Challenges for India and Central Asia

As one of the world's fastest-growing economies, India faces the challenge of climate change, acting as a potential impediment to its recent rapid economic expansion, particularly given its intricate patterns of internal mobility, which include both permanent and temporary migration, driven primarily by rural-to-urban shifts. With its significant international diaspora of approximately 20 million, India has long been a major origin country for international migrants, including large numbers of unskilled labourers seeking employment opportunities in the Middle East, alongside an increasing number of skilled workers migrating to OECD member states.

Beyond South Asia, Central Asia also faces severe climate-induced risks, as a significant proportion of the region's population resides in areas with heightened susceptibility to increased water stress, primarily driven by reduced rainfall and declining runoff levels. With the notable exception of Kazakhstan, virtually all Central Asian nations are expected to experience pronounced

challenges associated with diminishing water availability, further intensifying regional vulnerabilities and underscoring the critical need for comprehensive, forward-looking policies to address the intersection of climate change, resource scarcity, and migration pressures.

Table 8: Pacific Populations, 2008 and 2030

Country	*2008 ('000)*	*2030 ('000)*	*Annual Growth 2008 (%)*	*% Change 2008–2030*
Melanesia				
Fiji Islands	839	1,020	0.6	21.6
New Caledonia	246	320	1.6	30.1
Papua New Guinea	6,474	10,042	2.2	55.1
Solomon Islands	521	884	2.7	69.7
Vanuatu	233	388	2.6	66.5
Micronesia				
Federated States of Micronesia (FSM)	110	120	0.4	9.1
Guam	179	242	2.7	35.2
Kiribati	97	138	1.9	42.3
Marshall Islands	53	67	1.0	26.4
Nauru	10	14	2.1	40.0
Northern Mariana Islands	63	68	—	7.9
Palau	20	23	0.6	15.0
Polynesia				
American Samoa	66	91	1.6	37.9
Cook Islands	16	16	0.4	—
French Polynesia	263	321	1.2	22.1
Niue	2	1	(2.4)	(50.0)
Samoa	182	198	0.4	8.8
Tokelau	1	1	(0.1)	—
Tonga	103	115	0.4	11.7
Tuvalu	10	11	0.3	10.0
Wallis and Futuna	15	17	0.7	13.3

Source: Secretariat of the Pacific Community

Table 8 presents population projections for Pacific countries from 2008 to 2030, highlighting growth trends across Melanesia, Micronesia, and Polynesia. Papua New Guinea is expected to see the highest absolute increase, growing by over 55%, while Solomon Islands and Vanuatu will experience significant

population surges. In Micronesia, growth is relatively lower, with FSM and Palau showing modest increases. Polynesia exhibits mixed trends, with Niue's population projected to decline by 50%. High annual growth rates in some small island nations, like Nauru and Kiribati, indicate potential stress on resources and infrastructure, necessitating sustainable development and population management strategies.

The Pacific region is projected to face significant and far-reaching consequences due to climate change, mainly because of rising sea levels and the increasing frequency and intensity of cyclonic storms, which pose existential threats to many island nations that are geographically and environmentally vulnerable to these extreme climatic events. With the notable exception of Papua New Guinea, nearly all national populations of the Pacific Island states are classified as residing in hot spots of substantial climate impact, with coastal areas particularly susceptible to environmental hazards. Coastal erosion, saltwater intrusion, and storm surges threaten livelihoods and settlements. It creates long-term displacement risks that may require strategic interventions in relocation, resettlement, and migration policies (ADB, 2011).

In Papua New Guinea, while the nation is not as uniformly vulnerable as other smaller Pacific Island nations, specific regions, particularly the southern coastal belt and several low-lying islands, face heightened risks due to rising sea levels. In contrast, substantial inland areas are prone to riparian flooding caused by changing precipitation patterns and increased water runoff (ADB, 2011). The spatial distribution of populations at risk further complicates adaptation strategies, as two-thirds of those exposed to coastal flooding are urban dwellers who may have greater access to resources and infrastructural support. In contrast, most individuals vulnerable to riparian flooding reside in rural areas, where financial and institutional capacity for resilience-building remains limited. The pressing reality of climate-induced displacement is already evident, as demonstrated by the resettlement of communities from the Carteret Islands off the coast of Papua New Guinea, where the combined effects of land subsidence, storm surges, and sea-level rise have rendered these islands increasingly uninhabitable, a phenomenon that has also prompted the relocation of residents from the islands of Bougainville, underscoring the urgent need for comprehensive migration governance frameworks to address the impending waves of climate-induced displacement.

Climate-Induced Migration in the Pacific: Adaptation, Resilience, and Policy Imperatives

A crucial aspect that exacerbates the effects of climate change in the Pacific is the region's rapid population growth, which places additional strain on already fragile ecosystems and overstretched governmental resources, limiting the capacity of state institutions and individual households to effectively mitigate risks and adapt to changing environmental conditions. In examining the potential implications of climate change on migration patterns in the Pacific, it is essential to recognise that adverse environmental events and slow-onset ecological degradation have already been significant drivers of migration and population displacement, reinforcing the notion that mobility is a historically embedded adaptation strategy in response to climatic shocks (ADB, 2011).

However, the choice of adaptation responses, permanent migration, temporary migration, or *in situ* adaptation will ultimately depend on the severity of environmental stressors, the availability of financial and social capital, and the perceived risks associated with climate-induced changes, as objective ecological threats do not solely drive migration decisions but are also influenced by subjective interpretations of risk, cultural ties to ancestral land, and economic opportunities in potential destination areas.

Despite the growing body of research on climate change and migration, considerable uncertainty remains regarding the precise nature, scope, and scale of localised climate impacts, as well as the societal responses that will emerge to mitigate and adapt to these changes, given that the effects will range from minor disruptions to catastrophic events that result in large-scale impoverishment and loss of life, necessitating complex and multi-layered responses.

Changes in migration patterns are expected to be driven by a combination of push factors at the origin, including heightened exposure to environmental hazards, deteriorating resource conditions that limit access to essential natural assets, and growing perceptions of risk, irrespective of whether individuals or communities have directly experienced climate-related disasters. Importantly, migration responses will not be dictated solely by physical environmental changes but also by shifts in perception regarding the severity of climate risks, with increasing hazard frequency and intensity amplifying concerns over long-term habitability, potentially reaching thresholds or tipping points beyond which conventional migration dynamics no longer apply (ADB, 2011). As

climate change progresses, two primary migration patterns will likely emerge: a linear increase in voluntary migration along existing internal and international pathways, particularly as affected populations seek economic opportunities and improved living conditions in more stable environments. Second, entire communities are forced to abandon their traditional homelands in response to extreme climatic stressors due to nonlinear shifts in migration patterns driven by crossing resilience thresholds. This leads to large-scale displacement events that challenge the traditional voluntary and forced migration frameworks.

Adaptation-relocating communities and fortifying infrastructure offer hope but require unprecedented investment. Critically, the narrative must shift from viewing these populations as passive victims to agents of resilience capable of supporting solutions. The establishment's focus on carbon targets often overlooks these human dimensions, necessitating a scepticism toward top-down approaches that neglect local realities. These developments focus on the urgent need for formulating proactive policy measures at the global level, a pragmatic approach towards long-term adaptation planning. The policy must strengthen international cooperation to guarantee that migration, as a climate adaptation strategy, occurs in a manner that is safe, dignified, and sustainable for affected populations.

References

Asian Development Bank. (2009). *The economics of climate change in Southeast Asia: A regional overview*. ADB.

Asian Development Bank. (2011). *Climate change and migration in Asia and the Pacific* (Draft ed.). ADB.

Christian Aid. (2007). *Human tide: The real migration crisis*. Christian Aid.

Clement, V., Rigaud, K. K., de Sherbinin, A., Jones, B., Adamo, S., Schewe, J., ... Shabahat, E. (2021). *Groundswell Part 2: Acting on internal climate migration*. The World Bank. https://openknowledge.worldbank.org/handle/10986/36248

El-Hinnawi, E. (1985). *Environmental refugees*. United Nations Environment Programme.

Hugo, G. (1996). Environmental concerns and international migration. *International Migration Review, 30*(1), 105–131.

Intergovernmental Panel on Climate Change. (2014). *Climate change 2014: Impacts, adaptation, and vulnerability. Part B: Regional aspects* (V. R. Barros, C. B. Field, D. J. Dokken, M. D. Mastrandrea, K. J. Mach, T. E. Bilir, M. Chatterjee, K. L. Ebi, Y. O. Estrada, R. C. Genova, B. Girma, E. S. Kissel, A. N. Levy, S. MacCracken, P. R. Mastrandrea, & L. L.

White, Eds.). Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press. https://www.ipcc.ch/report/ar5/wg2/

Myers, N. (1993). *Ultimate security: The environmental basis of political stability*. W. W. Norton & Company.

Myers, N. (1997). Environmental refugees. *Population and Environment, 19*(2), 167–182. https://doi.org/10.1023/A:1024623431924

Myers, N. (2002). Environmental refugees: A growing phenomenon of the 21st century. *Philosophical Transactions of the Royal Society B: Biological Sciences, 357*(1420), 609–613.

Myers, N., & Kent, J. (1995). *Environmental exodus: An emergent crisis in the global arena*. Climate Institute.

Richmond, A. (1994). *Global apartheid: Refugees, racism, and the new world order*. Oxford University Press.

Rigaud, K. K., de Sherbinin, A., Jones, B., Bergmann, J., Clement, V., Ober, K., ... Midgley, A. (2018). *Groundswell: Preparing for internal climate migration*. The World Bank. https://openknowledge.worldbank.org/handle/10986/29461

Stern, N. (2007). *The economics of climate change: The Stern review*. Cambridge University Press.

Tripathy, S. N. (2023a, November 4). Fostering socio-economic growth: Indian immigrant remittances. *Mainstream, 61*(46–47). http://mainstreamweekly.net/article13955.html

Tripathy, S. N. (2023b). Remittance of Indian immigrants: Catalytic for socio-economic development. *Indian Journal of Applied Economics and Business, 5*(1), 165–179. https://doi.org/10.47509/IJAEB.2023.v05i01.09

Tripathy, S. N. (2024a). Climate change, migration, displacement in Asia and the Pacific: Role of UNDP. *Splint International Journal of Professionals, 11*(2), 139–149.

Tripathy, S. N. (2024b). Migration, remittances, and economic development in India. *Indian Journal of Global Economics and Business, 3*(2), 101–121.

Zolberg, A. R., Suhrke, A., & Aguayo, S. (1989). *Escape from violence: Conflict and the refugee crisis in the developing world*. Oxford University Press.