

# Towards an Integrated Transnational Climate Change-Induced Migration Policy Framework in the Bay of Bengal: An Ecological Geography and Policy Ecology Perspective

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## ABSTRACT

This paper examines the growing issue of climate change-induced migration in the Bay of Bengal, with a focus on the Sundarbans. It highlights how rising sea levels, extreme weather, and environmental damage disrupt livelihoods, compelling communities to migrate. The study underscores the absence of comprehensive and effective policies to address the multifaceted social, ecological, and governance challenges arising from cross-border climate change-induced migration. Drawing on the framework of ecology geography and policy ecology, the paper proposes an integrated approach that balances environmental vulnerabilities with governance imperatives. Emphasising the need for robust regional cooperation between India and Bangladesh, it calls for concerted efforts in ecosystem restoration, the development of climate-resilient infrastructure, and the promotion of sustainable livelihoods. The paper advocates for proactive, inclusive policies that go beyond national borders to tackle the socio-environmental impacts of climate-induced migration in the region.

**Key Words:** Climate change-induced migration, ecological geography, policy ecology, Bay of Bengal, climate resilience, the Sundarbans.

## Introduction

Climate change-induced migration is rapidly emerging as a critical global challenge,<sup>1</sup> driven by escalating environmental degradation, rising sea-levels, and the increasing frequency of extreme weather events. Factors such as the destruction of agricultural lands, desertification, coastal erosion, and hydrometeorological disasters are forcing millions to leave their homes, particularly in regions already vulnerable to these changes.<sup>2</sup> As natural resources dwindle and living conditions deteriorate, migration becomes an essential survival strategy for many, often rooted in immediate necessity rather than long-term planning.<sup>3</sup> This is especially evident in regions with limited adaptive capacity, where populations face the compulsion to migrate to secure their survival.<sup>4</sup> In climate-vulnerable regions such as South Asia, inadequate infrastructure, resource scarcity, and weak social support systems exacerbate the pressures on affected communities. As a result, migration often becomes a last resort rather than a proactive decision, as individuals

confront the harrowing choice between relocating to potentially safer areas or remaining in surroundings rendered increasingly uninhabitable by environmental stressors. Low-lying coastal and erosion-prone areas, in particular, are disproportionately affected by sea-level rise, frequent flooding, and intense tropical cyclones, which directly threaten livelihoods.<sup>5</sup>

However, existing frameworks fall short in addressing the complexities of transnational climate migration, where the movement of displaced populations often transcends national boundaries, straining governance structures and escalating geopolitical tensions. This paper addresses a significant research gap by focusing on the insufficient institutional, legal, and policy frameworks that fail to comprehensively manage climate change-induced migration. While regions like South Asia, including Bangladesh, are particularly affected—where millions are displaced annually due to flooding, cyclones, and riverbank erosion—current international and regional policies inadequately support the needs of climate migrants.<sup>6</sup> The absence of a unified approach leaves these populations vulnerable to systemic inequities, exploitation, and marginalisation.<sup>7</sup>

In response, some countries have introduced domestic relocation programmes to mitigate the impact of climate change. For example, the Philippines has initiated relocation programmes for people living in disaster-prone areas,<sup>8</sup> while Vietnam has introduced relocation plans to address the effects of rising sea levels.<sup>9</sup> The disparities in the impacts of climate change, however, coupled with varying adaptive capacities, create an uneven challenge for climate change-induced migrants, ranging from physical risks and psychological distress to social exclusion, economic instability, and legal hardships.<sup>10</sup> Inadequate international and regional governance mechanisms to manage climate change-induced migration exacerbate humanitarian crises, foster the growth of informal settlements, and intensify urban poverty, food insecurity, and resource scarcity.<sup>11</sup>

Despite growing awareness, the existing frameworks of institutions like the International Labour Organisation (ILO) and the International Organisation for Migration (IOM) have proven insufficient in addressing the unique challenges posed by climate migration, resulting in a politicised and securitised response that hinders adequate support for affected populations.<sup>12</sup>

This paper seeks to bridge these critical gaps by proposing an interdisciplinary approach that integrates ecological geography and political ecology. By examining ecological zones as unified systems, rather than fragmented national territories, it offers a comprehensive framework for developing sustainable and equitable responses to climate-induced migration. Specifically, the study focuses on the Bay of Bengal region, using the Sundarbans as a case study to explore how policy ecology can foster proactive, inclusive solutions. The paper emphasises the need for resilience, equity, and sustainability in these responses, with a particular focus on strengthening international collaboration, particularly between India and Bangladesh, to address the shared challenges of climate migration.

## Migration: Historical Context

Migration, as defined by the United Nations, refers to any person who is moving or has moved across an international border or within a State, away from their habitual place of residence, regardless of the person's legal status, whether the movement is voluntary or involuntary, the causes of the movement, or the length of the stay.<sup>13</sup>

This broad definition underscores the complexity of migration, encompassing voluntary versus forced movements, internal versus international migration, and various legal statuses. These distinctions highlight the multifaceted nature of migration, its far-reaching implications, and the absence of a universally accepted governance framework across local, national, regional, and international levels.<sup>14</sup>

Historically, migration has been a cornerstone of human existence, driven by adaptation, and survival strategies.<sup>15</sup> From an anthropological perspective, migration has been both a response to environmental challenges and a catalyst for cultural and social innovation. Nomadic pastoralist societies, for example, moved between water sources and grazing lands, demonstrating migration's role in human resilience and ecological adaptation.<sup>16</sup> Moreover, these migratory patterns fostered the exchange of knowledge, technologies, and cultural practices, profoundly shaping the evolution of societies.<sup>17</sup>

Migration patterns throughout history have been influenced by economic opportunities, conflict, environmental change, and socio-cultural dynamics. The Industrial Revolution, for instance, sparked large-scale internal migration as rural populations sought employment and better living conditions in urban centres. Similarly, conflicts and persecution—such as those during World War II—forced millions to migrate under dire circumstances.<sup>18</sup> Environmental crises have also played a critical role in driving migration, exemplified by the Dust Bowl of the 1930s in the United States, which displaced thousands due to severe drought and ecological degradation.<sup>19</sup>

In contemporary times, migration has evolved into a complex global issue shaped by national sovereignty and the development of Westphalian states. While historical migration primarily responded to economic and environmental factors, modern migration increasingly intersects with political, social, and security concerns.

The rise of securitisation has led to migrants being viewed through a narrow lens, often associated with threats like crime, terrorism, and economic strain.<sup>20</sup> This oversimplification fosters negative stereotypes that distort public perception and policy responses, undermining the diverse motivations, and experiences of migrants.<sup>21</sup>

As migration becomes more securitised, political leaders and policymakers often prioritise border control, law enforcement, and national security in their strategies.<sup>22</sup> This focus has led to the development of various institutional mechanisms to regulate migration, including labour laws, refugee governance frameworks, and global mobility agreements.

However, the emphasis on security often marginalises humanitarian concerns, reflecting the politicisation of migration.<sup>23</sup>

The politicisation of migration complicates the development of balanced and humane policies. Security-driven approaches tend to overshadow compassionate responses that recognise the diverse experiences, rights, and contributions of migrants. Effective migration governance, therefore, requires a nuanced understanding that transcends reductive narratives and considers the broader socio-economic, cultural, and humanitarian dimensions of migration.<sup>24</sup>

## **Navigating the Policy Complexities of Climate Change-Induced Migration**

As global migration governance continues to evolve, it increasingly reflects the growing complexity and scale of migration as a global phenomenon, driven by a combination of economic, social, environmental and political factors. Although the adoption of frameworks such as the Global Compact for Safe, Orderly, and Regular Migration (GCM) and the Global Compact on Refugees (GCR) marks a significant step toward international cooperation, they still face limitations when addressing climate change-induced migration. Unlike traditional migration drivers such as economic opportunities or conflicts, climate-induced migration presents unique challenges that require dedicated attention within international migration frameworks.<sup>25</sup>

Climate change, through rising sea levels, extreme weather events, and environmental degradation, is increasingly forcing communities to migrate, often in dire circumstances. However, the terminology used to describe individuals displaced by climate change remains contested. Terms such as “climate refugee”,<sup>26</sup> “environmentally displaced person”, and “climate migrant” have all emerged, but none have gained universal acceptance due to the relatively recent recognition of climate change-induced migration as a distinct category.<sup>27</sup> Moreover, climate change often intersects with other migration drivers, complicating the classification of migration patterns and policy responses.<sup>28</sup> The term “environmental refugees” was first introduced by Lester Brown in 1976<sup>29</sup> and later expanded by Essam El-Hinnawi in 1985,<sup>30</sup> who defined them as individuals forced to leave their homes due to environmental disasters. However, climate-induced migrants do not neatly fit into the conventional refugee category, leading to debates about their recognition, rights, and legal status.<sup>31</sup>

The IOM has stressed the need to broaden the definition of “refugee” to encompass environmental migrants, highlighting that migration caused by environmental change is a significant driver of both forced and voluntary displacement.<sup>32</sup> The issue of climate-induced migration was first raised by the Intergovernmental Panel on Climate Change (IPCC) in the early 1990s, which warned that climate change could disrupt settlement patterns and social stability.<sup>33</sup> This recognition was further formalised during the COP 16

negotiations in Cancun in 2010, where the Cancun Adaptation Framework acknowledged the importance of enhancing cooperation on climate change-induced migration and displacement.<sup>34</sup> In 2015, the Paris Agreement established a Task Force on Displacement to recommend actions on displacement caused by climate change.<sup>35</sup>

In 2018, the adoption of the GCM provided the first international framework to guide governments in managing migration linked to climate change.<sup>36</sup> Despite these milestones, there is still a lack of a comprehensive legal and policy framework to address climate-induced migration, and many countries continue to approach the issue through a security lens. This framing complicates efforts to create inclusive policies that address the rights and needs of climate migrants. Hence, there remains an urgent need for a unified international approach to effectively manage the complex challenges posed by climate change-induced migration.

### **Bay of Bengal: A Climate Vulnerability Hotspot**

According to the Internal Displacement Monitoring Centre (IDMC), 46.9 million new internal displacements occurred in 2023 alone,<sup>37</sup> with storms and floods being the primary drivers of these displacements. Between 2016 and 2021, a total of 134.1 million people were displaced due to extreme events, with 43.1 million children among them, severely disrupting their lives and education.<sup>38</sup>

South Asia, in particular, is one of the world's most climate-vulnerable regions, with millions displaced annually due to extreme weather events – four million in Bangladesh and five million in India in 2019 alone.<sup>39</sup> At the heart of this crisis is the Bay of Bengal, a vital socio-economic hub supporting 450 million people. It contributes 7% of the global marine fisheries catch and is projected to generate USD 72 billion from fisheries, aquaculture, and tourism in the next 25 years.<sup>40</sup>

However, escalating climate threats, including rising sea levels, intensifying extreme weather, and the degradation of critical ecosystems such as mangroves—20% of which have already been lost—are destabilising this fragile region.<sup>41</sup> Coastal communities in Bangladesh, India, Myanmar, and Thailand are increasingly forced to migrate as their livelihoods in fishing, farming, and tourism are disrupted. Urban centres like Kolkata, Dhaka, and Yangon, alongside ecologically sensitive areas like the Sundarbans, face compounding risks from storms, erosion, and salinity.<sup>42</sup>

This trend is expected to continue and worsen as the effects of climate change intensify. Projections suggest that by 2050, between 50 million and 250 million people could be displaced globally, with the number rising to 630 million by 2100.<sup>43</sup> To put these numbers into perspective, by 2050, the size of the entire population of Brazil—the world's fifth-most populous country—could be displaced, and by 2100, nearly the size of the entire European Union could face similar challenges. The potential scale of climate-induced

displacement is likely to surpass current global management capacities, even with conservative estimates. If carbon emissions continue to rise, and if positive feedback loops exacerbate environmental impacts, the number of displaced individuals could be even higher, deepening the humanitarian crisis.

## **Ecology, Geography, and Policy in the Sundarbans**

The Sundarbans, an expansive and complex deltaic ecosystem spanning India and Bangladesh, stands as one of the world's most ecologically significant regions. Nestled at the confluence of the Ganges, Brahmaputra, and Meghna rivers, the region covers approximately 10,200 sq km<sup>44</sup> and is home to the largest contiguous mangrove forests in the world. Recognised as both a UNESCO World Heritage Site<sup>45</sup> and a Ramsar Wetland of International Importance,<sup>46</sup> the Sundarbans play a critical role in providing essential ecological services, including cyclone protection, carbon sequestration, and critical resources for millions of people.<sup>47</sup> The region supports about 7.2 million residents – 4.5 million in India and 2.7 million in Bangladesh<sup>48</sup>—many of whom are among South Asia's most impoverished,<sup>49</sup> with nearly half living below the poverty line.<sup>50</sup> The region's tidal rivers, dense mangrove forests, and saline wetlands have long shaped its residents' adaptive lifestyle, emphasising harmony with natural rhythms.

## **Mounting Threats to the Sundarbans**

The Sundarbans, despite its ecological and socio-economic importance, face escalating threats from climate change, compounded by natural factors and anthropogenic factors. Rising sea levels, intensifying cyclonic storms, land erosion, and salinity intrusion have wreaked havoc on ecosystems and human settlements alike. Cyclone *Amphan*, which struck in May 2020, with wind speeds of up to 190 km/h, devastated the region, breaching embankments, salinising farmlands, and contaminating freshwater sources, leaving millions displaced. More recently, Cyclone *Mocha* in 2023 displaced 1.3 million people, primarily affecting vulnerable populations such as the Rohingya refugees in Cox's Bazar.<sup>51</sup>

The impacts of climate change in the Bay of Bengal are particularly severe. Sea-level rise in the region is rising at a rate of 4.44 mm annually—significantly higher than the global average—while average temperatures have increased by 0.7°C, over the recent decades.<sup>52</sup> These changes have intensified the frequency and intensity of cyclonic events, pushing storm surges further inland and aggravating the risks. For instance, Ghoramara Island, located 18.36 nautical miles from Haldia Dock in the Hooghly estuary, epitomises the vulnerability of the Sundarbans. Over the past four decades, this island has lost nearly half its landmass due to erosion, shrinking from its original size of just 4.6 km<sup>2</sup>. Neighbouring islands, such as Lohachara and Supribhanga, have already submerged due to sea-level rise, and Ghoramara's population has dwindled from approximately 9000 to 4900 in just

a decade.<sup>53</sup> The frequency of cyclones, including *Amphan*, has only exacerbated these challenges, destroying embankments, crippling traditional livelihoods in farming and fishing, and salinising agricultural lands.

In Bangladesh alone, approximately 80% of the country lies within floodplains, and nearly 48% of its population resides in low-elevation coastal zones (LECZ).<sup>54</sup> Projections estimate that by 2060, nearly 109.5 million people could inhabit these highly vulnerable areas.<sup>55</sup> Such demographic pressure compounds the risks of displacement and resource scarcity, with internal displacement already affecting 400,000 individuals annually.<sup>56</sup> By 2050, sea-level rise in the region could displace 18 million Bangladeshis, with up to 20 million potentially becoming climate migrants by 2030.<sup>57</sup> This climate change-induced displacement is already placing immense pressure on urban centres like Dhaka, which struggles to absorb the influx of climate change-induced migration flows.<sup>58</sup> Women are disproportionately affected, with increased risks of trafficking and exploitation reported among displaced populations. For example, organisations like Prerana have documented a rise in women trafficked from Bangladesh to urban centres such as Mumbai, underscoring the socio-political inequalities exacerbated by displacement.<sup>59</sup>

## **Defining Frameworks and Contextualising the Sundarbans**

To fully understand the socio-environmental challenges of the Sundarbans, an integrated approach that combines ecological systems with governance is essential. The region's complex ecological and governance dynamics require frameworks capable of analysing both spatial and policy-driven factors. This paper utilises two interconnected frameworks—policy ecology and ecological geography—to provide a comprehensive understanding of the region's vulnerabilities and resilience in the face of climate change.

### **Policy Ecology and Ecological Geography: An Integrated Lens for the Sundarbans.**

Policy ecology is an interdisciplinary framework that links ecological systems with governance strategies, focusing on the interaction between human decision-making and environmental outcomes. For the Sundarbans, a region significantly affected by climate change, issues such as climate change-induced migration and ecological degradation are often exacerbated by inadequate or misaligned policies. A policy ecology perspective highlights how governance practices can either support or hinder environmental sustainability, especially in regions where human livelihoods are deeply intertwined with environmental changes.<sup>60</sup>

Ecological geography, on the other hand, emphasises the spatial dynamics and interactions between geography and human systems. The Sundarbans with its unique landscape—characterised by dense mangrove forests, shifting river systems, and low-lying coastal lands—shapes the livelihoods of local populations and informs governance practices. Understanding how geographical factors such as flooding, land erosion, and salinisation affect both ecosystems and human communities is vital for developing effective resilience

strategies.<sup>61</sup> By integrating policy ecology and ecological geography, a comprehensive understanding of the Sundarbans emerges, revealing how spatial and governance factors drive the region's vulnerabilities and resilience. This integrated framework is essential for addressing the challenges posed by environmental changes and for fostering sustainable development in the region.

**Relevance to the Sundarbans: Understanding Vulnerabilities and Resilience.** Both policy ecology and ecological geography are essential for understanding the interconnected socio-environmental challenges in the Sundarbans. The region's distinctive ecology, worsened by climate change, has created a complex relationship between governance, migration, and environmental degradation. Rising sea levels and extreme weather events increasingly threaten local livelihoods and destabilise biodiversity, making it crucial to understand both the spatial and governance dimensions of these challenges.

By integrating policy ecology and ecological geography, this paper explores how governance practices, environmental policies, and geographic realities shape the region's vulnerabilities and resilience. This holistic perspective provides insights into the complex interplay between human and ecological systems in the Sundarbans, offering a foundation for developing sustainable strategies that can address both immediate challenges and long-term adaptation needs.

**Rethinking Governance and Resilience in the Sundarbans: Through Ecological Geography and Policy Ecology.** For the communities living in the Sundarbans, geography is not just a physical boundary but a medium of survival and shaping adaptive strategies that rely on local knowledge and practices. Traditional livelihoods such as fishing, honey collection, and small-scale agriculture are deeply attuned to the tides mangrove forests, and seasonal rhythms.<sup>62</sup> These activities are guided by an intimate understanding of ecological cycles and resource management passed down through generations, which form the backbone of community resilience in this fragile environment.<sup>63</sup>

These traditional adaptive strategies are intrinsically tied to informal governance systems that emphasise sustainability and community cooperation. Operating often outside formal state structures, these systems rely on shared local knowledge to balance resource use with ecological preservation. For instance, collective decision-making around the timing of honey collection or the sustainable management of mangroves reflects governance practices closely aligned with the environment's rhythms. Such approaches help ensure the survival of both ecosystems and human communities, emphasising the interdependence of nature and society.<sup>64</sup>

However, the accelerating impacts of climate change and urbanisation are disrupting this delicate balance, forcing many inhabitants to migrate. In addressing these challenges, a more comprehensive, integrated approach is necessary – one that combines ecological understanding with effective policy considerations. A policy ecology framework, which integrates ecological systems with governance strategies, offers a holistic approach to

the change change-induced migration and environmental degradation in this region. By incorporating traditional knowledge alongside modern conservation methods, this framework can help preserve ecosystems and safeguard local livelihoods, ensuring that strategies are effective and sensitive to the unique needs of the Sundarbans.<sup>65</sup>

A central aspect of a successful policy approach in the Sundarbans is recognising the region's ecological and cultural uniqueness. The geography of the region, marked by its intricate network of tidal rivers, mangrove forests, and saline wetlands,<sup>66</sup> transcends conventional nation-state boundaries, forming a natural unit that defies political jurisdiction. For the communities living in the Sundarbans, their daily lives are more strongly shaped by the natural environment than by the formal governance structures of India and Bangladesh.<sup>67</sup> Traditional governance systems, based on localised knowledge and ecological practices, have historically provided a buffer against environmental uncertainties. The future of the Sundarbans will depend not on dividing the region, but on strengthening adaptive capacity and co-management of its ecological geography.

In this context, James C. Scott's concept of "the art of not being governed" offers a relevant lens through which to understand the Sundarbans' resistance to formal state governance.<sup>68</sup> Scott's assertion that environmental constructions of space can hold more power over people than formal political boundaries is clearly evident in the Sundarbans. Ecological forces such as flooding, erosion, and salinity have a direct and tangible influence on daily life, shaping human behaviour and community organisation more so than the administrative divisions of the two countries.<sup>69</sup> This dynamic has historically allowed communities to operate autonomously, guided by their deep connection to their environment, often outside the formal control of the state.

However, as climate change intensifies, these traditional governance systems are being increasingly undermined. The natural forces that have historically guided the lives of Sundarbans residents are becoming more unpredictable and severe. Cyclones such as *Amphan* in 2020, along with continuous land erosion, force communities to migrate and confront the disempowering effects of state interventions that often fail to address the complex, localised realities of this ecologically sensitive region. One of the core elements of the policy ecology framework is the recognition of ecological limits. These limits refer to the inherent constraints imposed by the environment—constraints that shape both human displacement and adaptation strategies. While some scholars argue that environmental challenges can be mitigated through technological innovations and policy adjustments, it is critical to recognise that ecological limits are not entirely flexible. As Gómez-Baggethun notes,<sup>70</sup> these ecological thresholds, though influenced by societal factors, cannot be ignored without risking oversimplification of the challenges faced by vulnerable communities. Acknowledging these limits is vital for creating effective responses to environmental degradation and migration. Policies that overlook ecological realities often fail to address the root causes of displacement and may inadvertently worsen conditions for affected populations. By recognising ecological limits, policymakers can craft strategies that are realistic, grounded in environmental realities, and capable of

supporting long-term adaptation and resilience for displaced communities. This shift emphasises the need for a more nuanced, integrated governance approach—one that incorporates both traditional and formal mechanisms to adapt to the intensifying climate risks and safeguard the resilience of the Sundarbans’ communities.<sup>71</sup>

## Enhancing Cooperation through Policy Ecology

The policy ecology framework underscores the importance of integrating governance systems with ecological realities to tackle the transboundary climate change-induced challenges facing Bangladesh and India. It highlights the necessity of aligning cross-border efforts on critical issues such as flood management, coordinated cyclone responses, and the formulation of policies that support both temporary and permanent relocation. Such initiatives are indispensable for building resilience among vulnerable communities dependent on the Sundarbans’ fragile ecosystem.

A valuable example of regional cooperation is Australia’s engagement with Pacific Island nations through initiatives like the Pacific Islands Forum<sup>72</sup> and bilateral climate-resilience partnerships.<sup>73</sup> These programs prioritise disaster preparedness, sustainable development, and resettlement strategies that balance social, economic, and environmental considerations. Adapting such models to the Sundarbans can pave the way for regional resilience by fostering proactive, rights-based approaches to supporting climate migrants.

At the global level, frameworks like the Nansen Initiative<sup>74</sup> and the GCM<sup>75</sup> guide for addressing displacement drivers such as environmental degradation and climate change. These frameworks emphasise proactive measures that empower migration as a choice rather than a necessity. International climate policy milestones like the Cancun Adaptation Framework (COP 16, 2010) and the Paris Agreement’s Task Force on Displacement further highlight the importance of integrating migration into global adaptation strategies.<sup>76</sup>

**Regional Collaboration: BIMSTEC’s Role.** The Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC) offers a robust platform for addressing shared environmental and migration challenges. By fostering collaboration among member nations, BIMSTEC enables the exchange of best practices and the development of strategies for managing shared resources like the Sundarbans. Priority actions under this framework could include:

- (a) **Community-Based Adaptation.** Strengthening grassroots resilience through education, sustainable livelihood programs, and capacity-building initiatives.
- (b) **Ecosystem Restoration.** Collaborative mangrove restoration projects to reinforce natural defences against rising sea levels and extreme weather events.
- (c) **Sustainable Development.** Joint economic initiatives promoting climate-smart agriculture and aquaculture.

**Operationalising Bilateral Agreements.** The 2011 MoU between Bangladesh and India, aimed at jointly managing the Sundarbans, remains an underutilised framework.<sup>77</sup> To fully operationalise this agreement, both nations should prioritise the following: -

- (a) **Joint Disaster Management.** Establishing coordinated protocols for cyclone and flood responses that utilise shared expertise and resources.
- (b) **Community Resilience Programs.** Implementing localised initiatives focused on sustainable agriculture, efficient water management, and the promotion of alternative livelihoods.
- (c) **Ecosystem Restoration.** Partnering on large-scale mangrove restoration projects to enhance biodiversity and strengthen natural climate defences.
- (d) **Climate-Adaptive Infrastructure.** Developing resilient housing, flood barriers, and early warning systems tailored to the region's unique geographical and ecological conditions.

By aligning global frameworks, regional mechanisms and bilateral agreements, a coherent, actionable strategy can emerge to address the Sundarbans' socio-environmental vulnerabilities. Such an approach ensures not only the protection of ecosystems but also the resilience and well-being of affected communities.

## Conclusion

The Sundarbans underscores the urgent need for regionally coordinated, justice-oriented responses to climate-induced migration. Ecological geography and policy ecology offer essential frameworks for addressing the complex relationship between human systems and environmental change. For instance, in the Mekong Delta, ecological geography has informed targeted interventions for flood and salinity risks, while policy ecology has guided governance strategies in the Pacific Islands to address sea-level rise and displacement. These frameworks emphasise the importance of focusing on ecological zones, rather than political borders, for effective resilience in the face of climate impacts.

Policy ecology further connects ecological realities with governance strategies, advocating for adaptive policies that prioritise environmental sustainability and human dignity. This includes flexible zoning laws, investments in resilient infrastructure, and vocational training for displaced populations. The governance systems should be participatory, allowing local communities to contribute to decision-making and ensure that the policies remain relevant to evolving needs.

A justice-focused approach is critical, as the securitisation of migration risks marginalising vulnerable populations and detracting from root causes like environmental degradation. Integrating both frameworks would provide a roadmap for aligning governance with

ecological realities, enabling transboundary cooperation and adaptive legal frameworks that support both human and environmental needs.

In the Bay of Bengal, applying these frameworks would shift focus from short-term migration securitisation to long-term adaptation strategies, ensuring that migration becomes a choice rather than a necessity. By aligning efforts with principles of climate justice, the Sundarbans could serve as a global model for addressing climate-induced migration in ecologically sensitive regions. To realise this vision, the following actions are essential: -

- (a) Establish cross-border task forces between India and Bangladesh for enhanced disaster management and migration policies.
- (b) Invest in community-based adaptation programs that integrate traditional and modern ecological practices.
- (c) Scale up ecosystem restoration initiatives, particularly mangrove reforestation.
- (d) Develop regional legal frameworks to protect the rights and dignity of climate-induced migrants.

The challenges faced by the Sundarbans are shared by other climate-vulnerable regions, including the Pacific Islands, the Nile Delta, and the Mekong River Basin. By fostering regional cooperation, innovative policy frameworks, and sustained investment in adaptive strategies, the Sundarbans can serve as a replicable model for addressing climate-induced migration and building resilience worldwide.

## Notes

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## Note on Contributor

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