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# CLIMATE SCIENCE AND THE EMERGENCE OF CLIMATE REFUGEES: RETHINKING INTERNATIONAL REFUGEE LAW IN THE TWENTY-FIRST CENTURY

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## ABSTRACT

In the present day, one of the most profound challenges which is threatening humanity is climate change. The tentacles of climate change are now spreading beyond the environmental and economic consequences, and it is becoming a driver of displacement of humans across the world. Due to the rising of sea levels, prolonged droughts, desertification, extreme and uncertain conditions of weather and the degradation of ecosystem, millions of humans were forced to abandon their livelihood. It has been gradually demonstrated by the scientific evidence that climate-induced migration is now no longer a future possibility, rather a present reality, by which both the developed as well as developing nations are being hit badly. Regardless of the growing scale of environmental displacement, international refugee law remains inadequately equipped to provide legal protection to individuals displaced primarily due to climate-related factors. The existing framework established under the 1951 Convention Relating to the Status of Refugees and its 1967 Protocol limits refugee recognition to persons fleeing persecution based on specific grounds, thereby excluding climate-displaced populations from formal refugee protection. This legal gap raises critical questions regarding the adequacy of international law in responding to contemporary patterns of forced migration. The present paper examines the relationship between climate science and human displacement, analyses the shortcomings of existing refugee protection mechanisms, and explores the need for a reformed international legal framework capable of addressing climate-induced migration. It argues that scientific evidence should play a central role in shaping future refugee policies and that international cooperation, climate justice, and human rights principles must guide the development of effective legal protections for climate refugees. It highlights the importance of integrating environmental realities into international refugee law to ensure that vulnerable populations are not left without protection in an era increasingly defined by climate uncertainty.

**Keywords:** Climate Change, Climate Refugees, Forced Migration, International Refugee Law, Human Rights, Environmental Displacement, Climate Justice

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## **Introduction**

The twenty-first century has witnessed unprecedented environmental transformations driven largely by anthropogenic climate change. The increasing concentration of greenhouse gases in the atmosphere, coupled with unsustainable patterns of industrialization, urbanization, and resource exploitation, has accelerated global warming and triggered a range of environmental consequences. Rising global temperatures, changing rainfall patterns, melting glaciers, sea-level rise, desertification, and extreme weather events have become defining features of the contemporary world. While climate change is often discussed in terms of environmental degradation and economic loss, its impact on human mobility has emerged as one of the most pressing humanitarian concerns of modern times.

Migration has historically been an integral aspect of human civilization. Throughout history, populations have moved in response to economic opportunities, political instability, armed conflicts, and environmental changes. However, climate-induced migration presents unique challenges that distinguish it from traditional forms of displacement. Unlike political refugees who flee persecution by identifiable actors, climate refugees are displaced by environmental processes that may be gradual, cumulative, and transboundary in nature. Their displacement often results from a complex interaction between environmental, social, economic, and political factors, making legal classification particularly difficult.

The concept of climate refugees has gained increasing attention among policymakers, academics, environmental scientists, and human rights advocates. Although the term lacks formal recognition under international law, it is commonly used to describe individuals who are forced to leave their habitual places of residence because environmental changes associated with climate change have rendered their lives unsustainable or unsafe. The emergence of climate refugees represents a significant challenge to the traditional foundations of international refugee law, which were developed in response to political persecution and conflict rather than environmental degradation.

Climate science provides compelling evidence that environmental changes are already influencing migration patterns across the globe. According to various scientific assessments, climate-related disasters displace millions of people annually. Coastal erosion, saltwater intrusion, water scarcity, declining agricultural productivity, and extreme weather events are increasingly undermining livelihoods and threatening human security. Small island developing

states, low-lying coastal regions, and drought-prone areas are particularly vulnerable to these impacts. As climate change intensifies, the number of people forced to migrate is expected to rise substantially, placing immense pressure on existing legal and humanitarian systems.

Despite the growing scale of climate-induced displacement, international refugee law remains largely unchanged. The 1951 Refugee Convention and its 1967 Protocol continue to serve as the cornerstone of refugee protection, yet their definitions and eligibility criteria fail to encompass climate-displaced populations. Consequently, individuals displaced by environmental factors often fall into a legal vacuum where they lack access to formal protection mechanisms available to convention refugees. This protection gap highlights the urgent need for legal innovation and international cooperation.

The issue of climate refugees also raises important questions of justice and responsibility. The communities most vulnerable to climate change are often those that have contributed least to global greenhouse gas emissions. Developing countries, indigenous populations, and marginalized communities disproportionately bear the burden of climate impacts despite having limited resources to adapt. This disparity has given rise to the concept of climate justice, which emphasizes the ethical obligation of wealthier nations to support vulnerable populations affected by climate change.

The intersection of climate science, human rights, and refugee law demands a comprehensive and interdisciplinary approach. Scientific evidence can help identify populations at risk, assess vulnerability, and predict future displacement trends. Human rights principles provide a normative framework for protecting displaced persons, while international law offers mechanisms for institutionalizing protection measures. Together, these disciplines can contribute to the development of more effective responses to climate-induced migration.

This paper seeks to examine the relationship between climate science and the emergence of climate refugees, evaluate the adequacy of existing international refugee law, and explore potential legal and policy reforms capable of addressing climate-induced displacement in the twenty-first century.

### **Climate Science and the Growing Reality of Environmental Displacement**

Scientific research has fundamentally transformed our understanding of climate change and its

consequences for human societies. The overwhelming consensus within the scientific community confirms that human activities, particularly the burning of fossil fuels and deforestation, have significantly altered the Earth's climate system. The resulting increase in global temperatures has produced widespread environmental changes that directly affect human habitation and livelihood security.

One of the most visible consequences of climate change is the increasing frequency and intensity of extreme weather events. Hurricanes, cyclones, floods, wildfires, and heatwaves have become more destructive and more frequent in many regions of the world. These disasters often result in immediate displacement, forcing individuals and communities to seek temporary or permanent refuge elsewhere. In many cases, repeated exposure to climate-related disasters eventually renders affected regions uninhabitable.

Sea-level rise represents another major driver of climate-induced displacement. Scientific studies indicate that global sea levels are rising due to thermal expansion of seawater and the melting of glaciers and polar ice sheets. Coastal communities face growing risks from flooding, erosion, and saltwater intrusion into freshwater resources. For many small island states, sea-level rise poses an existential threat. Nations such as Kiribati, Tuvalu, and the Maldives confront the possibility that significant portions of their territories may become uninhabitable during the present century.

The prospect of entire populations losing their homes and national territories challenges traditional assumptions underlying international law. Questions arise regarding statehood, sovereignty, citizenship, and the legal status of displaced populations. Climate science thus reveals not only environmental risks but also profound legal and political challenges.

Agricultural systems are equally vulnerable to climate change. Changes in rainfall patterns, prolonged droughts, and increasing temperatures have reduced crop yields in many regions, particularly in developing countries dependent on rain-fed agriculture. Food insecurity resulting from environmental degradation often acts as a powerful driver of migration. Families facing declining agricultural productivity may initially migrate internally before eventually crossing international borders in search of livelihood opportunities.

Water scarcity constitutes another significant factor contributing to displacement. Climate change has intensified drought conditions in several parts of the world, reducing access to

freshwater resources essential for human survival and economic activity. Competition over scarce resources may exacerbate social tensions and contribute indirectly to migration and conflict.

Scientific models predict that climate-induced displacement is likely to increase substantially in the coming decades. Although estimates vary, researchers generally agree that millions of people could be displaced by climate-related factors by the middle of the century. The precise scale of future displacement will depend upon mitigation efforts, adaptation strategies, demographic trends, and socioeconomic conditions. Nevertheless, climate science clearly indicates that environmental migration will become an increasingly important feature of global mobility patterns.

### **Limitations of International Refugee Law in Addressing Climate-Induced Displacement**

The contemporary international refugee protection regime is primarily governed by the Convention Relating to the Status of Refugees, 1951, and the Protocol Relating to the Status of Refugees, 1967. These instruments were developed in the aftermath of the Second World War to provide legal protection to individuals fleeing persecution and conflict. The Convention defines a refugee as a person who, owing to a well-founded fear of persecution on grounds of race, religion, nationality, membership of a particular social group, or political opinion, is outside the country of nationality and is unable or unwilling to avail themselves of the protection of that country.

While this definition has served as a cornerstone of international refugee protection for more than seven decades, it reflects the geopolitical realities of the mid-twentieth century rather than the environmental challenges of the twenty-first century. Climate-induced displacement does not easily fit within the Convention framework because environmental degradation, rising sea levels, and extreme weather events do not constitute persecution in the traditional legal sense. Consequently, individuals displaced solely by climate-related factors generally fail to satisfy the legal requirements necessary for obtaining refugee status.

This limitation has created a significant protection gap. Millions of people facing severe environmental threats remain outside the scope of formal refugee protection despite experiencing conditions that may be equally life-threatening as political persecution. A farmer forced to abandon his land due to prolonged drought, a coastal resident displaced by rising sea

levels, or an island inhabitant facing permanent inundation may encounter extreme hardship, yet international law does not currently recognize them as refugees.

The challenge is further complicated by the multifaceted nature of climate-induced migration. Unlike conventional refugee movements, climate displacement often occurs gradually rather than suddenly. Environmental degradation may unfold over several years, making it difficult to determine the precise moment when migration becomes forced rather than voluntary. Moreover, climate change frequently interacts with economic hardship, social instability, and political factors, creating complex migration patterns that do not fit neatly within existing legal categories.

Judicial responses to climate-related displacement have been cautious. One of the most significant cases in this context is *Teitiota v. New Zealand* (2020), where the United Nations Human Rights Committee considered the claim of a citizen of Kiribati who argued that rising sea levels and environmental degradation threatened his right to life. Although the Committee ultimately rejected the claim due to insufficient evidence of immediate danger, it acknowledged that climate change could, in certain circumstances, create conditions preventing states from returning individuals to their countries of origin. This decision represents an important recognition of the potential human rights implications of climate-induced displacement, although it stops short of establishing refugee status for climate migrants.

Another challenge arises from the distinction between internal and cross-border displacement. Many individuals displaced by climate-related events remain within their national borders and therefore do not qualify as refugees under international law. These internally displaced persons often face significant protection challenges, particularly when national governments lack the capacity or willingness to provide adequate assistance. Existing legal frameworks governing internal displacement remain fragmented and largely dependent upon state cooperation.

The inadequacy of current refugee law reflects a broader failure to integrate scientific knowledge into legal frameworks. While climate science has advanced considerably over recent decades, legal institutions have been slower to adapt. As environmental displacement becomes increasingly prevalent, the disconnect between scientific realities and legal protections will become increasingly difficult to justify.

## **Climate Justice, Human Rights, and the Ethical Dimensions of Climate Refugees**

The issue of climate refugees extends beyond legal technicalities and raises profound questions of justice, equity, and human rights. Climate change is not merely an environmental problem; it is also a social and moral challenge characterized by unequal contributions and unequal consequences. The countries and communities most vulnerable to climate impacts are often those least responsible for greenhouse gas emissions.

Developed nations have historically contributed the majority of global carbon emissions through industrialization, energy consumption, and economic expansion. In contrast, many developing countries have contributed relatively little to climate change yet face disproportionate exposure to its adverse effects. Small island developing states, least developed countries, and vulnerable coastal communities frequently lack the resources necessary to implement effective adaptation measures. Consequently, they bear a significant burden of climate-induced displacement despite having played a minimal role in creating the problem.

The principle of climate justice seeks to address these inequalities by emphasizing fairness in the distribution of responsibilities and burdens associated with climate change. Climate justice recognizes that vulnerable populations possess a legitimate claim to protection, assistance, and compensation. In the context of climate refugees, this principle suggests that wealthier nations should assume greater responsibility for supporting displaced populations and financing adaptation efforts.

Human rights law provides another important framework for understanding climate-induced displacement. Climate change threatens a wide range of internationally recognized rights, including the right to life, the right to health, the right to food, the right to water, the right to housing, and the right to an adequate standard of living. Environmental degradation can undermine these rights directly by destroying homes, reducing access to resources, and increasing vulnerability to disasters.

The relationship between climate change and human rights has gained increasing recognition within international institutions. Various United Nations bodies have acknowledged that climate change poses serious threats to the enjoyment of fundamental human rights. The linkage between environmental protection and human rights protection has become increasingly evident as scientific evidence continues to demonstrate the widespread impacts of

climate change on human well-being.

For climate refugees, human rights principles offer an important source of protection even in the absence of formal refugee status. States remain obligated to respect and protect fundamental human rights regardless of an individual's legal classification. However, human rights protections alone may be insufficient to address the specific challenges associated with climate-induced displacement. Comprehensive legal frameworks are required to ensure access to durable solutions, legal status, and long-term protection.

The ethical dimensions of climate-induced displacement also challenge traditional notions of sovereignty and territoriality. International law has historically been organized around the territorial authority of sovereign states. Climate change, however, transcends national boundaries and creates consequences that cannot be addressed through purely national approaches. Rising sea levels, atmospheric pollution, and environmental degradation are global phenomena requiring collective action and shared responsibility.

The plight of climate refugees underscores the need for a more inclusive and humanitarian understanding of international responsibility. Protecting displaced populations should not be viewed solely as a matter of charity or discretionary assistance but as a legal and moral obligation arising from shared global interdependence.

### **Rethinking International Protection Mechanisms for Climate Refugees**

Given the limitations of existing refugee law and the growing scale of climate-induced displacement, there is an urgent need to reconsider international protection mechanisms. Legal scholars, policymakers, and international organizations have proposed various approaches to addressing the protection gap facing climate refugees.

One approach involves expanding the definition of refugee under the 1951 Convention to include climate-induced displacement. Advocates of this approach argue that environmental degradation can threaten human survival as severely as political persecution and should therefore constitute a legitimate basis for international protection. Expanding the refugee definition would provide climate-displaced persons with access to established protection mechanisms and legal rights.

However, amending the Refugee Convention presents significant political and practical

challenges. Many states are reluctant to reopen negotiations on a foundational international treaty due to concerns about increased obligations and potential disagreements regarding the scope of protection. There is also concern that broadening the definition could weaken existing protections for convention refugees by creating legal uncertainty.

An alternative proposal involves the creation of a new international treaty specifically addressing climate-induced displacement. A dedicated legal instrument could establish clear criteria for identifying climate refugees, define state responsibilities, and create institutional mechanisms for coordination and assistance. Such a treaty would allow the international community to address climate displacement without altering the traditional refugee framework.

Regional agreements may provide another promising avenue for protection. Regional organizations often possess greater flexibility and are better positioned to respond to localized environmental challenges. Several regional refugee instruments already adopt broader definitions of refugee status than those contained in the 1951 Convention. Building upon these precedents, regional frameworks could incorporate environmental displacement into existing protection mechanisms.

Planned relocation programs represent another important strategy. Rather than responding to displacement after environmental disasters occur, proactive relocation initiatives can help vulnerable communities move safely and voluntarily before conditions become uninhabitable. Such programs require careful planning, community participation, and respect for cultural identities to ensure successful outcomes.

Adaptation and resilience-building measures are equally essential. The most effective way to reduce climate-induced displacement is to address its underlying causes. Investments in climate adaptation, disaster risk reduction, sustainable infrastructure, and livelihood diversification can help vulnerable populations remain in their communities. Strengthening resilience reduces displacement pressures and enhances long-term human security.

Scientific knowledge should play a central role in shaping future protection mechanisms. Climate models, vulnerability assessments, geographic information systems, and environmental monitoring technologies can help identify populations at risk and guide policy interventions. Evidence-based policymaking can improve resource allocation, enhance preparedness, and facilitate more effective responses to displacement.

International cooperation will be indispensable in addressing climate-induced migration. No single state can effectively manage the challenges posed by large-scale environmental displacement. Multilateral cooperation involving states, international organizations, civil society groups, and scientific institutions is necessary to develop coordinated responses. Shared responsibility, financial support, and technical assistance will be essential components of any successful protection regime.

## **Conclusion**

Climate change has transformed the nature of human displacement and exposed significant shortcomings within existing international legal frameworks. Scientific evidence increasingly demonstrates that rising sea levels, extreme weather events, droughts, desertification, and environmental degradation are forcing millions of people to leave their homes. Climate-induced migration is no longer a hypothetical future concern but a present reality affecting vulnerable populations across the globe.

Despite this growing challenge, international refugee law remains rooted in a conception of displacement centered on persecution and conflict. The 1951 Refugee Convention, while highly effective in protecting traditional refugees, fails to accommodate individuals displaced primarily by environmental factors. This legal gap leaves climate refugees without adequate recognition and protection at a time when climate-related displacement is expected to increase significantly.

The emergence of climate refugees highlights the need for a fundamental rethinking of international refugee law in the twenty-first century. Legal frameworks must evolve to reflect contemporary scientific understanding and humanitarian realities. Whether through expanding existing refugee definitions, developing a new international treaty, strengthening regional protection mechanisms, or creating innovative forms of complementary protection, the international community must act to address the needs of climate-displaced populations.

Climate justice and human rights principles provide important normative foundations for this transformation. Those most affected by climate change are often those least responsible for causing it, creating a compelling moral argument for enhanced international responsibility and burden-sharing. Protecting climate refugees is not merely a matter of legal reform but also a question of global solidarity and human dignity.

Ultimately, the challenge of climate-induced displacement demands an interdisciplinary response integrating climate science, international law, human rights, and public policy. Scientific evidence can guide decision-making, human rights principles can inform protection standards, and legal innovation can provide institutional mechanisms for implementation. By embracing a forward-looking and inclusive approach, the international community can ensure that those displaced by climate change are not left without protection in an increasingly uncertain environmental future.

The emergence of climate refugees represents one of the defining humanitarian challenges of the twenty-first century. The effectiveness of future refugee protection systems will depend upon their ability to adapt to this new reality and uphold the fundamental principles of justice, equality, and human dignity in an era shaped by climate change.