



CLIMESD International Symposium



**Global Frameworks and Strategies to
Climate Change, Environmental Migration,
and Sustainable Development Challenges**

**19-20
FEBRUARY
2026
MACERATA**

RESEARCH PROJECT
**Collaborative
Research
Constellations**

*The phenomenon of environmental
and climatic migrations and its impact
on economic and social dynamics
in the Euro-Mediterranean region*



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Panel I **International Law Perspectives**

Giorgia CARRATTA | *University of Münster*

Between Environmental and Humanitarian Law: Rethinking the International Legal Protection of Climate-Displaced Persons

Valentina BONAVOGLIA | *University of Turin*

Valeria FERRARIS | *University of Turin*

Between Risk, Vulnerability and (In)Justice: How Climate Change is Framed in International Protection Judicial Reasoning

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Juan Sebastian VILLAMIL RODRIGUEZ | *American University*

Advisory Opinions on Climate Change and Human Rights: From Fragmentation to Legal Certainty in International Law

Alessandro BUFALINI | *University of Florence*

Rethinking Citizenship in the Context of Disappearing States

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Climate-induced Disasters and Trafficking Vulnerability Nexus: Exploring Legal Implications on Current Protection Gaps

Between Environmental and Humanitarian Law: Rethinking the International Legal Protection of Climate-Displaced Persons

GORGIA CARRATTA

As climate change intensifies, the number of people displaced by environmental degradation and climate-induced disasters continues to rise. Yet, international law remains fragmented in addressing the plight of these individuals, who often fall outside the protective scope of existing refugee and human rights regimes. This paper revisits and expands upon the dualism identified in early legal scholarship between environmental law and humanitarian/human rights law in dealing with climate-induced displacement. It argues that, while both regimes have increasingly engaged with the issue, they do so in complementary yet uncoordinated ways, leaving climate-displaced persons in a persistent protection gap.

On one hand, environmental law - particularly under the *United Nations Framework Convention on Climate Change* (UNFCCC) - has progressively recognized human mobility as a consequence of climate impacts. The 2010 *Cancún Adaptation Framework* and the establishment of the *Task Force on Displacement* under the *Warsaw International Mechanism for Loss and Damage* represented important milestones in conceptualizing migration and displacement as adaptation challenges. Recent years have seen the *Task Force on Displacement* adopt its third rolling Plan of Action (2022–2024) and produce a 2024 Technical Guide on integrating human mobility into national climate planning, signalling a shift in the way environmental migration is seen. Yet, these developments remain largely non-binding and focused on preventive or resilience-building measures rather than on the protection of individual rights.

On the other hand, humanitarian and human rights law offer entry points for protecting individuals affected by environmental change, notably through the principles of *non-refoulement*, the right to life, and the prohibition of inhuman or degrading treatment. Landmark decisions such as *Teitiota v. New Zealand* (UN Human Rights Committee, 2020) have reinforced the idea that returning individuals to life-threatening environmental conditions may violate fundamental rights. In parallel, the UN Human Rights Council's Resolution 53/6 (2023) reaffirmed states' obligations to avert, minimise and address loss and damage in ways that implicate mobility and human rights, underscoring a slowly converging legal architecture between climate, migration, and rights law. Nevertheless, the absence of a clear legal status for "climate refugees" or "environmental migrants" continues to hinder coherent state practice and coordinated international responses.

By juxtaposing these two legal paradigms, this paper assesses the extent to which international law has evolved since the late 2010s toward a more integrated framework for the protection of climate-displaced persons. It highlights recent policy initiatives - such as the *Global Compact for Safe, Orderly and Regular Migration* (2018) and the *Platform on Disaster Displacement* - that have sought to bridge the normative divide between environmental, humanitarian, and migration governance. The paper argues that future legal developments should build on existing frameworks and focus on mainstreaming human mobility within the UNFCCC's adaptation agenda and strengthening human-rights-based safeguards at both international and regional levels. In this sense, climate-induced migration

becomes not only a humanitarian challenge but also a test of the international community's capacity to achieve justice and solidarity in the Anthropocene.

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Between Risk, Vulnerability and (In)Justice: How Climate Change Is Framed in International Protection Judicial Reasoning

VALENTINA BONAVOGLIA – VALERIA FERRARIS

In the field of climate mobility, international, European Union and Italian legal systems are marked by protection gaps, definitional uncertainties and persistent resistance to the recognition of specific legal safeguards, despite growing scholarly attention. Within this fragmented framework, courts have played a central role in advancing interpretative pathways capable of addressing climate-related forms of displacement.

While existing research has largely focused on international adjudication and on the case law of courts of last instance — in particular the Teitiota decision of the Human Rights Committee and judgment no. 5022/2021 of the Italian Court of Cassation — comparatively less attention has been paid to the everyday judicial reasoning of first-instance courts. Yet it is precisely at this level that the practical incorporation, marginalisation or reframing of climate-related factors takes place.

Adopting a socio-legal perspective, this article examines judicial reasoning as a social practice through which narratives of risk, vulnerability and responsibility are constructed. The study is based on a qualitative analysis of 40 international protection decisions issued in 2023 by the Court of Turin, selected on the basis of the presence — explicit or implicit — of environmental or climate-related elements in the applicants' narratives, in Country of Origin Information, or in judicial reasoning.

Rather than focusing on outcomes alone, the analysis reconstructs the interpretative frameworks through which judges conceptualise the role of climate change within existing protection categories. The paper identifies three main approaches: (i) an invisibilising approach, in which climate-related factors are marginalised or absorbed into neutral categories such as general poverty; (ii) an economicist approach, in which environmental events are acknowledged but translated into purely economic loss, depriving them of autonomous legal relevance; and (iii) a selective multifactorial approach, in which climate change is integrated into a broader assessment of cumulative vulnerability, albeit in a variable and non-systematic manner.

By shedding light on these patterns, the article contributes to understanding how climate-related displacement is being juridically framed at first instance, and highlights the tensions and limits that continue to shape the judicial recognition of climate-related vulnerability within the Italian system of international protection.

Causation in Non-Refoulement Claims by Climate-Induced Migrants

FEDERICA PASSARINI

More than five years have passed since the decision in *Teitiota*, in which the Human Rights Committee recognised that the principle of *non-refoulement* may entail an obligation not to expel individuals fleeing the adverse effects of climate change. Nevertheless, the protection of climate-induced migrants under international and domestic legal orders remains highly contested.

Alongside an emerging body of national case law granting protection on the basis of the impact of climate change on applicants' human rights, many decisions continue to reject asylum claims in such contexts. These refusals are primarily based on the applicant's inability to provide sufficient evidence of the concrete effects of climate change on their individual situation. As illustrated by *Teitiota*, asylum seekers must demonstrate that removal would expose them to climate-related impacts amounting to a real risk of irreparable harm. However, meeting this evidentiary threshold is particularly difficult due to the inherent features of climate change, including uncertainty regarding the timing, location, and intensity of climate-related events.

This intervention seeks to explore possible ways to overcome these evidentiary difficulties by analysing the applicability of the principle of *non-refoulement* to climate-induced migrants through the lens of causation. While causation has received increasing attention in climate change litigation, its contribution to the legal understanding of climate-related migration remains underexplored.

Against this background, the intervention argues that causation may play a crucial role in identifying legal avenues for the effective protection of climate-induced migrants. In particular, it examines whether and to what extent approaches to causation developed by domestic and international courts in human rights-based climate change cases can – or should – be transposed to claims concerning climate-induced migration.

Advisory Opinions on Climate Change and Human Rights: From Fragmentation to Legal Certainty in International Law

JUAN SEBASTIÁN VILLAMIL RODRÍGUEZ

This article argues that the advisory opinions issued over the past year by the International Tribunal for the Law of the Sea (ITLOS), the Inter-American Court of Human Rights (IACtHR), and the International Court of Justice (ICJ) mark a pivotal reorientation of international law as a constraint on public power and private action in the face of the climate emergency. Read in concert, these decisions reaffirm that the law of nations is not a mere aggregation of state wills, but an objective legal order grounded in reason and the common good. By proscribing arbitrariness and articulating *erga omnes* duties of prevention, protection, and remedy for environmental and climate related harms, they give concrete form to peremptory requirements of justice within the international community.

The article advances two claims. First, these opinions compile, synthesize, and clarify applicable law across multiple regimes from human rights, the law of the sea, environmental law, and general international law, thereby providing legal certainty in debates too often clouded by disinformation and strategic doubt. They do so not only by interpreting treaty obligations, but also by reflecting the best available science, state practice as expressed in constitutions, legislation, administrative measures, and domestic jurisprudence.

Second, the opinions generate mutually reinforcing “bottom-up” and “top-down” effects. Bottom-up, they aggregate dispersed domestic innovations, demonstrating convergence around baseline duties of risk assessment, prevention, disclosure, participation, and effective remedy. Top-down, they discipline and organize diverse legal regimes by clarifying standards that travel through judicial citations, soft-law instruments, oversight by treaty bodies, ESG metrics, and compliance indicators, nudging hard-law development while preserving democratic choice. In this dynamic, advisory jurisdiction functions as a form of constitutional guidance: it constrains arbitrariness, orients regulatory discretion, and enhances the justiciability of climate-related obligations without displacing political accountability.

Methodologically, the paper undertakes a comparative doctrinal analysis of the three opinions and situates their reasoning within a matrix of sources such as treaty texts and travaux, state practice, and cross-regime jurisprudence. It identifies a common set of obligations that bind states *erga omnes* and guide corporate conduct along global value chains, including duties to prevent transboundary and supply-chain harms, to disclose and plan for transition in line with best available science, and to afford heightened protections to vulnerable groups. It also clarifies the remedial dimension, emphasizing participation, transparency, and forms of reparation that address both immediate and intergenerational injury.

The upshot is a postnational legal order in which advisory opinions serve as constitutional moments for climate governance: they embed fundamental rights at the core of a fast-integrating transnational landscape; they counter disinformation by stabilizing the meaning of legal duties; and they align international agreements with lived constitutional practice. By bringing coherence and enforceability to climate obligations, the opinions strengthen the rule

of law precisely when emergency rhetoric might otherwise license arbitrary action.

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Rethinking Citizenship in the Context of Disappearing States

ALESSANDRO BUFALINI

Sea-level rise threatens the territorial integrity of several island States, raising unprecedented challenges for international law. Traditional accounts of statehood are grounded in the presence of a defined territory, a permanent population, and an effective government. Yet recent developments in international legal discourse, including the work of the International Law Commission and statements by the International Court of Justice, suggest an emerging recognition of the continuity of statehood for disappearing island States, notwithstanding the loss or uninhabitability of their territory.

While this position primarily addresses questions of statehood, it also raises profound and underexplored issues concerning citizenship as the fundamental legal bond between individuals and the State. If a State may persist without effective territorial jurisdiction, what form of political and legal entity does it become, and what are the implications for the rights of its citizens? In particular, how can citizenship rights be meaningfully exercised when the State is no longer able to govern a territory where its nationals reside, or when such a territory has become uninhabitable?

In legal discussions on sea-level rise, the situation of affected populations is often examined through the lens of statelessness and the risk of loss of nationality. Yet the preservation of nationality alone may not be sufficient to ensure the effective enjoyment of the rights attached to citizenship. Similar limitations can be observed in the field of human rights law, where effective protection continues to depend to a significant extent on the territorial State.

The article examines the risks and benefits of possible avenues for guaranteeing citizenship rights in the context of disappearing States, including arrangements based on agreements between affected States and host States, as well as the potential role of the United Nations through new forms of international administration.

Climate-induced Disasters and Trafficking Vulnerability Nexus: Exploring Legal Implications on Current Protection Gaps

ELENA ARDITO

Despite the enormous attention paid to the traditional causes of human trafficking, such as poverty, lack of job opportunities or gender, the debate on the relationship between climate change and human trafficking seems to be less explored to date. The present paper intends to investigate this interconnection, in light of the increasingly alarming extent of climate change.

This phenomenon is likely to determine new migratory routes and, in general terms, will put a strain on livelihoods, increase poverty and food insecurity, cause job losses or deteriorate working conditions.

These factors disproportionately increase vulnerability to trafficking and could also worsen the conditions of those who are already victims of trafficking, reinforcing their dependence on the criminal network and undermining their chances of escape and emancipation.

Firstly, the proposed paper will provide an overview of the actual extent and implications of this interconnection, analysing it both in relation to people who do not have the means to move and therefore remain in the disaster-stricken area, and to those who decide or are forced to migrate abroad. In the first case, the risk is that they will accept exploitative conditions in order to cope with the consequences of the disaster, which creates new opportunities for traffickers, and thus become victims of internal trafficking. In the second case, there is a risk of international trafficking.

The contribution will therefore examine both of these scenarios. It will then reflect on the legal instruments applicable to those who remain in the affected area (in particular the applicability of the Palermo Protocol) and those applicable to those who migrate irregularly to another country. In this case, the discussion will start from some Italian judgments that have recognised international protection for victims of human trafficking also affected by climate change (Court of Florence, judgments of 3 and 10 May 2023; Court of Milan, ruling of 16 July 2025) through an evolutionary interpretation of the definition of refugee provided by the 1951 Geneva Convention. It will also be interesting to see whether the same reasoning is equally applicable to “potential” victims of trafficking, made vulnerable precisely because of climate-induced natural disasters, or what other forms of protection could be granted in such cases.

In summary, the document will explore the link between climate change and human trafficking at various levels and how it can play a key role in the legal protection of those affected, in order to highlight its importance not only in the application of existing legal instruments, but also in the development of future global policies and strategies dedicated to the two phenomena.

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Panel II

European Approaches

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Climate-Induced Displacement and the Principle of Non-Refoulement: European Human Rights Law Perspective

Pilar Lucea FRANCO | *Complutense University of Madrid*

The absence of the migration perspective in the judicial use of climate planning instruments in Europe

Filip CYUNCZYK | *SWPS University*

Legal Agency? A Case Study of Strategic Litigation in Climate Matters

Luna ARISTEI | *University for Foreigners of Perugia*

The EU financial taxonomy and the green finance as tools to counteract the phenomena of climate migration

Denard VESHI | *University College Bedër*

The impact of forced displaced persons due to climate changes on the criminality in EU host countries

Climate-Induced Displacement and the Principle of Non-Refoulement: A European Human Rights Law Perspective

FRANCESCA RONDINE – FRANCESCO NEGOZIO

As climate change increasingly alters ecosystems and livelihoods across the globe, a growing number of people are displaced by both sudden-onset disasters and slow-onset processes such as sea level rise, droughts, and desertification. Despite the severity and growing visibility of climate-induced migration, there is currently no legally recognised protection status under either Italian or European Union law for individuals forced to move due to environmental causes. In this context, this paper critically explores the potential of existing human rights frameworks - particularly the principle of non-refoulement - to offer protection to environmental migrants in extreme situations of vulnerability.

At the European level, the paper explores the legal space opened by Articles 2 and 4 of the EU Charter of Fundamental Rights, which enshrines the right to life and the prohibition of inhuman or degrading treatment. Drawing on CJEU case law and the evolving jurisprudence of the European Court of Human Rights (ECtHR), the paper examines how these provisions might ground a duty not to return individuals to environments where their fundamental rights would be seriously jeopardised. Special attention is paid to the ECtHR's judgment in *Budayeva v. Russia* and to cases involving degrading living conditions. While the European Union has shown increasing ambition in climate policy, paradoxically, it has remained reluctant to address the legal implications of climate-induced migration, leaving a normative and humanitarian gap that national measures - such as Italy's special protection and disaster-related permits - have only partially filled.

Focusing on Italy as a case study, the paper first analyses the current legal landscape governing international protection, including refugee status and subsidiary protection under Legislative Decree 251/2007 (transposing Directive 2011/95/EU, recently recast as Regulation 2024/1346). It shows that the Italian asylum system, despite some room for interpretation, does not currently allow for climate-related harms to qualify for protection on their own. However, administrative practices and judicial decisions increasingly suggest the possibility of granting humanitarian protection (permessi per "casi speciali") and special protection ("protezione speciale") in cases involving environmental degradation—particularly when these conditions intersect with broader socioeconomic vulnerability or when removal would result in a serious violation of fundamental rights under Article 8 ECHR or Article 3 of the Italian Constitution.

Notably, the Italian legal framework also includes a rarely applied but potentially relevant instrument: the permit for natural disasters ("permesso per calamità") under Article 20-bis of the Consolidated Immigration Act (d.lgs. 286/1998). This provision allows for the issuance of a temporary residence permit to individuals from countries affected by serious environmental disasters who cannot safely return. While this mechanism is underused and its scope remains limited—excluding slow-onset climate impacts, for example—it nonetheless demonstrates

that certain legal tools already exist at the national level and could be expanded or better implemented.

The paper concludes by arguing for a doctrinal and policy shift that would expand the interpretation of subsidiary protection and the use of existing national tools, such as “protezione speciale” and “permesso per calamità”, in line with the evolving understanding of human dignity, vulnerability, and environmental justice under both European and international law.

The absence of the migration perspective in the judicial use of climate planning instruments in Europe

PILAR LUCEA FRANCO

The expansion of climate litigation across Europe has played a decisive role in redefining the legal parameters of state action against climate change. Within this context, energy and climate planning instruments, such as the National Energy and Climate Plans (NECPs), have acquired an increasingly prominent role before national courts, serving as interpretative references for specifying the duty of diligence, delineating the State's climate obligations, and establishing the causal link in cases of liability. However, despite these advances, European climate planning continues to display a notable shortcoming: its weak connection with human mobility induced by climate change.

So-called climate migration constitutes one of the most tangible and unequal manifestations of the impacts of global warming, reflecting the inability of energy and environmental policies to prevent or mitigate forced displacements caused by environmental degradation, desertification or rising sea levels. Nevertheless, European climate litigation, focused on emission reduction, the energy transition and the protection of fundamental rights in the face of state inaction, has paid little attention to the legal implications of such displacements. This reveals a substantial gap between the material content of planning instruments and the standards of climate justice emerging from international human rights law.

Through a comparative analysis of major European climate cases (Urgenda, ASBL Klimaatzaak, Friends of the Irish Environment, Klimaschutzgesetz and KlimaSeniorinnen Schweiz), this paper demonstrates how national jurisprudence has consolidated the judicial use of energy plans as hermeneutic and evidentiary tools, without extending their reach to the human and territorial risks associated with climate migration. Although these instruments are often invoked to demonstrate the insufficiency of mitigation policies or the violation of fundamental rights such as life and physical integrity, they have not yet been employed to compel States to assume positive obligations in relation to climate-induced human mobility. The paper argues that the absence of explicit references to climate migration, both in planning instruments and in European climate jurisprudence, limits a comprehensive understanding of the State's duty of diligence and diminishes the transformative potential of climate litigation. Incorporating this dimension would allow climate mobility to be recognised as a direct consequence of deficiencies in energy planning and of the lack of coherence between mitigation, adaptation and human rights policies.

Ultimately, integrating climate migration into both climate planning and climate litigation in Europe would not only broaden judicial oversight of State obligations, but also reinforce the principle of intergenerational equity and the effective protection of those most vulnerable to the climate crisis. The study therefore proposes a reinterpretation of the relationship between planning, responsibility and climate justice that incorporates human mobility as an essential dimension of climate action in Europe.

Legal Agency? A Case Study of Strategic Litigation in Climate Matters

FILIP CYUŃCZYK

Over the past thirty years, strategic litigation has significantly accelerated processes of social and political change in Europe. Being part of so-called “revolution of rights”, it has enabled groups that had previously been marginalized to first articulate and subsequently enforce their fundamental rights. Its major strength lies in the fact that it operates within the formal framework of a dispute between citizens and their elected representatives. In other words, citizens, through one of the branches of power (in this case, the judiciary), gain the ability to express a demand for the transformation of a given public policy. Moreover, court rooms started to become forum for public debate and deliberation on most pressing issues, compensating for the shrinking space for such discussions in parliaments.

Judicial rulings, in turn, possess causal and performative force precisely because they constitute a legal decision, rather than merely a political declaration. Therefore, the dynamic function of law is now realized not only through the modification of legal norms but also through their reinterpretation by adjudicating bodies. In this sense, the agency of law has increased - at least in relation to traditional legal positivism.

However, does this enhanced agency extend to all spheres of life within national and supranational political communities - including those concerning climate change? The answer is far from straightforward. On the one hand, there is a visible rise in cases addressing the improper or insufficient implementation of climate policies. We can observe growing number of judgments of constitutional courts, supreme courts or common courts, as well as groundbreaking precedents from the European Court of Human Rights. The jurisprudence of international bodies is supported by the development of soft law standards adopted by different international organizations. On the other hand, even judicial findings of violations do not seem to generate transformations as far-reaching as those observed in other domains of fundamental rights protection.

Hence, the question posed in the title: legal agency - does it truly operate in climate matters? The aim of this paper is to analyse the most prominent judicial decisions forming part of the growing trend of climate-related strategic litigation, as well as to assess the effectiveness of implementing court-mandated policies. The outcome of this analysis will allow for the reconstruction of both the systemic legal mechanisms of climate strategic litigation (a narrow, legal perspective) and the broader socio-political context surrounding judicial findings of violations, with particular emphasis on issues of enforceability (a broad perspective drawn from the studies on law and politics). Finally, it considers whether the rise of climate litigation reflects growing distrust among civil society organizations and legal practitioners in traditional methods of political change, particularly in light of state hesitation to implement the objectives of the IPCC or subsequent COP conferences.

The EU financial taxonomy and the green finance as tools to counteract the phenomena of climate migration

LUNA ARISTEI

From an economic and social perspective, climate migration produces complex and multi-level impacts, affecting both origin and destination areas. These phenomena influence labour markets, welfare systems, and urban and rural infrastructures, generating challenges in terms of social inclusion, cohesion, and sustainable development. In this context, the European financial taxonomy plays a key role by defining clear criteria to identify sustainable economic activities and directing finance towards projects that support both environmental mitigation and climate adaptation, also in relation to migrant populations. Green finance, through instruments such as green bonds, ESG funds, and social impact investments, provides essential resources to promote resilient and inclusive strategies, fostering sustainable infrastructure, environmental regeneration, and social inclusion.

The environmental, social, and economic impacts of climate migration must be assessed within the ESG (Environmental, Social, Governance) framework, which serves as a fundamental guide for policymakers and investors. Environmentally, migration can increase pressure on natural resources and local ecosystems, requiring targeted management and territorial restoration interventions. Socially, there is a risk of marginalization and conflicts, but also opportunities for cultural enrichment and strengthening solidarity networks. Economically, climate migration can stimulate innovation and development if integrated into inclusive and sustainability-based strategies.

Therefore, the phenomenon of climate migration requires an integrated vision that combines effective global climate policies with targeted adaptive responses, supported by robust regulatory frameworks and innovative financial instruments. Only in this way will it be possible to protect migrants' rights, ensure sustainable development, and preserve environmental balance, in line with the Sustainable Development Goals (SDGs).

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The impact of forced displaced persons due to climate changes on the criminality of the EU host countries

DENARD VESHI

Climate change has increasingly become a pressing political and legal challenge. This paper explores the impact of climate-induced forced displacement on EU host countries, with particular attention to implications for national security. The analysis differentiates between categories of climate-displaced persons, including individuals who unlawfully invoke climate change as grounds for forced migration. By clarifying the distinctions between different groups, the study highlights the complex legal and policy issues arising from climate-related mobility. It concludes with policy recommendations designed to mitigate the potential negative effects of future large-scale forced migration driven by environmental transformation.

Panel III **Economic and Social Policies**

Silvia SOLIDORO | *University of Salento*

Climate Change and Migration under International Law: The Role of the World Bank

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Climate Change, Food Security and Migration: Challenges and Evolving Approaches in International Law

Paola CRISCI | *University of Naples “L’Orientale”*

Finance, Adaptation, and Mobility: The Political Economy of Climate-Adaptation Investments in West Africa and South Asia

Alessandro INDELICATO | *University of Las Palmas de Gran Canaria*

Climate Vulnerability, Household Resilience, and Migration Decisions

Francesco SEVERGNINI | *Cattolica University of Milan*

Global Networks and Local Action: How Local Authorities Build Territorial Ecosystems for the Climate Transition

Alicja KOTLOWSKA | *SWPS University*

Green Competences for the Job Market: Bridging Practitioner Experience and Academic Innovation

Salwa ECH-CHAFRI | *University of Rabat*

Climate Change Vulnerability and Inequality in Africa: A Panel Data Analysis

Climate-Induced Migration and International Law: The Role of the World Bank

SILVIA SOLIDORO

Climate-induced migration is emerging as one of the most pressing challenges at the intersection of environmental degradation, cross-border displacement, and global justice. As slow-onset events such as desertification, sea-level rise, and extreme weather increasingly lead to the involuntary movement of populations - especially in the Global South - the inadequacies of the current international legal framework for the protection of affected persons become increasingly evident. In this context, the role of international financial institutions such as the World Bank has gained prominence, not merely as development actors but also as influential norm-shapers within the evolving architecture of global governance. In this evolving context, this contribution first underscores the normative gap that persists in international law regarding the recognition and protection of climate migrants, who fall outside the scope of the 1951 Refugee Convention. While initiatives such as the Global Compact for Migration and the Nansen Agenda have attempted to fill this void, their non-binding nature limits their legal enforceability and normative impact. Against this backdrop, the contribution proceeds to critically examine how the World Bank - particularly through its climate-related financing mechanisms and development policies - interacts with international legal norms governing migration and human rights, and how it contributes - directly or indirectly - to the realization of the United Nations Sustainable Development Goals (SDGs), particularly SDG 10 (Reduced Inequalities), SDG 13 (Climate Action), and SDG 16 (Peace, Justice and Strong Institutions). Given that the World Bank's lending conditionalities, project standards, and technical assistance exert substantial influence over state behavior and domestic legal frameworks, the Bank indeed plays a pivotal role in shaping normative responses to climate-induced displacement, including through the facilitation of climate adaptation initiatives aimed at mitigating the underlying causes of forced migration. Ultimately, the contribution argues that a more coherent and rights-based approach to climate-induced migration requires an integrated legal and institutional response, in which the role of international financial institutions is reconceptualized as part of a shift toward sustainable, equitable, and climate-resilient societies.

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Climate Change, Food Security and Migration: Challenges and Evolving Approaches in International Law

ALESSANDRA NEPA

The interdependence between climate change, food security and migration has become a central issue for international law and global policy-making, requiring coherent legal and institutional responses at multiple levels. Climate disruptions severely undermine agricultural productivity, reduce food availability and destabilize prices, creating conditions of insecurity that frequently lead to displacement and migration. At the same time, agriculture itself is a major contributor to greenhouse gas emissions and environmental degradation. This reciprocal relationship – where food systems both suffer from and intensify climate change – creates a cycle of vulnerability that directly and indirectly affects the movement of populations.

International law has begun to address these dynamics, but in a fragmented and sometimes hesitant manner. The International Covenant on Economic, Social and Cultural Rights, as clarified by General Comment No. 12, enshrines the right to adequate food grounded in availability, accessibility, adequacy and sustainability; however, States' obligations are framed in terms of progressive realization and remain difficult to enforce. The Paris Agreement acknowledges the importance of food security in the Preamble but refrains from imposing clear commitments in this regard; while refugee law usually lacks explicit reference to climate-induced displacement, although evolving case law and the interpretation of treaty bodies have acknowledged that protection may arise where environmental degradation intersects with persecution, discrimination or threats to life and dignity.

In this context, it is difficult to identify concrete binding obligations of States regarding the food– climate–migration nexus, however existing provisions can be read in an evolutionary manner. The right to food, for instance, may entail duties to preserve the ecological conditions that make food production possible, while the principle of international cooperation can be interpreted as requiring States to avoid policies that exacerbate food insecurity abroad. Within this evolving framework, international organizations play a crucial role. The FAO, UNEP and the European Union, among others, have advanced approaches such as climate-smart agriculture and agroecology, which aim to strengthen the resilience of food systems to climate shocks while reducing their environmental impact. Though often operating through soft law and policy guidance, these initiatives shape expectations, inform State practice and create benchmarks that contribute to a gradual consolidation of international standards, thereby reorienting food systems toward sustainability and resilience, and fostering a more integrated relationship between environmental protection, human health and social justice. This analysis suggests that international law, despite its structural constraints, provides meaningful tools for addressing the food–climate–migration nexus. If interpreted through a systemic and evolutionary lens, as emphasised in recent doctrinal approaches, hard- and soft-law instruments, as well as general principles of environmental and human rights law, can bridge the fragmentation among regimes governing food, climate and migration. Moreover, integrating human rights discourse and innovative agricultural approaches can contribute to a more coherent and preventive legal framework, progressively clarifying State responsibilities in addressing the food and climate crisis and its consequences for human mobility.

Finance, Adaptation, and Mobility: The Political Economy of Climate-Adaptation Investments in West Africa and South Asia

PAOLA CRISCI

Climate adaptation finance is increasingly recognised as a key instrument for promoting resilience in climate-vulnerable economies, yet its concrete territorial and socio-economic effects remain insufficiently understood. While global mechanisms such as the Green Climate Fund (GCF) and the Adaptation Fund have expanded their portfolios in recent years, the allocation and effectiveness of these investments, particularly in addressing local vulnerabilities, remain uncertain (Betzold & Weiler, 2017). This paper examines how adaptation finance interacts with local economic structures and institutional capacity in selected countries of West Africa (Senegal, Ghana, Nigeria) and South Asia (India, Bangladesh) between 2015 and 2024.

Grounded in the frameworks of *territorial innovation systems* (Moulaert & Sekia, 2003) and *territorial anchoring* (Jeannerat & Crevoisier, 2022), the study adopts a qualitative and comparative approach based on document analysis of 20 adaptation- finance projects financed by multilateral institutions. The analysis focuses on publicly available project documents to identify how these initiatives allocate resources between two main domains: productive infrastructure (e.g., irrigation, energy, logistics) and institutional capacity (e.g., local governance, training, risk management).

Rather than attempting to measure migration outcomes directly, the study examines indirect economic and social indicators, including livelihood diversification, employment generation, and institutional strengthening, that the literature recognises as determinants of climate-related mobility (Black et al., 2011; Cattaneo et al., 2019). By analysing how these elements are incorporated into project objectives and expected results, the research evaluates the extent to which adaptation finance may influence the economic conditions underlying (im)mobility, without inferring causal relationships that the data cannot substantiate.

Preliminary findings suggest that projects combining infrastructure and institutional components tend to generate more consistent local spillovers, whereas fragmented or short-term interventions offer limited structural benefits. These patterns highlight a persistent gap between financial design and territorial outcomes, supporting critiques of the limited integration between adaptation finance, economic planning, and migration governance (Felli, 2013).

The paper introduces the concept of *territorial efficiency* to describe the capacity of adaptation finance to produce spatially embedded, economically resilient outcomes. It contributes to current debates on the migration–development nexus by proposing a grounded and evidence- based assessment of adaptation investments, demonstrating how climate finance can strengthen local economic systems and indirectly reduce vulnerability to forced migration (IPCC, 2022).

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Climate Vulnerability, Household Resilience, and Migration Decisions

ALESSANDRO INDELICATO – JUAN CARLOS MARTÍN

As climate change in Southeast Asia and sub-Saharan Africa continues to worsen, adapting to environmental risks through migration has become critical for the sustainable development of rural households (Black et al., 2011; Toscano, 2015). The paper examines the connections between household resilience, climate vulnerability and migration choices, using new micro-level data.

This study uses the TransRe Household Survey, which is a custom-commissioned panel of 1,085 households from two countries: Thailand and Ghana. We have developed an integrated analytical framework underpinned by three indices: (1) the Climate Vulnerability Index (CVI), which quantifies household exposure to and sensitivity to drought, flooding and lost farm productivity; (2) the Household Resilience Index (HRI), which reflects capacity for adaptation through economic resources, social capital, livelihood diversification and access to institutions; and (3) the Climate-Induced Migration Index (CMI), which shows temporary and permanent migration flows induced by environmental and economic shocks and thereby links vulnerability, resilience and mobility outcomes.

First, we employ Spearman and Pearson correlation tests to determine the magnitude and direction of the relationships between the CVI, HRI and CMI, correcting for any expected non-linearities. Then, logistic regression models are fitted using migration determinants as predictors (CVI, HRI and household factors). Thirdly, K-means clustering is used to segment households into various vulnerability–resilience–migration classes, identifying patterns such as “trapped” (high vulnerability, low migration) and “proactive” (high resilience, high migration). Thus, scenario simulations entail adding 0.2 to the CVI to capture the influence of high climate stress when classifying households and implementing adaptive action.

We have found a remarkable degree of heterogeneity in how households adapt to climate stress. Households with a reliable stream of remittances and diversified income sources have 40% higher resilience indicators and a 60% lower rate of distress migration than those who are economically vulnerable. However, households exposed to serial climatic shocks and with poor access to formal financial services have astronomically high out-migration rates in the long term, often to urban informal economies (Barnett & Adger, 2007).

The study contributes to the growing body of literature on the link between climate and migration by demonstrating quantitative data from two highly dissimilar regional contexts. This highlights the way in which determinants at the household level mediate the influence of climate more robustly than has been recognised to date. The results imply that constructing adaptive capacity via non-climatic action may be a more successful approach than adapting unilaterally to climate change.

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Global networks and local action: How local authorities build territorial ecosystems for the Climate transition

FRANCESCO SEVERGNINI

In transformation processes – meaning the international and global ideas and trends capable of determining paradigm shifts within institutional systems – local authorities have also become key actors in shaping public administration action and the territorial response to these dynamics of change. They actively participate in the territorialisation of transitions, translating global objectives into strategies and tools rooted in local contexts.

In particular, with regard to the processes of climate change mitigation and adaptation, municipalities are increasingly experimenting with their role in developing models, examples, and pilot initiatives that go well beyond the implementation of individual environmental policies. Global and European initiatives, as well as international networks such as the C40 Cities Climate Leadership Group and Cities100, have gained growing importance in supporting local administrations in defining integrated strategies for ecological transition and in building genuine multi-level governance networks.

These networks play a role that goes beyond the mere sharing of good practices: they represent governance instruments capable of promoting the dissemination, advancement, and support of public administrations' actions in response to transition processes. Through the definition of common standards, monitoring systems, and accountability pathways, they help strengthen the administrative and political capacities of local authorities, providing tools for integrated planning and for the activation of partnerships among public actors and with private stakeholders oriented toward sustainability.

The proposed contribution aims to analyse the role of these networks in fostering forms of collaborative governance capable of generating structural effects within public administration and across territorial systems. In particular, it will explore the construction of local ecosystems able to involve public administrations, universities, enterprises, associations, and citizens in the co-production of solutions for climate transition. This perspective views the local authority not merely as an implementer of European, national and regional programmes, but as a promoter and experimenter – a territorial governance platform in which cooperation and knowledge sharing become central instruments of institutional and social change.

Special attention will be given to how the experiences of C40 and C100 facilitate the translation of global strategies (such as Agenda 2030 and the European Green Deal) into local public policies, through organisational and programmatic integration. The analysis will also focus on the potential of these approaches within the European and Italian contexts, where municipalities and territorial networks can draw inspiration from global models to build local ecosystems of climate innovation.

The paper therefore proposes to discuss how participation in international networks can become a driving force for institutional transformation, cross-sectoral collaboration, and the definition of new paradigms of local governance. Ultimately, the case of global networks will be interpreted as an advanced laboratory for understanding how local authorities can evolve towards models of enabling administration, capable of guiding territories through the challenges of climate and social transition.

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Climate Change Vulnerability and Inequality in Africa: A panel data analysis

SALWA ECH-CHAFRI

Climate change is one of the defining challenges of our time, characterized by its complexity and evolving impacts. While the effects of climate change on economic output and poverty have been widely studied, its relationship with within-country income inequality has received less attention. This paper provides new insights into the link between climate vulnerability and income inequality by analyzing data from 43 African countries between 1995 and 2021.

Our findings indicate that increased vulnerability to climate change is positively associated with rising income inequality. Additionally, we examined the interaction between climate vulnerability and two key transmission channels: employment in agriculture and institutional quality. Results reveal a positive and statistically significant correlation, suggesting that, given the high proportion of Africans employed in agriculture, their incomes are among the first to be affected, thereby exacerbating inequality. Furthermore, the analysis shows that the quality of institutions fails to mitigate the adverse effects of climate change on the poor. Our focus on Southern African countries highlights the existing heterogeneity, suggesting that a panel approach may not be ideal; instead, future studies should consider focusing on individual countries or regions.

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Panel IV

New Technologies and AI for governance solutions

Adelaide Francesca Daniela LUMINARI | *European University of Rome*
Forecasting Mobility, Protecting Rights: International Law and the Use of Predictive AI in Climate Migration

Niruka SANJEEWANI | *General Sir John Kotelawala Defence University*
Artificial Intelligence and Climate-Induced Displacement: Data Governance, Digital Identity Policy Frameworks, and Prospects in Migration Management

Davide CALVARESI | *University of Applied Sciences and Arts Western Switzerland*
GB-Flex: AI-based Automated and Distributed Decision-Making in Energy Balancing Groups

Forecasting Mobility, Protecting Rights: International Law and the Use of Predictive AI in Climate Migration

ADELAIDE FRANCESCA DANIELA LUMINARI

Artificial intelligence (AI) is increasingly applied to anticipate and manage climate-related displacement through predictive modelling and satellite-based monitoring. By processing large datasets and integrating environmental, socio-economic, and conflict-related variables, AI promises to improve early warning systems and inform policy responses to climate-induced mobility. Yet its deployment raises a central legal question: under what standards and safeguards can predictive technologies support anticipatory action without undermining the human rights of climate-affected populations?

While legal scholarship on climate migration has largely focused on refugee status and the broader ‘protection gap’, research directly linking AI to climate-related mobility remains limited. Most existing studies examine AI in migration governance or in climate change separately, leaving their intersection in the context of climate migration underexplored. This paper engages with that intersection through doctrinal legal analysis and normative evaluation, anchored in the case of UNHCR’s Project Jetson. Piloted in Somalia, the initiative applies predictive analytics to forecast displacement by correlating drought patterns with conflict dynamics. Although developed several years ago, it remains a reference point in humanitarian innovation, with UNHCR updates (2023) reflecting its relevance. To complement this, the paper also considers satellite-based monitoring projects led by the United Nations Environment Programme (UNEP) and civil society, which use remote sensing to track environmental pressures in refugee and Internally Displaced Persons (IDP) camps. Together, these cases illustrate both the promise and the pitfalls of AI-driven anticipatory action where climate change intensifies human mobility.

The analysis highlights two clusters of risks. First, fairness and accountability: algorithmic bias may reproduce inequalities, while opacity and lack of explainability weaken accountability and hinder contestability. Second, privacy and security: the collection of sensitive data from vulnerable populations raises surveillance concerns, while potential misuse by state or non-state actors risks restricting mobility or denying protection. While such risks arise in migration governance generally, they gain particular significance in climate-induced displacement, where protection gaps heighten vulnerability.

These risks are assessed against international human rights instruments, including the International Covenant on Civil and Political Rights (ICCPR), the Convention on the Rights of the Child (CRC), and the Universal Declaration of Human Rights (UDHR), alongside frameworks such as UNGA Resolution 41/65 and the UNFCCC’s Technical Guide on Human Mobility (2024). The analysis suggests that while these provisions provide safeguards, they remain fragmented and only partially responsive to the challenges posed by predictive technologies in the context of climate migration.

To address this gap, the paper suggests a rights-based governance checklist as an analytical tool for evaluating AI initiatives in the context of climate migration. The checklist emphasizes transparency, meaningful human oversight, non-discrimination, data minimization, and participatory safeguards for affected communities. Rather than prescribing fixed solutions, it would offer criteria grounded in international law to inform proportionate, rights-respecting approaches to anticipatory action. In this way, the paper

aims to contribute to ongoing debates on how international law and global governance might adapt to technological frontiers while upholding human rights and principles of climate justice.

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Artificial Intelligence and Climate-Induced Displacement: Data Governance, Digital Identity Policy Frameworks, and Prospects in Migration Management

NIRUKA SANJEEWANI

Climate-induced displacements extend beyond environmental drivers, as they frequently exacerbate social vulnerabilities in both host and home communities. This phenomenon reveals a contemporary governance gap that has emerged with the integration of Artificial Intelligence (AI) in managing climate-induced migration. In the context of cross-border migration, climate migrants are often displaced from data-scarce regions and resettled into digitally governed environments where they face heightened risks of surveillance and data exploitation. The use of AI tools such as machine learning, natural language processing, facial recognition, and biometric systems for climate migrant's registration and aid distribution presents significant ethical, legal, and governance challenges. This dynamic is pronounced in the Mediterranean, where countries like Greece and Italy, under the European Union's border externalization policies, have implemented AI-driven surveillance systems. In this regard, Italy has piloted transcription tools for migrant interviews, prompting concerns about informed consent, while Greece's Centaur and Hyperion systems gather biometric data in refugee camps in Lesbos, Chios, Samos, Leros, and Kos. Also, this study explores how AI is used in humanitarian aid to optimize service delivery for climate migrants, particularly through collaborations with tech companies. The tendency encompasses the involvement of tech companies in the development of open data platforms and data commons, which facilitates the sharing and exchange of environmental data, as well as the tracking and routing of migrant movements, across multiple spatial and governance scales. It raises critical questions about data governance, accountability, and rights protections. Conversely, AI offers potential for forecasting displacement trends, optimizing resource allocation, and supporting migrant integration through advanced modeling. These technologies have not yet been effectively deployed to mitigate the revictimization of migrants through climate disaster prediction, particularly in climate-vulnerable refugee camps, as evidenced during Storm Daniel in Greece. However, these applications often reflect Western-centric epistemologies, raising concerns of 'data colonialism' through controlling and monitoring practices. In this context, the key question of the study is what the multifaceted uses of AI are in dealing with climate-induced migration. The objectives are to explore AI applications, data-sharing practices, and their implications for the ethical, legal, and rights-based treatment of climate-displaced populations, using a qualitative approach. The study further examines data protection measures, the role of data protection impact assessments, and offers policy recommendations for improved migration governance. Finally, the study highlights the need for strengthened data protection measures and comprehensive legal frameworks to ensure effective data governance for climate-displaced populations.

GB-Flex: AI-based Automated and Distributed Decision-Making in Energy Balancing Groups

DAVIDE CALVARESI

Electricity balancing groups are responsible for ensuring that energy production and consumption match the forecasts they submit ahead of time to transmission system operators. When deviations occur, they are penalized. Although intraday forecasts and energy markets provide opportunities to correct these deviations, many sub-balance groups – especially smaller ones – do not actively react. As a result, avoidable penalties accumulate, not because corrective actions are impossible, but because decision-making and coordination remain largely manual and costly.

This talk introduces GB-Flex, a simulator developed to explore how balancing decisions can be automated and distributed across the actors of a balancing group. The simulator represents balancing groups and sub-balance groups as agents and allows them to follow different strategies when reacting to forecast deviations. These strategies range from doing nothing (reflecting current practice), to relying only on external markets, to exchanging energy internally, or combining both internal and external actions in a hybrid manner. Decisions are updated every 15 minutes using intraday forecasts and configurable market and penalty parameters.

The presented study evaluates these strategies using six months of real operational data from a Swiss balancing group. The results show that active strategies consistently outperform the do-nothing approach and can significantly reduce imbalance penalties. In some situations, the simulated strategies completely avoid penalties by reallocating energy within the group or by accessing the intraday market. Importantly, the study shows that hybrid strategies achieve benefits comparable to centralized coordination while preserving actor autonomy and avoiding the practical limitations of full centralization.



RESEARCH PROJECT

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