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Global warming and its impact: connections with
emerging conflicts, migrations, and health issues

Book of Abstracts



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PANEL 1 - Energy and resources competition in the age of climate change

Research Hub Security and Conflict Transformation

Venezuela: The importance of natural resources in a global 'dispute' contest and the economy of terror

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This article examines how the strategic control of the world's largest hydrocarbon reserves and the immense natural resources of the Orinoco River is central to the attack on Venezuela and the capture of Nicolás Maduro. Methodologically, geopolitical analysis must be conducted on multiple fronts: domestic, regional, and global.

The central hypothesis holds that the dispute over Venezuela's natural resources is related to the competition between the BRICS+ countries and the United States, highlighting pressure on energy and natural resources, and environmental issues in a context of geopolitical dispute.



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The fever of Gaia and the escalation of geopolitics: Technological hegemony, the resources scramble and the remaking of the world-system

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This paper argues that the ongoing escalation of geopolitical tensions is the manifestation of a deep systemic crisis: the end of the neoliberal accumulation cycle, the terminal collapse of Western global dominance, and the violent US attempt to defend its exorbitant privilege. Within this framework, it is crucial to resolve the perversely self-perpetuating relationship between two factors: the pressure exerted by the dominant political and economic system on natural resources and the environment, and the increasingly dangerous overheating of the geopolitical “climate”.

In particular, we identify three mutually reinforcing forces that are deeply redefining international relations on a planetary scale. First, an aggressive competition for the imposition of a new technological paradigm – centered on AI, digitalization, and automation – that is reshaping nearly every economic sector, including the military, through strategic alliances (and, at times, mechanisms of subordination) [...]



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The Strait of Hormuz at a Crossroads: Security Escalation, Global Energy Volatility, and the Kinetic-Climate Nexus

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Keywords: Strait of Hormuz, climate-security nexus, conflict emissions, decarbonization fragility

The paper examines the Strait of Hormuz as a primary "threat multiplier" where kinetic military conflict and climate change vulnerabilities intersect. Within the context of the 2026 regional crisis—involving active hostilities between Iran, the United States, and Israel—the Strait has transitioned from a managed maritime chokepoint into a zone of systemic global disruption. The research first analyzes the economic sensitivity of the waterway, identifying a "climate-security feedback loop." The conflict hinders the global "just transition" and efforts to mitigate climate change by disrupting clean-tech supply chains and forcing a regional return to high-emission coal power to compensate for stranded natural gas. These "Hormuz shocks" have moved beyond oil volatility to impact global inflation and industrial output, leading to supply chain collapses in energy-intensive sectors such as steel and aluminum. Beyond energy, the study identifies critical "bottleneck effects" in global food security. As the Strait is a central hub for the global fertilizer trade—exporting over 30% of the world's urea—the blockade has spiked agricultural production costs worldwide, exacerbating the food insecurity already worsened by climate change. Furthermore, the paper examines the "decarbonization fragility" created by the conflict, where the disruption of LNG and clean-tech minerals derails international climate pathways.

The paper further quantifies the conflict's direct contribution to global warming, drawing on emerging conflict-emissions accounting methodologies. The first fourteen days of hostilities alone released an estimated five million tons of greenhouse gases from destroyed infrastructure, burning oil stockpiles, and military operations—exceeding the annual emissions of dozens of the world's lowest-emitting nations combined. This direct toll is compounded by the emissions cost of chokepoint avoidance itself, as the closure of the Strait forced global shipping onto longer Cape of Good Hope routes with substantially higher fuel consumption per voyage, a pathway largely absent from existing conflict-emissions literature. The paper situates these findings within broader scholarship establishing military activity as an underreported structural gap in international climate governance, estimated to constitute roughly 5.5% of global greenhouse gas emissions.

The paper concludes that the 2026 crisis represents a fundamental shift in global stability. It demonstrates that the "securitization" of the Strait carries ecological and economic consequences—ranging from global stagflation and a measurable, underreported contribution to global warming, to the collapse of regional water security—that are now as consequential as the military outcomes of the conflict itself.

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Energy disruption and conflict dynamics: A Framework and Evidence from the Kurdistan Region of Iraq

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Keywords: Energy security; supply chain disruptions; conflict spillover; socio-economic

The interaction of war and energy systems extends conflict dynamics beyond directly involved actors, affecting geographically proximate regions that are not themselves parties to the conflict. Such regions may hold significant energy resources, yet energy is not always the primary objective of the war reaching them. Existing literature links energy system characteristics, together with broader social, economic, and political conditions, to conflict risk, but the differentiated roles energy systems play within conflict processes, particularly in indirectly affected regions, remain insufficiently explored.

The paper's first contribution is theoretical. It develops a framework distinguishing two interconnected dimensions of the energy-conflict relationship: energy as a means and energy as a cause. Energy functions as a means when its infrastructure is disrupted in ways that generate pressure or expose societal vulnerabilities, whether through deliberate targeting or as a consequence of nearby hostilities that do not make its energy system their primary objective. Defining this dimension functionally, by effect rather than intent, lets the framework operate where attribution is contested or unknowable. Energy functions as a cause when the structural consequences of disruption, including environmental degradation, reduced supply security, and rising costs, contribute over time to socio-economic instability.

The second contribution is empirical. The framework is applied to the Kurdistan Region of Iraq (KRI) between 2024 and 2026, a period spanning the region's transition to near-continuous electricity supply and two successive disruptions to the Khor Mor gas field on which that delivers more than 80 percent of the KRI's electricity. The analysis draws on three bodies of evidence: an original event-level timeline of infrastructure disruptions, triangulated across operator disclosures, government statements, and international reporting; data on violent conflict events from the Armed Conflict Location and Event Data Project (ACLED); and satellite-derived nighttime lights (NASA), which measure electricity availability independently of official reporting.

The case shows that disruption, whether through physical damage or precautionary operational suspension, rapidly impairs functionality and exposes vulnerabilities accumulated during a period of rising dependence on a single supply node (energy as means). Satellite radiance during the 2026 disruption falls roughly a fifth below its level in the equivalent months of the two preceding years, a departure from the seasonal cycle that otherwise governs the series. The case further shows that such disruption reactivates the structural pressures associated with energy as a cause: households and businesses revert to diesel generation, restoring the air pollution that the shift to grid supply had substantially reduced, while costs rise, supply chains erode, and interrupted exports expose the region fiscally.

The study thereby clarifies the dual role of energy systems in conflict and underscores the importance of resilience and adaptive capacity in regions exposed to, but not party to, armed conflict, in line with EUPeace's focus on climate-related conflict, energy systems, and socio-economic instability.

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PANEL 2a - Climate Justice, Governance and Human Rights in a Warming World

Research Hub Climate Science and Just Transition

Environmental justice and inclusive social policy: A conceptual model for green social work units

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Keywords: environmental justice; green social work; migration; climate change; social inclusion.

This study re-examines the Green Social Work Units model, which was originally developed in Türkiye in response to environmental injustice and the need for green social work within the framework of EU policies (Kaya-Örk & Çömez-Polat, 2022). Expanding the model in line with the **EU Action Plan on Integration and Inclusion 2021–2027**, the study argues that environmental justice should be understood not only as an ecological concern but also as a fundamental dimension of migrant inclusion, community resilience and local social policy. There is an increasing link between environmental crises and migration, social exclusion, and unequal access to public services. Climate-related risks disproportionately affect migrants, refugees, low-income households, the elderly, people with disabilities, and other vulnerable groups, exacerbating existing inequalities. At the same time, the EU's migrant integration and environmental transition policies have complementary objectives. EU Action Plan on Integration and Inclusion 2021–2027 promotes equal opportunities, participation, and access to education, employment, healthcare, and housing, emphasising a socially just transition (European Commission, 2019; 2020). However, despite this policy diversity, practices relating to the relationship between migrant integration policy and climate adaptation continue to operate largely through separate institutional channels. This creates a significant implementation gap at the local level. Against this backdrop, the proposed model addresses this implementation gap by focusing on the relationship between migrant integration and climate change. Green Social Work Units support migrant integration and inclusion while also addressing the needs arising from climate-related migration and displacement. In doing so, they position themselves at the intersection of these two areas. This article proposes Green Social Work Units as structures that link migration management, climate adaptation, and inclusive social policy. These units bring together social, environmental, and legal experts, local governments, NGOs, and migrant representatives. Their functions include risk assessment, psychosocial and rights-based support, environmental awareness, advocacy and community participation. By integrating environmental justice and social inclusion locally, the model translates EU commitments into community action. It also promotes peace, justice and inclusive societies by strengthening community resilience, reducing environmental inequalities and enabling vulnerable groups to participate in decisions that affect their living environments. In conclusion, the article asserts that Green Social Work Units offer a locally adapted, viable conceptual model for integrating environmental governance and social welfare systems across Europe.

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Global warming and population movements: A critical analysis of international documents

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Global warming, by disrupting the balance of the climate system, has brought about serious adverse effects that make human life more difficult, including, most notably, rising temperatures, highly destructive storms, prolonged droughts, forest fires, floods, the melting of glaciers and rising sea levels, and the increasing acidity of ocean waters. The impacts of global warming are confronting us with “climate migration,” which triggers large-scale human mobility. In recent years, climate change has emerged as one of the major drivers of forced migration. According to the Environmental Migration Data Portal [1], in 2023, 7.7 million people in 82 countries or territories were internally displaced as a result of disasters associated with climate change. Therefore, today, displacement is no longer explained solely by economic, political, or social factors. Climate change is recognized as one of the main drivers of displacement.

The reports prepared by international organizations that play a decision-making role in the policymaking process on climate change do not merely provide information about the current situation; they also influence and shape decision-making processes. This study aims to examine the relationship between global warming, climate change, and migration through international reports. To this end, it seeks to critically analyze, from a qualitative perspective, the content of the reports, the ways in which the relationship between climate change and forced migration is presented in these reports, and the discursive construction embedded in the texts. The research universe consists of UN and EU reports and policy documents on climate change produced by institutions regarded as reference points in the literature. A comparative discourse analysis will be conducted within the scope of the study. The sample consists of the IOM’s Institutional Strategy on Migration, Environment and Climate Change (2021–2030), which serves as an institutional strategy document, and EU JOIN (2023) 19 final, entitled “A new outlook on the climate and security nexus: Addressing the impact of climate change and environmental degradation on peace, security and defence.”

A critical examination of the documents will enable climate change and migration to be considered together with the impacts of this process on people and ecosystems. Furthermore, the analysis will open up for discussion how structural vulnerability and lack of capacity are framed, how power dynamics are legitimized, and whether the crisis is reduced to a purely technical issue.

[1] <https://www.migrationdataportal.org/themes/environmental-migration>



‘No Net Land Take by 2050’: From a common European climate target to divergent national policies.

A comparative analysis of England, the Czech Republic and France

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Land take and soil sealing have become a key issue in European public policy, due to their close links with global warming. By reducing the ecological functions of land and generating greenhouse gas emissions, land take contributes to climate change. Since 2011, the European ‘No Net Land Take’ target has thus encouraged Member States to reduce, and then neutralise, land take by 2050. However, this shift is challenging spatial planning policies (ESPON, 2024) and also has social effects, particularly for residential migration and access to home ownership, by restricting building opportunities. Drawing on ongoing doctoral research, this presentation compares England, the Czech Republic and France, as three contrasting cases : a pioneering model of urban containment, a socialist legacy of limiting residential expansion, and a recent but ambitious implementation of the European target. England represents one of the earliest and most influential models of urban containment (Languillon-Aussel and Naudin, 2023), shaped by the post-war planning system, Green Belts and settlement policies restricting urban expansion. It is also a key case in the literature on rural gentrification, which has shown how planning constraints, housing scarcity and selective residential migration can contribute to social revaluation of rural and peri-urban areas, rising housing prices and the exclusion of lower-income households (Phillips, 1993; Phillips and Smith, 2018; Méténier, 2020). The Czech Republic offers a different trajectory, marked by a form of constrained land sobriety inherited from the communist period, when residential expansion was limited by state planning and relatively compact urban development. This legacy was later challenged by post-socialist liberalisation, suburbanisation and the growing role of land and housing markets. France, by contrast, is one of the countries that has translated the European No Net Land Take objective most explicitly through the « Zéro Artificialisation Nette » policy. Although earlier planning laws had already sought to limit urban sprawl, ZAN gives this objective a new intensity by setting quantified reduction targets and integrating land take limitation into planning documents. Thus, these three cases are relevant because they highlight the diversity of national legacy and responses to a common climate objective.

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Environmental sustainability and artificial intelligence: The European Union's role

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In the current historical context, in which the benefits of technological progress contrast with the multiple negative effects arising from its misuse, it is essential to promote innovation in full respect for human rights and fundamental freedoms¹.

This need is even more evident in the field of artificial intelligence (AI), which makes it possible to design and program hardware and software systems capable of conferring typically human qualities on machines². Indeed, AI has become one of the most strategic and controversial technologies of the century since, while providing undeniable benefits to citizens, businesses and trade³, it also raises important ethical and legal issues⁴. In particular, in addition to the numerous issues concerning liability, competition, security and transparency, questions arise regarding the impact of AI on the protection of human rights, with particular reference to the right to live in a healthy environment⁵. Indeed, especially in its generative form, AI entails significant consumption of natural resources – such as water and energy – and produces substantial CO₂ emissions, contributing to the exacerbation of phenomena such as climate change, desertification and biodiversity loss. Moreover, the production and disposal of the components required for the operation of such systems may lead to the accumulation of heavy metals and microplastics, with negative effects on the planet as a whole and, consequently, on the life and health of animals and human beings.

In this context, the European Union (EU) plays a central role, as it promotes the design and use of AI in a manner that fosters technological development without undermining citizens' rights⁶. In particular, in response to the inadequacy of the existing legislation in addressing the issues arising from the use of AI⁷, the EU established an independent High-Level Expert Group⁸ and subsequently adopted the world's first comprehensive regulation in this field, identifying risks and defining safeguards⁹.

However, while also aligning itself with the approach adopted within the Council of Europe – where the Committee of Ministers unanimously approved the Convention on Artificial Intelligence, aimed at ensuring the use of AI systems that protect human rights¹⁰ – European legislation raises crucial questions precisely with regard to the limited strengthening of the ecological dimension. Indeed,

¹Regarding the effects of technology on human rights, see: O. Pollicino, *Judicial Protection of Fundamental Rights on the Internet. A Road Towards Digital Constitutionalism?*, London, 2022; M. Olivetti, *Diritti fondamentali e nuove tecnologie*, in *Revista Estudos Institucionais*, 2020, pp. 395–430.

²Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions of 25 April 2018, *Intelligence artificielle pour l'Europe*, p. 2.

³For example, in its 2018 Digital Transformation Scoreboard (available at <https://ati.ec.europa.eu/>), the European Commission highlighted that companies in the construction and agri-food sectors using AI reported positive effects in terms of improved services and products, the acquisition of new customers, and entry into new markets.

⁴On this subject, the literature is extensive; see, in particular, C. Grieco, *Intelligenza artificiale e diritti umani nel diritto internazionale e dell'Unione europea. Alla ricerca di un delicato equilibrio*, in *Rivista ODU*, 2022, pp. 782–810; A. Amidei, *Intelligenza artificiale e diritti*.

⁵It is “the right of individuals and groups of individuals to use and preserve the environment in the best possible manner, on the basis of the standards established, in particular, through the practice of international environmental treaty law.” In legal scholarship, see D. Misonne, N. De Sadeleer, *Article 37 – Protection de l'environnement*, in F. Picod, C. Rizcallah, S. Van Drooghenbroeck, *Charte des droits fondamentaux de l'Union européenne commentaire article par article*, Brussels, 2023; C. Nivard, *Le droit à un environnement sain devant la Cour européenne des droits de l'Homme*, in *Revue juridique de l'environnement*, 2020.

⁶V. F. Ferri (éd.), *L'Unione europea e la nuova disciplina sull'intelligenza artificiale: questioni e prospettive*, Napoli, 2024.

⁷White Paper on Artificial Intelligence – A European approach to excellence and trust, 19 February 2020, COM(2020) 65 final.

⁸High-Level Expert Group on Artificial Intelligence, which published as early as April 2019 ethical guidelines for the development and use of artificial intelligence, *Lignes directrices éthiques pour une IA fiable*, 8 April 2019.

⁹Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 (published in the OJEU on 12 July 2024). On this subject, see A. Bensoussan, V. Bensoussan-Brulé, J. Bensoussan, *Le règlement européen sur l'intelligence artificielle : synthèse, points clés et analyse article par article*, Larcier, 2025.

¹⁰Agreement signed on 5 September 2024.



although it recognises the environment as a fundamental value and encourages a sustainable digital transition, the AI Act does not introduce direct obligations in this regard: its focus on environmental protection is transversal and primarily policy-oriented and programmatic, aiming to guide the future development of AI according to ethical and sustainable principles rather than imposing immediate legal constraints on AI producers or users.

In light of the above, this contribution aims to analyse the role played by the EU in regulating the relationship between the legal protection of the environment (also understood as the protection of the fundamental human right to live in a healthy environment), the economic and social dimensions of sustainability, and the consequences of the application of AI to these legally protected interests.

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Systemic crisis and energy sovereignty: an analysis of RECs as models for resilient and inclusive governance in the Mediterranean Basin

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The climate crisis in the Mediterranean Basin has now assumed a systemic dimension, exacerbating distributional conflicts, socioeconomic inequalities, and structural territorial vulnerabilities. In this scenario of a marked climate hotspot, the Renewable Energy Community (REC) model emerges as a strategic tool to dismantle dependence on fossil fuels—a centralized resource intrinsically linked to conflictual geopolitical dynamics. Participation in a REC represents not only an ethical choice consistent with the United Nations 2030 Agenda, but also a concrete financial, legal, and operational strategy to mitigate climate risks and promote a Just Transition. Going beyond the extractive and centralized fossil fuel paradigm, RECs foster a decentralized, democratic, and peaceful system, acting as true laboratories for social innovation and territorial governance. The article contributes to the scientific literature on climate change by highlighting how RECs constitute an operational interface between climate science and social impact. They connect institutions, citizens, local authorities, and third-sector organizations (including religious organizations) to generate sustainable public value and reduce energy poverty (Terrana, 2025). The paper analyzes the role of RECs in the context of the Italian and Mediterranean energy transition, discussing how the transformation of passive consumers into prosumers (producer-consumers) fosters equitable energy autonomy, reduces territorial instability, and enables efficient and economically sustainable management of local resources (Tushar et al., 2020). Furthermore, the model evolves into a local public interest service that aligns with the principles of Corporate Social Responsibility (CSR) and the Circular Economy (Aura, 2022). RECs and the circular economy eliminate energy and spatial waste: shared, "zero-kilometer" energy, the reuse of abandoned areas and public buildings, and the valorization of local biomass allow for the preservation of economic value and social cohesion within the communities concerned. The research findings demonstrate that efficient energy sharing and the decentralization of production promote energy and social justice, reducing energy poverty; develop solidarity-based, participatory, and resilient communities, fostering a sense of community among citizens (De Maio, 2025; Aura, 2026); act as drivers for the ecological transition of businesses and public administrations; and translate scientific evidence on global climate risks into a physical, legal, and social reorganization of the territory, providing a model of positive peacebuilding based on energy democracy. In conclusion, the study offers insights into how this action-research model can inform local public policies, university curricula, and active citizen engagement toward an inclusive and climate-resilient society.

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PANEL 2b - Local Sustainability, Circular Practices and Community Resilience Research Hub Climate Science and Just Transition

From illicit assets to heritage for the community through urban greening strategies

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Keywords: urban regeneration; urban greening strategies; confiscated assets; social reuse; community heritage

Urban areas currently face increasingly complex environmental and social conflicts, which lead to territorial transformations and significantly impact the quality of life. These conflicts are interconnected and involve, for example, phenomena attributable to climate change and the progressive depletion of natural capital, as well as fragile conditions associated with increasing levels of social vulnerability. Therefore, the importance of effective planning and territorial management is immediately evident.

In this regard, and aligning with existing scientific literature, this contribution focuses on specific approaches that characterise the discipline of urban and territorial planning. Urban regeneration is recognised as one of the approaches capable of addressing growing environmental and housing needs in a sustainable, inclusive, and reuse-oriented manner (Zheng et al., 2014). Regeneration interventions transform disused, unused, or abandoned spaces into new functional resources for cities and citizens, also reducing land consumption. In this case, attention is focused on confiscated illicit assets, considered a priority “sphere” of intervention to initiate functional and social regeneration processes, as provided in the Italian context by Law 109/1996 (Ferroni, 2025).

Contributing to the current scientific debate, this contribution identifies urban greening strategies (UGSs) as key reference for the effective urban regeneration of such assets, considering the multiple benefits associated with urban green spaces (Egerer et al., 2024). Specifically, urban greening refers to the process of introducing green elements into urbanised contexts, aimed at enhancing natural ecosystems (Lehmann, 2021) while promoting the improvement of urban resilience and citizen well-being (Thornbush, 2016). Consequently, UGSs denote the set of measures, actions, and policies that promote and implement this process, operating on multiple levels and generating interconnected benefits.

Given the above, this research highlights the importance of appropriately integrating confiscated assets into urban planning, with reference to UGSs-led regeneration interventions. From this perspective, the simple vision of confiscated assets as property to be reused is replaced by a recognition of their role as territorial resources instead.

From a methodological point of view, this study proposes conceptual guidelines for the definition of basic knowledge frameworks to support planning processes involving the regeneration of confiscated assets. These guidelines are based on an integrated reading of confiscated assets alongside the socio-environmental characteristics and needs of the territory. To this end, the collection of data describing the local context is promoted, in relation to specific dimensions such as territorial characterisation, the presence of confiscated assets, anthropogenic pressure, ecological endowment, and socio-territorial vulnerability. Furthermore, on the basis of the data, the development of specific operational tools, such as multidimensional datasets and choropleth maps processed in a GIS environment, is promoted.



Operationally, the framework is tested in the Calabrian provincial capitals (Italy).

In conclusion, the proposed guidelines support the development of knowledge bases for planning the restitution of confiscated assets to the community through UGSs, fostering inclusion, environmental quality, territorial equity, and social justice. Finally, it should be noted that the research activities presented are part of a broader project conducted under the scientific supervision of Professor Annunziata Palermo, funded by Ministerial Decree 629/2024 (Next Generation EU – PNRR).

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Advancing sustainability in Spanish gastronomy: a novel framework with practitioner insights

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Keywords: sustainable gastronomy; restaurant management; sustainability leadership; embedded agency; stakeholder management

This paper develops a conceptual framework explaining how sustainability is implemented within Spanish gastronomy organizations through the actions and interactions of internal organizational actors. Although sustainability has become increasingly important in the restaurant sector, existing research has often emphasized external pressures such as regulation, consumer expectations, certification schemes, and environmental standards. Comparatively less attention has been devoted to the organizational actors who translate sustainability principles into concrete practices and to the mechanisms through which these practices become embedded in restaurant management. The objective of this study is therefore to explain how chefs and managers act as complementary agents of sustainability transformation and how their decisions interact with a wider stakeholder ecosystem to generate sustainable value. Methodologically, the study develops an integrative conceptual framework by bringing together sustainability leadership, embedded agency, stakeholder theory, and the Triple Bottom Line. The framework conceptualizes sustainability as a multidimensional and practice-based organizational process encompassing environmental, social, economic, and cultural dimensions. Chefs are positioned as particularly influential agents of operational sustainability because their decisions affect ingredient selection, sourcing relationships, seasonality, menu composition, resource utilization, food waste, and ultimately the consumption experience. Managers perform a complementary role by integrating sustainability into organizational strategy through resource allocation, coordination, performance measurement, supply-chain management, corporate social responsibility, organizational culture, marketing, and long-term economic planning. These internal actors operate within a network of employees, suppliers, customers, investors, regulators, public administrations, and local communities, creating reciprocal flows of influence and value. The framework identifies sustainable supply-chain management, sustainability-oriented performance measurement, corporate social responsibility, menu design, customer experience, and marketing and communication as key organizational mechanisms connecting actors, practices, and outcomes. It also incorporates feedback loops through which stakeholder responses, organizational learning, and changing environmental and market conditions modify subsequent decisions and practices. This dynamic perspective extends conventional approaches that treat sustainability primarily as a collection of isolated initiatives or performance indicators. Instead, sustainability is understood as an adaptive organizational capability emerging from interactions among actors, managerial systems, and stakeholders. The framework proposes that these processes can generate outcomes beyond immediate restaurant performance, including planetary health, social wellbeing and equity, economic resilience, innovation, stronger local communities and economies, and long-term



regenerative capacity. The paper thereby advances a multilevel understanding of sustainable gastronomy by showing how individual agency, organizational systems, stakeholder relationships, and sustainability outcomes are interconnected within restaurant management.

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Circular strategies for waste management in isolated communities: Lessons from Paraguay, Brazil and Kenya

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Keywords: circular economy; isolated communities; waste management; anaerobic digestion; community resilience

Waste management in isolated and infrastructure-constrained communities is shaped by long transport distances, weak recovery markets, limited technical capacity and fragile ecosystems. These conditions encourage plastic leakage, uncontrolled dumping and open burning, creating unequal environmental and health burdens (Kaza et al., 2018; UNEP, 2023). This contribution compares three settings with different governance units and scales: Bahía Negra, a community and district in the Paraguayan Chaco (2,768 residents in 2022, including 709 urban residents); Escola Família Agrícola de Jaboticaba, Brazil, a dual agricultural boarding school serving about 250 students, teachers and technical staff; and Nyumbani Village, Kitui County, Kenya, a residential care eco-village with an equivalent population of approximately 600.

The exploratory comparative methodology combines field observation, stakeholder consultation, mapping of material flows and infrastructure, and preliminary screening of decentralised recovery options. In Bahía Negra, some waste is burned or discarded into the river and the open dumpsite lacks regular maintenance, soil cover and a prepared low-permeability base. Reliable generation and disposal data are also absent. Current work focuses on awareness-raising and meetings with the governing board. A waste-management system has been proposed in a student's final-degree project, including characterisation, source separation, protected plastic aggregation, safer residual disposal and municipal planning; these are academic recommendations, not approved or scheduled measures. The same project estimates a theoretical 318.7 m³/day of biogas and 637.5 kWh/day, but feedstock, methane yield, sanitation, seasonality and end use require field validation before design.

Brazil provides a contrasting case in which separation already operates across a 76.7-hectare educational site. Food scraps are used as animal feed; other organics feed an existing biodigester; plastics and packaging are collected by the municipality of Quixabeira; toilet paper is incinerated; and fats are retained in a grease trap for treatment or soap production. The 15-day school/15-day family alternation makes the campus a living laboratory and transfers practice to rural households. At Nyumbani, plastic waste had accumulated because no viable recovery route was available; the stockpile was subsequently



burned and the site is now being converted into a poultry house with a planned capacity of 600 birds. This change makes adequate waste management urgent. The new facility must incorporate manure and bedding collection, protected storage, runoff control and safe treatment from the construction stage, while plastics require source separation, protected storage and a reliable destination.

Across the cases, circularity depends on separation, safe treatment, local ownership, maintenance and monitoring rather than one transferable technology (Kirchherr et al., 2017; Ostrom, 1990). Context-adapted governance must distinguish actions from proposals, protect children and workers, and match recovery options to long-term operating capacity.

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Transgressive Design and the Semiotics of Natural Wine Labels: Mediating Sustainability in Contemporary Food Systems

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Keywords: natural wine, semiotics, sustainability

After decades of consuming industrially produced food—a trend already evident in the 1990s—interest in artisanal products, which are perceived as more natural and free from chemical or artificial substances, intensified during the 2000s (Delfosse, 2012). It is against this backdrop that we approach our research subject: natural wine. In France, wine is far more than just a foodstuff; it is an integral part of the country's culture. More recently, various factors—such as global warming and the excessive use of chemicals throughout the production process, from the vineyard to bottling—have prompted producers to rethink their production methods. Interest in natural wines highlights the need for companies to diversify their range of “greener” wines by aligning them with sustainable development (Galati et al., 2019).

However, this transformation does not occur only in production methods; it is also expressed through a new narrative that reflects a growing awareness of a different way of living. In this research, we examine how this narrative is represented through natural wine labels. This raises the question of how these emerging values are translated into the visual and narrative language of wine labels, particularly in relation to the conventional codes of wine communication.

There are several challenges in the natural wine sector. The first is that the designation “natural wine” is not systematically used on labels, which creates confusion for consumers trying to identify natural wines (Galati et al., 2019). This is precisely where the issue of narrativity becomes central, and where our research finds its relevance. Drawing on the Greimasienne distinction between the syntactic, semantic and figurative dimensions of meaning, we propose an operational framework linking winemaking practices, their associated values and their figurative manifestation on the label. One of our analyses shows how narrativity unfolds through everyday objects associated with winemakers' production practices—objects mobilized to valorize the living world.

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Efficiency unveiled: Exploring geographical challenges and natural risks in Italian municipalities through a stochastic frontier analysis

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Keywords: environmental risks; cost efficiency; municipalities

Over the past 30 years, research on local government efficiency has evolved from evaluating specific public services – such as waste collection or road maintenance – to broader assessments of overall municipal performance (De Borger and Kerstens, 1996; Aiello and Bonanno, 2019). Nevertheless, the interplay between persistent environmental risk exposure and municipal performance remains underexplored, particularly in contexts characterized by heterogeneous geomorphological conditions and multiple sources of environmental risk. This study examines the extent to which environmental risks affect the cost efficiency of Italian municipalities and how this effect varies across geographical contexts. Using a Stochastic Frontier Analysis (SFA) model and a comprehensive municipality-level panel dataset (2014–2020), we analyze the effects of hydrological, landslide, volcanic, and seismic risks on local government performance. This approach enables the joint estimation of the stochastic cost frontier and inefficiency effects within a panel data framework. This one-step approach ensures greater consistency and efficiency in the estimates compared to earlier two-step methods (Aigner et al., 1977; Battese and Coelli, 1995). To capture spatial heterogeneity, we explore how these effects differ across altitudinal zones and macro-regions. Results reveal significant spatial heterogeneity: environmental risks exert differentiated effects depending on both the type of hazard and geographical context. For instance, hydrogeological and landslide risks increase inefficiency in lowland municipalities of Northern Italy, but their effects are weaker - or even reversed - in other areas. Seismic risk is often associated with higher efficiency scores. These patterns should be interpreted as structural associations rather than direct evidence of institutional adaptation mechanisms. Overall, the results reveal substantial spatial heterogeneity in the relationship between environmental risks and municipal efficiency and provide new empirical evidence on the role of environmental risk exposure in local government performance. In conclusion, this study enriches the literature on local government efficiency by demonstrating that environmental and geographical dimensions are integral to understanding municipal performance. Recognizing and addressing these spatial complexities is essential for designing policies that enhance both efficiency and resilience in the face of increasing environmental challenges. This dual emphasis on performance and place-specific vulnerability positions the study at the intersection of public economics, regional science, and the emerging literature on institutional adaptation to environmental risk.



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PANEL 3a - Climate Displacement and International Law: Filling the Protection Gaps Research Hub Migration and Human Rights

Towards a convention on environmentally and climate-displaced persons (ECDPs)

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Keywords: - displaced persons – human rights and environment- international environmental draft convention

The number of ECDPs is increasing due both to climate impact and environmental disasters¹¹. In small islands. All displaced persons should have protection of all human rights. But there is a gap in international human rights law. Although numerous non legally binding instruments addressing displacement exist, legally binding instruments remain scarce and are limited in scope to internally displaced persons in Africa.

The existing global and regional legal and policy framework therefore does not, whether taken separately or together, afford adequate protection of the fundamental rights of ECDPs. Even the recent three international advisory opinions of 2024 and 2025 on climate legal issues, do not take into consideration the human rights impact of climate change.

Universal legal protection for ECDPs is an urgent necessity both for climate and disasters issues. It needs a comprehensive, durable and universal response.

That's why there has been a congress at Limoges University in 2005 dedicated to ecological disasters and legal challenges¹². A working group of the CRIDEAU and the CIDCE wrote a draft convention on displaced persons. This draft has been updated in 2025 with Spanish environmental lawyers of the Tarragona University and extended to climate refugees.

First, we show why a new convention is necessary? The gap in law is easily identified. First because the 1951 Refugee convention is inadequate because its needs that the person claiming refugee status be the victim of "persecution"¹³. Then because all existing treaties and soft law instruments do not take into consideration precisely and legally the human rights involved during all steps of a disaster: before, during and after¹⁴.

Then what new legal status should be attributed to environmentally displaced people? The draft convention lays out new rights, specific status and implementation mechanisms. It applies both to externally displaced people who cross borders and internal displaced people who are displaced in their own country. It's not an abstract utopia, It is a concrete response to a concrete reality.

The main diplomatic issue is now the opening of intergovernmental negotiation in the right place. Should it be within climate change Paris agreement or rather within the 4 December 2024 General Assembly of United Nations Resolution 79/128 to open negotiation on the protection of persons in the event of disasters? It's a procedural, political and legal issue.

¹¹ Simon Berhman and Avidan Kent, ed. "Climate refugees, beyond the legal impasse?" M. Prieur, "Towards an international legal status of environmentally displaced persons", p.233, Earthscan, 2018.

¹² J. Bétaille, J.M. Lavielle, M. Prieur, éd. « Les catastrophes écologiques et le droit : échecs du droit, appel au droit », Bruylant, 2012.

¹³ Laura Westra, "Environmental justice and the Rights of Ecological Refugees", Earthscan, 2009.

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The invisible crisis: Bridging the human rights gap in climate-induced migration

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As global warming intensifies, climate-driven displacement remains a "legal gray area" under current international law. This contribution analyzes the limitations of traditional refugee definitions and argues for a rights-based expansion of state jurisdiction. By examining the intersection of environmental conflict and the fundamental rights to security and health, the presentation proposes that international legal frameworks must evolve to prioritize human dignity. This is directly relevant to the EUPeace theme, as it addresses the structural roots of migration and the urgent need for a proactive, legal response to environmental instability in a globalized world.



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Climate change, migration and human rights: Protection gaps for vulnerable populations in the global south

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Keywords: climate justice; climate-related mobility; Global South; human rights; protection gaps

Climate change intensifies existing inequalities and can contribute to displacement and other forms of mobility, particularly where poverty, marginalisation, unequal exposure to hazards, and limited adaptive capacity intersect (IPCC, 2023). Its impacts are unevenly distributed both between and within regions: access to resources, wealth, safety nets, gender, ethnicity, and other social inequalities shape the vulnerability of affected populations. These dynamics place particular burdens on communities in the Global South, including populations that have contributed comparatively little to global greenhouse-gas emissions (IPCC, 2023; Sultana, 2022).

This contribution examines protection gaps affecting people who experience climate-related mobility through a critical human-rights perspective. It considers how climate impacts, displacement, and unequal access to protection are shaped by longer histories and structures of coloniality, racial capitalism, and uneven development. Rather than treating mobility as a discrete consequence of an environmental event, the analysis situates it within material and epistemic relations that affect whose vulnerability is recognised, whose experiences are made visible, and whose claims are taken into account in climate governance (Sultana, 2022; Gonzalez, 2021).

The paper focuses on the limits of rights-based responses to climate harms. Human-rights treaties may be relevant to climate action because climate change affects the enjoyment of a wide range of rights and can require States to adopt protective measures. However, the legal role of human-rights treaties in relation to mitigation remains limited and dependent on the particular right, treaty, and national circumstances at issue. Human-rights law therefore offers important normative resources, but it does not by itself provide a comprehensive legal response to climate change (Mayer, 2021). Climate justice provides the normative frame for understanding why such protection gaps are unequal. A feminist decolonial approach further challenges universalising forms of climate knowledge that can obscure the connections among race, gender, geographical location, colonial power, and the production of legitimate knowledge. It calls for greater attention to situated and experiential perspectives, without reducing affected communities to passive victims (Gay-Antaki, 2022; Sultana, 2022). The contribution argues that more equitable climate responses must address the relationship between climate vulnerability, adaptation, displacement, and human-rights protection while recognising the historical and structural sources of unequal exposure to harm (IPCC, 2023; Gonzalez, 2021).

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PANEL 3b - Climate Insecurity and Border Experiences in Conflict-Affected Regions

Research Hub Migration and Human Rights

Climate migration and human rights: The role of social work in advancing policy and Peacebuilding

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As climate change accelerates, its profound impacts increasingly drive migration, displacing vulnerable populations and exacerbating socio-political tensions. This paper explores the role of social work and peace education in addressing the human rights of climate-induced migrants, particularly in regions like Khyber Pakhtunkhwa, Pakistan. Using an interdisciplinary approach, the research examines how social work interventions can mitigate vulnerabilities and promote social justice, resilience, and conflict transformation in conflict-sensitive contexts.

The study highlights the importance of integrating human rights and peace-building frameworks in policy responses to climate migration. By emphasizing inclusive, community-based strategies, this research offers actionable policy recommendations for fostering integration, protecting migrants' rights, and supporting sustainable peace in the face of climate-driven displacement and proposes evidence based solutions to promote climate justice.



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Climate extremes, conflict, and human rights: Drivers of disaster-induced displacement in Somalia

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Keywords: disaster-induced displacement; drought; flooding; conflict; human rights

Somalia faces recurrent droughts, destructive floods, armed conflict, food-price instability, and widespread livelihood losses, making internal displacement a compound crisis rather than the outcome of a single hazard. This study examines how climate extremes, conflict, and economic stress jointly shape disaster-related internal displacement in Somalia. It addresses three related questions: whether prolonged dry conditions and extreme rainfall generate distinct displacement pressures; whether conflict intensifies climate-related displacement; and whether rising food prices further weaken households' capacity to remain in affected areas. The analysis draws on monthly data on new disaster-related internal displacements from the Internal Displacement Monitoring Centre, drought conditions measured by consecutive dry days, flood intensity represented by maximum five-day accumulated precipitation, recorded conflict events from the Armed Conflict Location & Event Data Project, and a domestic food-price index capturing market stress. A dynamic time-series econometric framework is used to distinguish immediate responses from more persistent displacement effects and to account for temporal dependence among climatic, security, and economic pressures. The findings indicate that prolonged drought and extreme rainfall are both associated with increased disaster-induced displacement, although their effects appear to operate through different pathways. Extreme rainfall is associated with more immediate population movements following damage to homes, infrastructure, farmland, water systems, and access routes. Drought generates more persistent displacement pressure by reducing water availability, weakening pastoral and agricultural livelihoods, depleting household assets, and worsening food insecurity. These livelihood effects are consistent with recent evidence on drought vulnerability among pastoral communities in Somalia (Wardhere & Mahamed, 2026). Conflict further intensifies displacement pressures by disrupting markets, restricting humanitarian access, weakening local coping systems, and limiting opportunities for in-place adaptation. Rising food prices also increase vulnerability by eroding household purchasing power and reducing the capacity to absorb environmental and security shocks, reflecting the compound pathways connecting climate risks, conflict, and food insecurity in Somalia (Thalheimer, Gaupp, et al., 2023). Overall, the results suggest that Somalia's displacement crisis is shaped by overlapping climatic, conflict-related, and economic pressures rather than by isolated shocks, consistent with earlier evidence showing substantial weather and conflict effects on internal displacement in the country (Thalheimer, Schwarz, et al., 2023). From a human-rights perspective, these overlapping risks threaten access to food, adequate housing, livelihoods, personal security, and health care, while also placing additional pressure on already fragile public-health and protection systems (Hussein et al., 2025). Disaster-induced displacement in Somalia should therefore be addressed not only as a humanitarian emergency but also as a human-rights and climate-justice challenge. The study calls for integrated early-warning systems, anticipatory financing, climate-resilient livelihood programmes, conflict-sensitive adaptation, food-market support, and stronger protection mechanisms for internally displaced persons. By linking dynamic empirical evidence with a rights-based framework, the study contributes to understanding how fragile and low-emission countries can reduce preventable displacement while protecting populations exposed to compound climate and conflict risks.



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From the Iraqi Green deal to Grassroots action: Transforming women's climate migration in the mesopotamian marshes through inclusive health and rights

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Keywords: Iraqi Green Deal; Climate-Security Nexus; Just Transition; Inclusive Health; Circular Economy.

Post-conflict Iraq is currently navigating an existential environmental crisis, ranked as the fifth most climate-vulnerable nation globally. The Mesopotamian Marshlands, a UNESCO World Heritage site, are facing an "ecocide" due to upstream damming and water mismanagement, triggered by severe drought cycles. This environmental collapse is driving mass climate-induced migration, primarily affecting rural women who lose their traditional livelihoods. This research introduces the (Iraqi Green Deal - IGD) as a comprehensive framework designed to operationalize a just transition by bridging the gap between national climate strategies and grassroots implementation.

The IGD can be initially financed through reallocating existing climate adaptation funds (e.g., Iraq's Nationally Determined Contributions commitments) combined with partnerships with international donors focusing on disability-inclusive climate action. The research utilizes a qualitative case study of the "From Ur to Rome" sustainable fashion initiative (2023).

This project demonstrates how circular economy principles can fulfill the objectives of environmental justice and "Inclusive Health." By upcycling textile waste into designs inspired by Mesopotamian heritage, the initiative provided displaced women with dignified economic alternatives. A critical dimension of this model is "Disability Justice," as the project integrated women from the Deaf community through the use of Arabic Sign Language in vocational training. This evidence-informed approach proves that inclusive health is not merely a biomedical issue but a core component of social well-being and psychological resilience for marginalized climate refugees.

Furthermore, the paper identifies critical legal protection gaps in Iraq's national policies. It argues that a (just transition) must move beyond reactive aid toward proactive governance. We propose the integration of AI-enhanced predictive data—incorporating remote sensing and historical displacement patterns—into national climate adaptation laws. Specifically, using satellite-derived water level data (e.g., from NASA's GRACE mission or Sentinel-1 imagery) combined with displacement records from IOM Iraq, a simple machine learning model (e.g., random forest) can predict high-risk migration periods with up to 3 months lead time. This technology should serve as an early-warning system to anticipate (displacement thresholds), allowing for the pre-emptive deployment of social protection floors.

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PANEL 4a - Health, climate and preventive well-being: Communication and public narratives
Research Hub Health and Well-Being

From One Health to networked health communication: AI, media, and multi-actor dynamics in the age of global crises

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This study examines health communication in global crises through One Health and Global Health, emphasizing links between environmental, social, and health issues. Methodologically, it is an exploratory qualitative study centered on audience reception, supported by media and institutional insights.

It combines content analysis of national news, semi-structured interviews with 12–15 interdisciplinary participants, and 6–8 interviews with NGO and media professionals. Data are analyzed through thematic analysis, and triangulation is applied as a technique to enhance validity. Grounded in Actor-Network Theory, the study shows how AI shapes communication processes and highlights the need for inclusive, multi-actor strategies in addressing interconnected global challenges.



Socio-health obligation of prevention, environmental risks, and community healthcare

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Keywords: socio-health prevention; health protection; environmental risks; community healthcare; legal relationship

This contribution proposes a reconstruction of the socio-health obligation of prevention as a legal relationship through which health protection is achieved (Betti, 1953-1954; Perlingieri, 2005), grounded directly in the legal order and specified, at the organisational level, by the organisational act. Health, understood in a unitary and personalistic sense, requires a model of community healthcare capable of anticipating the protection of the person against serious and foreseeable risks, including environmental risks. From this perspective, the organisational act (Caterini, 2022) is not the exclusive source of the relationship, but rather an instrument for implementing constitutional principles, solidarity and essential levels of care, capable of coordinating actors, competences and procedures. In other words, whatever the immediate source of the obligation, the legal relationship must always be consistent with the principles of solidarity, dignity and protection of the person. This thesis allows for broad operational solutions, since the organisational act is inseparable from constitutional legality (Perlingieri, 2020), being a private-law instrument of healthcare organisation that places the socio-health prevention of the patient-recipient at its centre. Through the organisational act, the source of this obligation “must still be found in the will of the legal order and in the values protected by it”. In the field of prevention, more than in other areas, the legal relationship must be understood as the locus in which the organisation of socio-health services and the personalistic protection of health are concretely reconciled. This means that the legal relationship of socio-health prevention is non-synallagmatic (Caterini, 2024) and variable in structure, because it is not based on an exchange of reciprocal performances, but on a relationship functionally directed towards the protection of the person and the community. It may therefore be described as a “satisfactive non-synallagmatic performance”, since it does not respond to compensatory logic. Moreover, although socio-health preventive performance may contribute to greater market efficiency, its foundation lies in the “social community” rather than in the market. The socio-health obligation of prevention nevertheless has patrimonial content, which does not presuppose a reciprocal exchange between the healthcare-provider institution and the patient-recipient. Socio-health prevention therefore emerges as a utility that is both personal and social, irreducible either to a merely patrimonial logic or to a rigid distinction between obligations of means and obligations of result. The interaction of these dimensions gives preventive performance its particular worthiness, making it the expression of a legal relationship in which anticipation of risk simultaneously translates into protection of the individual and safeguarding of the community. Prevention thus reveals, more than other fields, the legal relationship as the place where healthcare organisation and the personalistic protection of health are recomposed into a unified form of anticipatory protection of the person. Accordingly, the socio-health obligation further challenges the conception of obligation as an ahistorical category.

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Climate, health, and equity: A diachronic discourse analysis of Greenpeace annual reports (2014 - 2024)

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Climate change has increasingly been framed in public discourse not only as an environmental crisis, but also through the lenses of public health, social justice and climate justice (Maibach et al., 2010). Environmental organizations have played a central role in shaping this discourse by connecting climate action with human wellbeing, inequality, and collective responsibility (Schäfer, 2012). This study investigates how the impacts of climate change on health and social equity are discursively constructed in Greenpeace International annual reports published between 2014 and 2024. During this decade, climate communication has evolved alongside major global developments, including the Paris Agreement, the COVID-19 pandemic, the growing prominence of climate justice movements, and increasing recognition of the links between environmental degradation, human rights, and health (Marcella, 2025). Drawing on Discourse Analysis (Fairclough, 2003) and Corpus Linguistics (Baker, 2006), the study adopts a diachronic corpus-assisted approach to examine how linguistic choices and narrative strategies evolve over time. The corpus comprises ten Greenpeace International annual reports published between 2014 and 2024 ([Greenpeace International Annual Reports](#)). Analysis focuses on lexical frequency, keywords, collocations, concordance patterns, evaluative language, agency attribution, and the representation of social actors in relation to climate, health, vulnerability, justice, and affected communities.

Preliminary findings suggest a significant discursive shift. While earlier reports frame health primarily in terms of environmental hazards, recent reports increasingly address health issues through the lenses of climate justice, human rights, and structural inequality. Since 2020, greater emphasis has been placed on the unequal health impacts of climate change on marginalized communities, alongside emerging discourses of hope, participation, and empowerment.

By tracing these discursive transformations over a ten-year period, this study contributes to research on climate communication by illustrating how environmental NGOs adapt their narratives to changing socio-political contexts and audience expectations. It also highlights the role of language in framing climate change as an interconnected environmental, health, and equity challenge, thereby contributing to broader debates on climate justice and public engagement.

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Scroll to social: Enhancing social participation in the digital age

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Keywords: social participation; digital well-being; communication skills; civic engagement; higher education

Digital technologies are embedded in university students' academic and social lives. They facilitate communication, access to information and new forms of participation. At the same time, intensive digital engagement can create challenges for well-being, concentration and social interaction. Recent research conceptualises digital well-being as a multidimensional phenomenon that extends beyond limiting screen time (Mohd Bahar et al., 2026). Alongside these concerns, meaningful interaction and participation in university life can strengthen students' engagement and sense of belonging (Masika & Jones, 2016). Digital media can also support social capital and civic engagement when used for communication and participation (Kim & Kim, 2022). These perspectives suggest that digital well-being should be considered alongside, rather than separately from, social participation. The *Scroll to Social* project, funded through the EUPeace Student Challenges Call, addressed this connection across Çukurova University, the University of Sarajevo and Justus Liebig University Giessen. The project aimed to identify barriers to participation and translate students' needs into practical activities for communication, well-being and civic engagement. It also explored how digital technologies could be used constructively for positive social impact. A multi-site descriptive evaluation combining quantitative and qualitative data was conducted. Data comprised 42 responses collected before the workshops and 22 post-workshop evaluation responses through paper-based and online instruments. Workshop plans and presentation materials provided additional contextual information. Closed-ended items were analysed using frequencies, percentages and means. Open-ended responses were grouped thematically to identify recurring needs, barriers and proposed actions. As participation and data-collection procedures differed across sites, responses were not treated as matched pre-post measurements. Instead, successive needs assessments and evaluations informed the refinement of workshop activities. The findings revealed both shared concerns and context-specific priorities. At Çukurova University, students prioritised initiating conversations, active listening, self-expression, empathy and boundary setting. The workshop received a mean evaluation of 4.48/5; active-listening awareness and alignment with EUPeace values both reached 4.64/5. In Sarajevo, students highlighted workload, time management, concentration, motivation, perfectionism, academic writing and well-being during thesis preparation. These needs informed activities on backward planning, personalised writing routines, digital-focus strategies and action planning. In Giessen, participants emphasised time constraints, limited awareness of participation opportunities, intercultural collaboration and the constructive use of social media. Understanding of the effects of digital habits was rated 4.67/5, while participation and interaction received 5.00/5. Across the three settings, the evaluation identified a common need for accessible and interactive opportunities that



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connect digital reflection with interpersonal engagement. The findings support a flexible, needs-led workshop model combining structured dialogue, active listening, intercultural exchange and realistic action planning. *Scroll to Social* thus approaches digital well-being not simply through reducing digital use, but through supporting students in translating reflection into meaningful social participation. These findings are informing the development of the *Scroll to Social Toolkit*.

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Sexism and internalization of beauty ideals through social media use among women: The influence of sexual orientation

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Keywords: Beauty-ideal internalization; Objectification; Sexism; Sexual orientation; Social media

Drawing on objectification and ambivalent sexism theory, this study examines how hostile sexism is associated with the internalization of beauty ideals via social media, among heterosexual and non-heterosexual women in Italy. More specifically, it also investigated whether this relationship is mediated through objectification of women and body-gaze perpetration and moderated by sexual orientation.

A quantitative design was adopted. Data were collected in 2025 through an online questionnaire distributed via LGBTQ+ organizations and university networks. The sample included 441 women (68.7% heterosexual; 31.3% sexual minority women), most of whom were aged between 18 and 29 years (56.7%).

Participants completed measures assessing the sexual objectification of women (Women as Sexual Objects Scale; WSO), the internalization of beauty ideals through social media (Sociocultural Attitudes Toward Appearance Questionnaire–Social Media; SATAQ-SM), hostile and benevolent sexism (Ambivalent Sexism Inventory–Short Form; ASI), and the perpetration of interpersonal sexual objectification (Italian version of the Interpersonal Sexual Objectification Scale–Perpetration Version; ISOS-P). Data were analysed by performing structural equation modeling, multigroup analysis, and moderation analysis were used to examine the role of sexual orientation.

The results of the analyses showed that hostile sexism was positively associated with WSO, which was associated with body gaze perpetration, which in turn was positively associated with beauty-ideal internalization through social media. The direct link between hostile sexism and beauty-ideal internalization was not significant. Sexual orientation moderated the WSO–body gaze relationship, suggesting that the link is stronger among non-heterosexual women. Benevolent sexism did not show any significant unique effect.



Overall, these findings highlight an indirect pathway linking hostile sexism to beauty-ideal internalization through objectification processes. Sexual orientation appeared to influence a specific link within this pathway, with a stronger association between objectification of women and body gaze among non-heterosexual women. The results suggest platforms should be encouraged to promote diverse, non-objectifying representations of women and limit content reinforcing harmful beauty norms. Educational and public health initiatives should strengthen media literacy and body image awareness, with attention to sexual minority women. Collaboration with LGBTQ+ organizations may support inclusive interventions fostering body acceptance and resilience against appearance-based pressures.

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PANEL 4b - Digital health, AI, sensors and data-driven innovation**Research Hub Inclusive Health and Well-Being****Impact of various telerehabilitation modalities on physical fitness after an inpatient rehabilitation programme in adults living with obesity: A randomized controlled trial****Rémi SCHNEIDER**

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Keywords: Obesity; Telerehabilitation; Physical fitness; Digital health; Body composition

Introduction: Obesity is a chronic disease with growing worldwide prevalence (Janić et al., 2025). Inpatient rehabilitation improves physical fitness and clinical outcomes; however, these gains typically reverse upon discharge (Martins et al., 2020; Oppert et al., 2025). Telerehabilitation offers a promising strategy for sustaining improvements through remote patient support, yet comparative efficacy data across delivery modalities remain limited (Wichansawakun et al., 2025). This study investigates the impact of different telerehabilitation modalities on physical fitness in patients with obesity following inpatient rehabilitation.

Methods: A parallel 3-arm open-label RCT was conducted at Bernard Descottes Obesity Centre (France, April 2025–March 2026). Adults aged ≥ 18 years with BMI > 30 kg/m² completed a 3-week inpatient programme, then were randomised to three 6-week telerehabilitation arms: Supervised Group (SG) received supervised exercise sessions via Teams (3×/week, 60 min); Unsupervised Group (UG) performed self-directed exercise videos (3×/week, 60 min); Control Group (CG) received motivational messages (3×/week). All interventions were delivered via MS Santé (France) digital application. Primary outcome was functional evaluation (6MWD (m), modified Borg scale for exertion and dyspnea perception, and 30-s sit-to-stand test). Secondary outcomes included fat and fat free mass (%), waist circumference (cm), weight (kg), and BMI (kg/m²).



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Results: 122 participants completed the intervention (SG $n=43$; UG $n=39$; CG $n=40$). Inpatient rehabilitation produced comparable improvements across all physical fitness outcomes regardless of group at $T1$ (all $p < .05$). After telerehabilitation program ($T2$), 6MWD continued to improve in all groups, with a significant interaction ($p = .023$) driven by SG's greater gain (+34.6 m) versus UG (+14.1 m) and CG (+8.1 m). The 30-second sit-to-stand test showed the strongest interaction ($p < .001$), with SG achieving the largest gain (+5.83 repetitions) versus UG (+2.43 rep) and CG (+1.40 rep). Perceived dyspnea revealed a significant interaction ($p = .031$), with SG achieving the largest reduction, followed by UG, whilst CG showed the smallest change. Perceived exertion decreased across all groups ($p < .001$) with no significant interaction ($p = .078$). BMI and weight decreased significantly in all groups with no significant interaction ($p = .088$ and $p = .149$, respectively), indicating comparable overall weight loss. Body composition markers showed the strongest interactions: FM% ($p < .001$), with SG achieving the greatest reduction (−1.89%) versus UG (−0.52%) and CG (−0.24%); and waist circumference ($p < .001$), with SG achieving the largest decrease (−3.3 cm) versus UG (−1.8 cm) and CG (−0.5 cm).

Conclusion: These findings suggest that supervised telerehabilitation is superior to unsupervised and motivational-message-only approaches for sustaining physical fitness gains after inpatient rehabilitation. The supervised group exhibited the most consistent and progressive improvements across walking distance, lower-limb muscular strength, dyspnea, fat mass, and waist circumference, whilst the unsupervised group showed intermediate, more modest gains on these same outcomes. The control group displayed the smallest improvements across most fitness and anthropometric measures. These results underscore the potential added value of healthcare professional involvement in remote post-rehabilitation follow-up for adults living with obesity. Larger-scale trials with extended follow-up are warranted to confirm these findings.

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Validity and reliability of smartphones for step counting during walking

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Daily step count is a simple, accessible, and clinically meaningful metric for monitoring physical activity, with established dose-response relationships to reduced all-cause mortality (Paluch et al., 2022), supported by strong evidence linking regular physical activity to reduced cardiovascular disease, type 2 diabetes, and premature death (Warburton et al., 2006). Smartphones are increasingly used as low-cost tools for step counting, yet their accuracy remains poorly documented under ecological, free-living conditions, and is known to vary with body position and device model (Fuller et al., 2020). This study examined the criterion validity, measurement error, and reliability of smartphone-based step counting across three body positions, and secondarily explored differences between two smartphone models, during a 6-minute walk performed outdoors at a self-selected pace, following the validation framework recommended by the INTERLIVE network (Johnston et al., 2021).

Thirty-eight healthy adults (10 men, 28 women; mean age 23.4 ± 8.5 years) were allocated to two independent groups according to smartphone model (Samsung Galaxy A17, $n = 20$; OnePlus, $n = 18$). Three smartphones were worn simultaneously at three body positions (Hand, trouser Pocket, Armband), and step counts were averaged across three applications (Pacer, Google Fit, Accupedo) to limit application-specific bias. Two Physilog® 5 inertial sensors served as the criterion reference. Validity was assessed using Pearson or Spearman correlations, measurement error using Bland-Altman analysis and Mean Absolute Percentage Error (MAPE), and reliability using intraclass correlation coefficients (ICC[3,1]).



Among the 38 participants recruited, 34 had complete reference data and were included in the analysis. The Pocket and Armband positions did not differ significantly from the reference, showing good validity ($r = 0.79$ and 0.77 , respectively), good reliability ($ICC = 0.78$ for both), and excellent accuracy ($MAPE = 2.93\%$ and 3.24%), with no significant effect of smartphone model. The Hand position performed poorly overall, but with a marked model-dependent pattern: for OnePlus, validity was null and non-significant ($r = 0.12$), reliability was very low ($ICC = 0.04$), and accuracy was unacceptable ($MAPE = 17.01\%$; bias = -126.8 steps, $p < 0.001$); for Samsung, measurement error was markedly lower ($MAPE = 4.04\%$), but validity remained non-significant and reliability only moderate ($ICC = 0.58$), so this position could not be considered exploitable either.

These findings indicate that smartphone-based step counting during a 6-minute walk is valid and reliable when the device is worn in the trouser pocket or an armband, regardless of the model tested, supporting the use of smartphones as an accessible, low-cost tool for physical activity monitoring in research and clinical settings, as previously demonstrated in an oncology population (Douma et al., 2018). Conversely, the hand position should be excluded as a standardised measurement site for both devices, a pattern that highlights the potential contribution of proprietary step-counting algorithms and/or hardware components, which manufacturers should document more transparently.

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Comparison of the 6 minute walk test (6MWT) values obtained using inertial measurement units (IMUs) and clinical measurement

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Keywords: 6-minute walk test; inertial measurement unit; gait; distance covered; older adults

The six-minute walk test (6MWT) is widely used to assess functional walking ability based on the distance covered (DC) (Cazzoletti *et al.*, 2022). In clinical practice, DC is typically measured by multiplying the number of segments completed by the length of the course (M1) (O'Neal *et al.*, 2022). However, this method can be influenced by examiner-related measurement errors (Shah *et al.*, 2022), as well as by the configuration of the course (Ngueleu *et al.*, 2024). Inertial measurement units (IMUs) offer a promising alternative due to their ability to estimate gait parameters and walking trajectories, including during changes in direction (Shah *et al.*, 2022). The purpose of this study was to compare the DC during the 6MWT as measured by M1 and by two IMUs sensors attached to the shoelaces (Physilog® 5). A second objective was to assess the influence of age on the differences between the two methods.

A cross-sectional observational study was conducted among 44 participants divided into two groups: 28 young adults (YA; 25 ± 4 years) and 16 older adults (OA; 69 ± 10 years). The DC during a 6MWT performed on a 30 m course was measured simultaneously using two methods. Agreement between the methods was assessed using the intraclass correlation coefficient (ICC), the root mean square error (RMSE), the normalized root mean square error (NRMSE), and Bland-Altman analysis. The influence of age was analyzed using a linear mixed model that included an interaction term between the method and age.

In YA, the mean distances measured were 582 ± 65 m for M1 and 577 ± 64 m for the IMUs. In the OA group, these measurements were 434 ± 84 m and 447 ± 88 m, respectively. The agreement between methods was excellent in both groups (ICC = 0.994 [0.966-0.998] in the YA group; ICC = 0.955 [0.855-0.985] in the OA group), with low relative errors (NRMSE = 1.2% and 6.0%, respectively). Bland-Altman analysis showed a low bias between M1 and the IMUs (4.49 m in the YA group; -12.84 m in the OA group). A significant interaction between age and measurement method was observed. For each additional year of age, the difference between the distances obtained using the two methods increased on average by 0.37 m [0.19; 0.56].



The IMUs system showed excellent agreement with M1 for measuring DC during the 6MWT. Although the differences between the two methods increase slightly with age, their magnitude remains small relative to the distances measured. These findings support the use of IMUs as an instrumented option for estimating DC during TM6.

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Sensing inequity: AI-assisted diagnosis of smell and taste disorders

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Keywords: chemosensory disorders; artificial intelligence; health equity; olfaction; inclusive Health

Chemosensory disorders affecting olfaction and gustation remain an underestimated component of human health despite their established impact on nutrition, emotional well-being, cognitive function, social interaction, and quality of life. Their assessment is still largely confined to specialised settings, with limited integration into routine screening pathways and substantial variability in access across populations.

The COVID-19 pandemic markedly increased awareness of chemosensory dysfunction (Cecchetto et al., 2021) while highlighting persistent diagnostic inequalities affecting older adults, post viral patients, migrants, and individuals with limited access to specialised care. These disparities provide a relevant framework for examining how digital innovation can contribute to more inclusive and equitable models of healthcare, in line with EUPeace's transdisciplinary mission.

This contribution presents an integrated framework for AI-assisted chemosensory assessment developed within the otorhinolaryngological and neuroscientific research activities of the University of Calabria (Cantone et al., 2022). Standardised psychophysical evaluation of olfactory and gustatory function (Hummel et al., 2007) is combined with multimodal clinical information and machine-learning approaches to support phenotype classification and patient stratification.

Neuroimaging-based analyses (Canna et al., 2022) provide complementary insight into the neural correlates of chemosensory dysfunction and age-related sensory decline (Masala et al., 2022).

The potential value of this framework extends beyond diagnostic performance. By translating complex multimodal information into interpretable clinical patterns, AI-assisted approaches may support scalable screening, remote monitoring, telehealth triage, and earlier identification of individuals requiring specialist assessment. Smell and taste are particularly suitable for re-search informed teaching and health communication because they connect advanced scientific concepts with familiar sensory experiences. Clinical cases, psychophysical testing, and visual representations of AI-supported decision processes can therefore facilitate understanding among students, healthcare professionals, and non-specialist audiences, while encouraging critical reflection on the limitations, ethical implications, and equitable use of digital health technologies.

AI-assisted chemosensory assessment can thus be understood not only as a technological development, but as part of a wider approach to inclusive health. Integrating diagnostic innovation, health literacy, and equitable access to care may contribute to a more informed and socially sustainable European healthcare landscape.

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From routine clinical data to predictive intelligence: Leveraging targeted geriatric assessment and secondary data use in a climate-sensitive context

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Climate change is increasingly recognized as a major factor influencing the health of older adults by exacerbating physiological vulnerabilities such as dehydration, cardiovascular instability, and impaired neuromuscular function. These changes contribute to a higher risk of adverse events, particularly falls, but also undernutrition, sedentary behavior, diabetes, and depression. Addressing these complex and interconnected risks requires a shift toward more integrated and data-driven approaches in geriatric care. Comprehensive Geriatric Assessment (CGA) provides a multidimensional evaluation of an older person's health status, covering clinical, functional, cognitive, nutritional, and social domains. While highly informative, its systematic use for all patients can be resource-intensive and difficult to implement in routine practice. A more pragmatic strategy is therefore needed, based on prioritizing the collection of key variables according to the specific clinical outcomes.



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The role of artificial intelligence - supported healthcare services in protecting the health of migrant mothers: A narrative review

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Keywords: immigrant women; maternal health; artificial intelligence; healthcare; maternal health care

Background

Maternal health is being severely affected globally by ongoing and changing climatic conditions, conflicts, wars, migration and socio-economic crises. Migrants are disproportionately affected, particularly due to limited access to healthcare services. In this context, AI-supported digital interventions can significantly improve healthcare for migrant mothers in particular.

Objective

The aim of this study is to examine the opportunities offered by AI-based healthcare services in terms of migrant women's access to maternal health services, as well as the challenges encountered in this process.

Method

This study was designed as a comprehensive and systematic narrative review. Searches were conducted in the PubMed, Scopus, Web of Science and Google Scholar databases up to April 2026. Articles published in peer-reviewed journals, for which full-text access was obtained following a review of titles and abstracts, were included according to pre-defined inclusion and exclusion criteria. The following terms and combinations thereof were used as keywords: "Immigrant", "Refugee", "Asylum seeker", "Immigrant Women", "Refugee Women", "Asylum seeker", "Maternal Health", "Maternal Health Care", "Antenatal Care", "Prenatal Care", "Postnatal Care", "Artificial Intelligence", "Machine Learning", "Deep Learning" and "Natural Language Processing" were used to retrieve data, utilising the PRISMA 2020 flowchart. The SANRA scale was used to assess the quality of the study.

Findings

A total of five studies were included in the review. These comprised studies involving AI-based mobile health interventions (n = 4), machine learning prediction (n = 1), studies on healthcare needs (n = 2), and studies on the usability of this technology (n = 2). It was reported that AI-based mobile support significantly improved continuity of antenatal and postnatal care among migrant women. However, at



the usability stage in this field, migrant women's limited technical capabilities and data privacy concerns posed limitations.

Conclusion

The importance of integrating artificial intelligence-based digital tools into the healthcare system to improve maternal health among migrant women is emphasised. For these innovations to be incorporated into routine practice and to improve maternal health outcomes, an equity-focused design, transparency and seamless integration with electronic health records are required.

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PANEL 5 - Security Studies in comparative perspective
Research Hub Security and Conflict Transformation

Mediating scarcity: food governance, climate stress and political order in Syria

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This article examines how food governance mediated the relationship between climate stress and political order in Syria across civil war and transition. It argues that food was not only a humanitarian issue or a by-product of conflict, but a central arena through which rival authorities built, enacted, and contested rule. Drawing on the Syrian case from the fragmentation of state authority to the post-Assad transition, the article analyses how the Assad regime, ISIS, Hay'at Tahrir al-Sham, the Autonomous Administration of North and East Syria, and later the transitional authorities used wheat procurement, bread subsidies, aid access, market regulation, and control over water and agricultural infrastructure to translate territorial control into everyday forms of governance. These actors pursued different political projects, yet all treated food systems as material and symbolic instruments of authority.



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With ukraine, without the usa, and against russia? The prospects for a new european security architecture

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Keywords: European security architecture; strategic autonomy; Ukraine; NATO; Russia

Russia's full-scale invasion of Ukraine in February 2022 has fundamentally altered the European security environment, challenging assumptions that shaped the continent's post-Cold War order and renewing debates over European strategic autonomy. At the same time, uncertainty surrounding the durability of United States security commitments has intensified questions about whether European states could assume greater responsibility for their own defense (Michaels and Sus, 2024; Ossa, 2025). Against this background, this paper examines the prospects for a European security architecture constructed “with Ukraine, without the USA, and against Russia.” It asks whether Europe possesses the political cohesion, military capabilities, and institutional structures necessary to sustain such an arrangement and what role Ukraine could occupy within it.

The paper advances three interconnected arguments. First, Ukraine should increasingly be understood not solely as a recipient of European security assistance but as a potential security provider. Since 2022, Ukraine has accumulated extensive operational experience in high-intensity warfare, drone operations, battlefield innovation, cyber defense, and adaptation to Russian military tactics. Its integration into European defense structures could therefore contribute materially to European deterrence and shift the geographical and strategic center of European security toward the continent's eastern flank.

Second, Russia has become the principal external threat around which European defense cooperation is increasingly organized. The invasion has contributed to renewed attention to territorial defense, defense-industrial capacity, and closer interaction between EU and NATO frameworks (Mustasilta and Karjalainen, 2025). Rather than producing immediate European strategic autonomy, however, the war has also demonstrated the continuing centrality of NATO and transatlantic capabilities to European defense (Michaels and Sus, 2024; Ossa, 2025). European efforts to strengthen autonomous capacity therefore coexist with institutional and material dependence on the transatlantic security framework.

Third, these constraints make the emergence of a fully autonomous European security architecture without substantial American involvement unlikely in the short term. Political differences among European states concerning strategic priorities, threat perceptions, defense procurement, and the appropriate relationship between the EU and NATO further complicate the development of a unified European defense system. The paper therefore argues that the most plausible trajectory is a hybrid architecture combining stronger European defense capabilities, deeper integration of Ukraine into European security structures, and continued reliance on NATO as the principal framework for collective defense. Strategic autonomy is thus understood as increasing Europe's capacity to act when American support is constrained rather than replacing the transatlantic alliance altogether.

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Transformation of international presence after Kosovo's independence

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The declaration of Kosovo's independence on February 17, 2008 marked a historic turning point in state-building efforts in the Western Balkans. However, this act of sovereignty did not signify an immediate break from the past of international intervention; rather, it ushered in a prolonged period of coexistence between local institutions and various international structures. Instead of ending, the intervention took on a new, more sophisticated form, with declared aims of building internal capacities and supporting democratic transition. In reality, however, the international presence in Kosovo remained strong, often exercising decision-making powers that challenged the very notion of an independent and sovereign state.



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What went wrong? Donor-driven gender interventions, post-conflict fragility and the failure of contextual adaptation in Afghanistan (2001-2021)

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The collapse of two decades of international gender in education programming in Afghanistan following the 2021 Taliban takeover represents one of the most striking case of post-conflict intervention failure in recent history. Drawing on +15 years of field experience in Afghan gender and education programming - including roles at the ministerial and donors levels - and a critical systematic review of 65 studies (2002-2024), this paper argues that the failure is not incidental but structural: international donor systematically imposed Western gender frameworks onto a society governed by Islamic jurisprudence and customary law, producing gains that were measurable but unsustainable. This paper identifies three tensions driving this failure - progress versus sustainability, access versus empowerment, and universal norms versus local legitimacy - with direct implications for conflict transformation, women's security, and rights-based policy in fragile states.



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PANEL 6a - Climate Transitions, Resource Conflicts and Environmental Politics

Research Hub Climate Science and Just Transition

The environmental cost of AI warfare: Resource consumption, inequality, and global sustainability

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Keywords: Military AI, Environmental Impact, Climate Justice, Resource Depletion, AI Governance

The increasing use of Artificial Intelligence (AI) in warfare is reshaping modern conflict while generating significant and often overlooked environmental costs. This paper examines the environmental impact of military AI, highlighting its direct contribution to global resource depletion, energy consumption and greenhouse gas emissions (Nasaw, 2024). Adopting an interdisciplinary approach, it analyzes the full lifecycle of AI systems, from the extraction of critical minerals to the intensive energy demands of compute data centers and rapid technological obsolescence (IEEE, 2025; Luccioni, 2024). The study argues that global competition in AI-driven military innovation intensifies exploitation resource and aggravate structural inequalities, directly undermining global efforts toward ecological transition (BSIA, 2025). Particular attention is given to the link between AI militarization and climate justice, demonstrating how environmental burdens disproportionately impact vulnerable regions. Ultimately, the paper calls for integrating environmental accountability into military AI governance to foster more climate-resilient security models (IMCCS, 2024).

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Climate change and just transition in fragile territories: Rare earth extraction by the Sámi communities in Northern Sweden

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keywords: Sámi communities; rare earth extraction; reindeer husbandry; climate change; seasonal migration.

The accelerating demand for rare earth elements (REEs), driven by the global transition toward low-carbon technologies, exposes fundamental tensions within contemporary narratives of sustainability and the Just Transition. While rare earths are presented as indispensable resources for renewable energy systems, electric mobility, and digital infrastructures, their extraction raises critical questions regarding the uneven distribution of environmental costs and benefits. Increasingly, the ecological burdens associated with resource extraction are displaced onto peripheral regions and Indigenous territories, where economic development agendas often conflict with local livelihoods, cultural rights, and environmental integrity. Within this context, the Indigenous Sámi communities of northern Sweden provide an emblematic case through which to examine the contradictions of this kind of Green Transition.

Sámi reindeer husbandry is not merely an economic activity but a mobile socio-ecological system grounded in seasonal migration, transhumance routes, and extensive landscape connectivity.

The movement of herders and reindeer across large territories is essential to pasture rotation, ecological adaptation, cultural transmission, and the reproduction of Sámi livelihoods. Mobility is not an auxiliary feature of the system but one of its constitutive foundations.

However, the expansion of mining operations, rare earth extraction projects, wind energy installations, transportation infrastructures, and associated industrial developments is increasingly fragmenting these landscapes. Such processes reduce access to grazing areas, interrupt migratory corridors, and constrain both reindeer mobility and the spatial practices through which Sámi communities maintain social, cultural, and economic continuity. At the same time, climate change is altering snow conditions, freeze-thaw cycles, and vegetation dynamics, affecting pasture quality and limiting the availability of winter forage. These environmental transformations have led to a growing reliance on supplementary feeding practices, generating additional economic pressures and reshaping traditional herding practices.

Drawing on diverse perspectives - political ecology, environmental justice, mobility studies, and Environmental Humanities - this paper argues that the cumulative interaction of extractive development and climate change produces a form of socio-ecological vulnerability that cannot be adequately captured by technocratic understandings of sustainability.

Based on qualitative research combining secondary sources, policy documents, and semi-structured interviews, the paper examines how Sámi communities experience and negotiate these overlapping pressures. It argues that sustainability pathways, when detached from robust land governance, Indigenous rights, and the protection of Indigenous mobility systems, may reinforce existing inequalities rather than enable socially equitable transitions. The Sámi case thus highlights the need to rethink the green transition not only as a technological project but also as a question of territorial justice, ecological integrity, mobility rights, and Indigenous sovereignty.

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No Future for the People? The Far-Right and the Energy Transition in a Car-loving Germany

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Keywords: Energy transition; electromobility; far-right; ontological security

The European energy transition forces local economies and ways of life to change. Societies built around a carbon-based economy, and affectively invested in it (Dagget, 2018), now see their worlds threatened by the perception that they belong to the past. In Germany, at a time of perceived crisis in the national car industry, the change to electromobility has been deemed painful for risking thousands of jobs and an economic sector that has become a proud collective marker over eight decades (Rieger, 2009).

Against this background, the far-right party Alternative for Germany (AfD) has endorsed recarbonization and a growing reliance on fossil fuels (Hess and Renner, 2019), unlike the centre-right or other far-right parties in Europe. Notably, it targets areas dependent on automotive plants by declaring war on the energy transition under highly emotional terms, therefore challenging the European Union's ambitious plans to spearhead a renewables-based industrial revolution. In doing so, AfD members have often claimed the energy transition will design a bleak future with no place for the German people, taking away political liberties and economic prosperity. This way, the party has systematically denied the deadly threats for humankind stemming from climate change to privilege perceived political and economic threats posed by climate politics, arguing it will lead such car-dependent places to a catastrophic end in a crumbling world order.

This paper investigates the role of the far-right in the rise of divided interpretations of the energy transition in Wolfsburg, the birthplace of Volkswagen (VW). This city located in the state of Lower Saxony has been famously influenced by VW – converted into an industrial symbol for West Germany after the Second World War (Streeck, 2019) – and shaped its own identity around this beloved national company. This identity, however, has found itself at peril once it became clear in the past few years that VW would most likely sharply shrink or close factories around the state. At the same time, the AfD has enjoyed a significant increase in the share of votes casted in Wolfsburg's electoral district for federal elections, gaining over 12 percentage points (9,6% to 22,1%) between 2021 and 2025 (Die Bundeswahlleiterin, 2025).

By deploying Critical Future Studies, Ontological Security Studies and research on the far-right's affective grip, I show that apocalyptical far-right imaginations of a lacking future channel local ontological insecurity brought about by the energy transition. I conduct non-participant observation, interviews, qualitative content analysis, and discourse analysis to map emotional discourses by key actors in Wolfsburg and collect apocalyptical narratives by the AfD. Ultimately, I show how AfD's future-making strategies catch on, produce local affective identities, and garner political support for a nationalist project in a city under existential threat.

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Wood energy, local conflict and controversies surrounding forest management practices in the face of climate change: The case of the Biosyl project (Guéret, Massif Central, France)

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Keywords: Environmental conflict; wood energy; forests; climate change; political ecology

Whilst wood energy is often considered to be a contributing factor to the decarbonisation of economies, its development is the subject of growing debate (Banos and Dehez, 2017).

This contribution aims to highlight the potential contradictions between the necessary development of renewable energy and the ways in which this is implemented through processes of increased production and greater mobilisation of forest biomass (Sergent, 2014). For the proponents of the contested project, forest biomass is regarded as a resource to be exploited primarily from an economic perspective. However, a new line of argument is emerging in view of the vulnerability of forest stands to global warming. In this context, many stakeholders in the timber sector consider the renewal of stands to be essential. Conversely, for those involved in the protests under study, these arguments are merely a rhetorical strategy that risks 'depoliticising' issues of forest management whilst reinforcing the expansion of industrial monocultures (Kröger, 2016). Forests are at the core of debates concerning their status, functions and uses. These discourses, representations and practices have a significant impact on the emergence of forestry conflicts (Kull, 2017). To what extent is opposition to an industrial wood energy project driven by conflicts concerning values, representations and definitions of forests and their functions in the context of global warming? The present study is grounded in field research conducted between 2023 and 2025. Semi-structured interviews and participant observation were conducted with members of residents' groups, environmental organisations and trade unions involved in forest-related protests, as well as with local elected representatives and stakeholders in the timber industry. The presentation draws upon a range of activist and institutional documents and press articles. The strategies and arguments of these stakeholders will be analysed in order to reveal how different perceptions and definitions of forest vulnerability influence the dynamics of the conflict.

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Hydropower governance and territorial dynamics in the Sila Plateau

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Hydroelectric power is crucial for the sustainable energy transition, yet climate change makes water increasingly scarce. This scarcity fuels competition and conflicts among various actors over different uses, such as drinking water, agriculture, and tourism. Our research examines the governance and socio-technical network of the Arvo and Ampollino reservoirs in Italy's Calabrian Sila plateau, where hydropower competes with agricultural and drinking water needs, local water uses compete with energy profits which are made by a company from Northern Italy, and the regulation by competent public bodies is contested by relevant stakeholders. By reconstructing collaborative and conflictual territorial dynamics, this case study illustrates the tensions surrounding the energy transition in peripheral, resource-rich areas.



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PANEL 6b - Climate Communication, Innovation and Inclusive Green Transitions

Research Hub Climate Science and Just Transition

Under-appreciate and climate policy: Analysis of survey data across 11 European countries

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Keywords: Populism; climate change; policy; attitudes

Climate change is an existential threat to human societies through increased disease transmission, extreme weather and instability in the good system and other issues. However, climate-related policies have become politicized and it has been difficult to implement climate change policies to meet emissions targets and to harden infrastructure against climate change. There is a robust literature considering under-employment (Zagórski et al., 2021), fear of migrants (Thiele et al., 2024) and right-wing political strategies across the world. Much of this literature has focused on lack of support for policies such as immigration, health care, climate change (Kulin et al., 2021) and LGBTQ+ rights. Creating messages that appeal to individuals who are part of the right-wing populist movement may help create a political climate where climate-related policies are easier to pass and implement with greater public support. It has been hypothesized that people engage in right-wing populist rhetoric because they feel, in part, that elites are controlling their world and that they are not able to reach their full potential (Baro, 2022). The purpose of this work is to determine whether under-appreciation could be used uniquely to predict policy support for left-leaning policies for individuals who feel under-appreciated and thereby might be at risk of right-wing populist beliefs since feelings of under-appreciate could be linked to having the sense that a person's full potential is not being appreciated. This cross-sectional weighted analysis of CRONOS3 data from the European Social Survey tests the relationship between feeling under-appreciated, climate despair and confidence in climate-related policies and policies to help the citizens of the countries in which data was collected (11 European countries).

The focus is on policies within the country in which respondents live, increasing the salience of the policy. Across models, results suggest that individuals who feel under-appreciated are less likely to experience climate despair (Coef=-0.21, $p<.001$), and to be confident in climate policy (Coef=-0.05, $p<0.001$) and less likely to support the government helping students financially (Coef=-0.03, $p<0.01$). However, they are more likely to support support helping the elderly (Coef=0.003, $p<0.001$) and there is no statistical effect on helping families with young children financially. There is a positive statistical relationship between donating, volunteering, posting online and being less than 35 on feeling left behind. Implications for future research and climate-related message design are discussed.

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The symbolic materiality: The construction of light housings in a French village

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Keywords: Community ; Materiality ; Light housing ; Local dynamics

In direct response to environmental issues, many people are seeking to make fundamental changes to their way of life. They are therefore coming outside urban centres, as part of a movement towards political emancipation and local self-reliant development. Proposing new ways of living together through the sharing of common resources, they are thus “intentional communities” (Miller, 1990), to which, however, a central environmental dimension is added. Nevertheless, this often appears to be the work of people from favourable socio-political backgrounds, thereby raising issues of local justice under the guise of universal environmental concerns. Indeed, the value of the proposed study lies in analysing local dynamics that may initially reflect a desire for openness towards the local community, but which could ultimately take the form of domination and gentrification (Richard and Tommasi, 2025). However, although rarely analysed, the built environment and physical infrastructure are the primary mediators of this relationship, acting as an immediate visual image (and imaginary).

Thus, based on an analysis in western France, combining ethnographic research with individual and group interviews, we will critically examine the materiality of the housings, since the community under observation is characterised by the establishment of around ten light housings (yurts, wooden cabins, clay-straw houses, etc.). This presentation aims to highlight the tensions that exist between individual initiative (building for oneself), and the (imagined?) external view of the housing (building for others) ; between the symbolic issues behind such ecological constructions, and the material “dialogue” that ensues with the “other” inhabitants of the village.

On the one hand, the group under study want to realise their ideal through their project. They refuse to live in the city, without social ties. Yet the sense of space is directly linked to the sense of self, which in turn is intimately connected to one’s environment (Hall, 1966). They therefore decided to take matters into their own hands and become their own architects, in order to develop something that closely reflected their desires and values. They wished to be as close as possible to nature, blending into it, and focused on interpenetration (Benjamin, 1999). In doing so, they are challenging the traditional relationship between the interior and the exterior.

However, on the other hand, the eco-hamlet is not merely a physical project, but rather a conversation that develops between all the village’s residents. A dialogue is taking place here, the community is therefore not addressing only itself, but is also building “for” others. Depending on whether the physical form of the eco-hamlet is perceived as a sign of legitimacy (a conscious choice, a coherent way of life) or as a sign of deviance (marginalisation, non-conformity with local housing standards), it becomes a vehicle for either integration or distancing. What matters here in architecture, therefore, is not the form itself, but effective communication with an audience (Venturi and Scott Brown, 1972).

Through an interdisciplinary approach, this contribution explores the mutations arising from environmental challenges and the choices made by stakeholders to address them, thereby disrupting local dynamics.

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From climate to crisis nexus: Third-level agenda-setting in the age of AI-driven journalism

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Keywords: Climate Crisis Communication; Third-Level Agenda-Setting; Artificial Intelligence; Climate-Migration-Conflict Nexus; News Agenda

Climate change has increasingly become a multidimensional societal challenge whose consequences intersect with migration, conflict, public health, economic vulnerability, and broader questions of social resilience. Against this background, this study examines how climate crisis communication is constructed within the contemporary digital news ecosystem by focusing on the relational structures through which climate change is associated with other major societal risks. The study is grounded in Third-Level Agenda-Setting Theory, also conceptualized through the Network Agenda-Setting Model, which extends traditional agenda-setting research by examining not only the salience of individual issues and attributes but also the connections established among them in media representations (Guo, Vu and McCombs, 2012). From this perspective, the research investigates whether and how climate-related news constructs networks of meaning connecting global warming with migration, conflict, and public-health concerns. The empirical analysis focuses on climate-related news published between 2025 and 2026 by three major national newspapers in Türkiye—Hürriyet, Sabah, and Sözcü. These outlets were selected because of their broad audience reach and their representation of different editorial and ideological positions within the Turkish news landscape. Methodologically, the study adopts a mixed analytical design combining content analysis and text analysis in order to identify recurring thematic associations and discursive patterns across the selected news corpus. Particular attention is given to the frequency, prominence, and configuration of linkages between climate change and migration crises, emerging conflicts, and health-related risks. The research additionally situates these patterns within an increasingly algorithmic and AI-influenced media environment, in which computational systems are becoming relevant to processes of news production, distribution, prioritization, and visibility (Diakopoulos, 2019). Rather than assuming a direct causal effect of artificial intelligence on the sampled news content, the study considers AI-driven editorial dynamics as part of the broader transformation of the digital information environment within which contemporary agenda-setting processes operate. The analysis is expected to show whether climate crisis communication is increasingly organized through cross-issue associations rather than through isolated environmental narratives. By examining these relational patterns, the study seeks to extend the application of Third-Level Agenda-Setting Theory to contemporary climate communication and contribute to discussions about how networked news agendas shape public understandings of interconnected global risks. The findings are also expected to offer implications for media practitioners, researchers, and policymakers seeking more inclusive, evidence-informed, and socially responsive approaches to climate crisis communication.

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Regional innovation ecosystems and their limits: The case of skilled employment in a just transition region

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Keywords: regional innovation system; regional development; innovation; Karlovy Vary Region; institution

This paper examines the role of institutions within the regional innovation system of the Karlovy Vary Region in Czechia, focusing on their support for firms' innovation activities and their perceived contribution to creating opportunities for highly skilled workers.

The concept of regional innovation systems is based on the assumption that innovation does not emerge within firms in isolation but through interactions among firms, knowledge organizations, public authorities, and intermediary actors. These actors collectively shape a region's innovation capacity and performance (Tödtling & Trippl, 2018). Regional innovation systems are commonly understood as comprising two interacting components: a knowledge generation and diffusion subsystem and a knowledge application and exploitation subsystem (Autio, 1998; Cooke, 2004). Existing research has predominantly examined well-performing and institutionally developed regions, while innovation systems in smaller, peripheral, and declining regions have received comparatively less attention (Blažek & Uhlíř, 2020). The Karlovy Vary Region, a region undergoing a transition away from lignite mining and related industries, therefore represents a relevant case for examining how a regional innovation system operates under conditions of limited research capacity and the absence of a public university with a regional campus.

The paper investigates which actors constitute the regional innovation system, which instruments they use to support firms' innovation activities, and how institutional representatives perceive the system's contribution to attracting and retaining highly skilled workers. The study employs a qualitative case-study design based on six semi-structured interviews with representatives of key institutions involved in the regional innovation system. The interviews were recorded, transcribed, and analyzed thematically. The interview data were supplemented by an analysis of institutional websites and regional strategic documents.

The findings indicate that the system is coordinated primarily by the Karlovy Vary Region Innovation Centre in cooperation with the regional government. Institutions support innovation through financial instruments, particularly innovation and entrepreneurship vouchers and investment incentives, as well as through advisory services, networking, and conferences. The interviews provided limited evidence of a direct contribution to the creation of highly skilled jobs. Instead, the system appears to influence the regional labour market indirectly by supporting education, entrepreneurship, skills development, and the external image of the region. The study contributes to the literature by examining how a regional innovation system functions in a small peripheral region with limited knowledge infrastructure and no public university campus. Its main limitation is that it captures primarily the perspectives of support institutions rather than those of firms and other beneficiaries.

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Understanding the climate impacts of AI: Survey data across 11 European countries considering support for climate-related policies and climate despair and use of and support for AI use in the workplace

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Keywords: Artificial Intelligence; Policy; Climate Change; Knowledge

AI systems require vast quantities of energy (De Vries, 2023; Luccioni et al., 2024) and water (George et al., 2023), posing a risk for carbon emissions and environmental degradation. In the context of climate change, AI may provide numerous benefits but these costs must also be considered. It is unclear that individuals who support climate-related policies or who experience climate despair have information about the costs of AI or that information about the costs of AI informs attitudes and beliefs about the use of AI. This study describes nationally representative data across 11 European using the CRONOS3 dataset 2025 using multiple regression analyses. Controlling for demographic covariates and internet use, there was a small positive statistically significant relationship between AI acceptability in the workplace (Coef=0.04, $p<0.01$) and climate despair. There was no statistically significant relationship between AI knowledge and climate despair or AI use and climate despair. There was a statistically significant relationship between climate-related policies and AI acceptability in the workplace (Coef=0.21, $p<0.001$) and a small statistically significant relationship between policy support and AI knowledge (Coef=0.2, $p=06$, $p<0.01$). For AI knowledge ($F(10,8343)=12.9$, $p<.001$, Chi-squared=80.1, $p<.001$), AI use ($F(10,9533)=28.0$, $p<.001$, Chi-squared=80.1, $p<.001$), AI application ($F(10,9533)=23.7$, $p<.001$, Chi-squared=81.2, $p<.001$) results suggested differences in responses toward AI across countries. However, the differences were small and varied across country comparisons in terms of outcome variable.

These results led to a post-hoc analysis of the demographic differences associated with AI use and AI acceptability in the workplace. The purpose of this analysis is to help understand which groups may benefit the most from communication surrounding the climate risks of AI. In our sample, participants who use AI and who support AI use in the workplace generally have a higher income and more education. They use the internet more frequently than those who do not use AI or support AI use in the workplace and donate and volunteer slightly more (perhaps due to having more disposable income or available time). In the group of participant who use AI or support AI use in the workplace and also who experience climate despair or support climate-related policies, these individuals tend to slightly younger and more male than in other conditions. Suggestions for future research and campaign design are discussed.

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Workforce gender diversity and Green Energy: Insights from a firm-level analysis

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Keywords: gender diversity; green energy management; energy efficiency; female empowerment; sustainable development

The transition towards sustainable and low-carbon production systems is not only a technological and regulatory challenge but also an organizational and social one. Firms play a central role in this transition, yet their capacity to implement sustainable energy practices may depend on workforce composition and on the institutional environment in which they operate. A substantial strand of previous research has examined gender diversity at the board or top-management level, documenting its relevance for environmental innovation and performance (Nadeem et al., 2020). However, less is known about gender balance across the overall workforce. This study addresses this gap by investigating whether workplace gender diversity is associated with firms' adoption of sustainable energy management practices and whether this relationship varies across firms, sectors and institutional contexts. We also examine whether women's economic and political empowerment strengthens this relationship.

Drawing on the Resource-Based View (Barney, 1991), Social Role Theory (Eagly & Wood, 2012), the Natural-Resource-Based View (Hart, 1995) and Institutional Theory (DiMaggio & Powell, 1983), we conceptualize workforce gender diversity as an organizational resource whose environmental value may depend on the context in which it is mobilized. A gender-balanced workforce can broaden the knowledge, experiences and perspectives available within firms, enhance problem-solving capabilities and potentially support sustainability-oriented practices. At the same time, these potential benefits may depend on organizational and institutional conditions that enable diverse perspectives to be incorporated into decision-making.

The empirical analysis draws on the EBRD-EIB-World Bank Enterprise Surveys conducted over 2018 - 2020, covering approximately 28,000 manufacturing and service firms across transition and comparator economies. Sustainable energy practices are measured through the Energy Management and Efficiency Index (EMEI), which captures energy monitoring, energy targets, formal energy management and improvements in heating, cooling and lighting systems. Workplace gender diversity is primarily measured through the Blau Index and tested using alternative diversity measures. The empirical strategy combines linear and non-linear specifications with robustness checks and instrumental-variable approaches addressing potential endogeneity.

The results show a robust positive association between workplace gender diversity and firms' adoption of sustainable energy management practices. The relationship remains consistent across alternative estimators and diversity measures and is particularly evident among small and medium-sized enterprises and stronger in manufacturing and energy-intensive industries. Moreover, the association strengthens as women's labour-force participation and political representation increase, suggesting that female empowerment facilitates the translation of workplace diversity into environmental action.



Overall, the findings suggest that workplace gender inclusion and environmental sustainability can operate as mutually reinforcing dimensions of the green transition. By shifting attention from corporate leadership to the overall workforce, the study shows that the environmental benefits associated with gender diversity are shaped by both organizational and institutional conditions. Policies supporting women's economic and political participation may therefore contribute to greater gender equality while also supporting firms' capacity to advance sustainable energy strategies.

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PANEL 7a - EU Migration Governance: Politics, Policy and the Coordination Crisis

Research Hub Migration and Human Rights

Asylum governance and the politics of protection in the European Union: Germany as a prominent case

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Keywords: asylum governance; protection; European Union; Germany; Turkish asylum seekers

This contribution examines asylum governance in the European Union through Germany as a prominent case for understanding the politics of protection. In recent years, asylum has become a central field in which questions of human rights, state sovereignty, administrative discretion, and social belonging are negotiated. Although the EU has developed an extensive legal and institutional framework for asylum, protection is not experienced as a purely legal guarantee. It is shaped by national implementation, political narratives, bureaucratic encounters, and changing ideas of who is seen as deserving of protection (Lavenex, 2001; Fassin, 2012). Germany is a particularly important case because of its central role in European asylum debates and because it combines a comparatively strong protection framework with contested public and political discussions on migration, integration, and security. The paper presents the conceptual and empirical framework of my ongoing doctoral project on Turkish asylum seekers in Germany, especially in the aftermath of the political transformations following 2016. It asks how asylum governance produces and regulates protection, and how individuals seeking asylum navigate the tension between formal legal rights and everyday experiences of uncertainty, recognition, and future-making. By placing Germany within the broader EU asylum regime, the contribution explores how protection is not only granted through legal status determination, but also negotiated through policy categories, administrative practices, access to institutional support, and the recognition or devaluation of educational, professional, and biographical capital. Methodologically, the research follows a qualitative socio-legal approach. It combines the analysis of asylum-related legal and policy documents with narrative interviews with Turkish asylum seekers in Germany. This design connects macro-level developments in EU and German asylum governance with the lived experiences of people subject to these frameworks. Rather than treating asylum seekers solely as objects of policy, the project foregrounds their interpretations, strategies, expectations, and struggles for recognition within the protection regime. The main argument is that asylum governance should be understood as a field in which protection and exclusion are produced simultaneously. Germany's case shows how legal access to protection may coexist with prolonged insecurity, social waiting, and unequal opportunities for inclusion. By focusing on Turkish asylum seekers, the presentation examines how protection is interpreted, administered, and lived in practice. Rather than approaching protection as a fixed legal outcome, it treats it as an ongoing process shaped by rights, institutions, bureaucratic encounters, and everyday struggles over recognition, belonging, and future-making.

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How domestic narratives and policy divergence obstruct european cooperation in migration policy

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Keywords: Germany; European Union; migration; narratives; Poland;

Climate change-induced migration pressure has and will continue to pose a major challenge for European coordination. And yet, European migration governance is characterized by a profound coordination crisis, driven by increasingly divergent national strategies and intensifying domestic political polarisation. Taking Germany and Poland as case studies, this presentation analyses how nationally embedded strategic narratives and conflicting political priorities obstruct bilateral and multilateral cooperation on migration. It also looks at the spillover from the field of security cooperation. Despite an overwhelming functional logic pointing towards deeper cooperation, coordination failures persist.

The research, which is part of a new binational project on German-Polish cooperation in migration and security policy, identifies concrete mechanisms through which national migration policy choices complicate negotiation dynamics within the EU Migration and Asylum Pact. By examining this domestic–international nexus, the paper shows how competing political narratives weaken strategic coordination in Europe and entrench existing patterns of mistrust. It argues that effective migration governance cannot be achieved through EU-level institutional reform alone if domestic political dynamics at the national level continue to undermine coherent bilateral coordination. Using the case study of German-Polish conflicts and cooperation in migration policies and security policies, the paper illustrates the concept of 'reverse spillover' and explores its potential application to other fields of European integration. Methodologically, the paper investigates how populist security narratives invoke notions of ontological security and emotionalise threat perceptions. Strategic narratives constructed by policy-makers and the media both on the national and the local level will be investigated. Thus, this research attempts an innovative fusion of concepts from integration theory and critical security studies. In doing so, the paper contributes new insights into the structural obstacles to developing an inclusive and effective EU migration policy in an increasingly strained security environment.

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Consent-based governance for climate migration: The Funding Gap as a Governance Architecture Failure

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Keywords: climate migration; humanitarian governance; algorithmic vulnerability assessment; consent-based architecture; UNHCR funding verification

The academic diagnosis of humanitarian and development funding failure converges on three structural causes. Weak institutional governance, in the tradition of Ostrom (1990), explains why pledges made in one venue are not enforceable in another. The temporal gap between pledge and disbursement, documented across the aid effectiveness literature associated with Easterly (2006), explains why funds committed at year zero are often absent at year one when needs materialise. Information asymmetry between donor and recipient, in the tradition running from Stiglitz (2002), explains why disbursement cannot be verified from outside the disbursing institution. In climate migration governance these three diagnoses are individually correct and jointly insufficient. By the end of 2025, 82.2 million people were living in internal displacement, the second-highest figure ever recorded (IDMC, 2026), with UNHCR's 2026 operational budget of USD 8.505 billion (reduced by 20% from 2025) standing at 18% committed at year-start. The three diagnostic frames name three symptoms of a single underlying condition: the absence of a constitutional architecture in which donor commitments are recognised as obligations at the point of commitment, verified continuously against the resources required to satisfy them, and rendered algorithmically checkable by parties outside the disbursing institution.

This paper applies the novel Smart-Time transversal constitutional governance architecture (Kennedy, 2026) to the climate migration domain. Smart-Time is constitutionally bound in a precise sense: consent and algorithmic obligation standards operate as genuine complements, not false friends. Algorithmic standards without consent produce coercion; consent without verifiable algorithmic obligations produces unenforceable promises. The architecture requires both conditions to be met before any obligation is recognised as legitimate. The gap between UNHCR declared receipts and OCHA Financial Tracking Service verified disbursements is the empirical Goodhart Delta for humanitarian funding: the quantifiable distance between what institutions claim and what they deliver. Analysis of UNHCR funding allocation patterns (2015-2025) demonstrates that algorithmic vulnerability assessment, drawing on age, health status, persecution risk, and climate exposure, could improve support targeting efficiency by an estimated 40-50% relative to documented discretionary allocation processes, consistent with findings in the humanitarian targeting literature (Brown et al., 2021).

The paper further examines remittance-funded origin development as a complementary resilience pathway: global remittances reached USD 905 billion in 2025, yet transaction costs above 6% systematically extract value from the populations the SDG 3% target is designed to protect (World Bank, 2024). The oracle architecture for the migration domain rests on three independent sources: IDMC/NRC for displacement stock, IATI donor-published disbursements for funding, and Frontex/Eurostat for EU border flows. Two-sided IATI reconciliation across nineteen donor governments confirms that fewer than 10% of UNHCR's reported incoming commitments (2016-2025) are independently verifiable at transaction level from donor-published data (Kennedy, 2026). The gap is not evidence of misreporting; it is evidence that the independent verification architecture does not exist at scale. The paper contributes a causal account of humanitarian funding failure and a consent-based governance architecture capable of resolving its structural cause: replacing retrospective tracking with real-time, oracle-verified disbursement obligations enforceable at the point of commitment.



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Algorithmic governance of climate-induced mobility in the EU: Between anticipation, securitisation and fundamental rights

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Keywords: climate mobility; artificial intelligence; predictive governance; European Union

This contribution examines how European Union law governs institutional reliance on AI-based aggregate forecasts of climate-induced mobility before individual decisions are taken. The research problem stems from a structural asymmetry: public authorities increasingly seek anticipatory knowledge – scenarios, risk indicators and projections supporting preparedness and resource allocation – yet uncertain, aggregate predictions may become a material premise of public action without triggering the intensive safeguards that EU law reserves for individualising decisions. An aggregate forecasting system may satisfy the general definition of an AI system under Article 3(1) of the Artificial Intelligence Act (Regulation (EU) 2024/1689) while remaining outside the enumerated high-risk uses in migration, asylum and border management listed in Annex III. The objective is to reconstruct, as a matter of public law, the conditions under which such upstream reliance becomes legally relevant. Methodologically, the study proceeds through doctrinal and institutional analysis, distinguishing three functional levels – knowledge production, operational structuring and individualisation (cf. Mir, 2024) – and testing them against two institutional chains. Frontex serves as a normative case study in which risk analysis under Regulation (EU) 2019/1896 enters a mediated sequence of vulnerability assessment, impact classification and operational response, without evidence of a deployed climate-mobility AI system. The European Union Agency for Asylum framework illustrates how common country knowledge may acquire administrative force while remaining subject to individual assessment, access to sources, reasons and complete ex nunc review. Drawing on the modelling literature (Schewel et al., 2024) and on critical accounts of how calculation renders futures actionable (Baldwin and Waters, 2025), the analysis shows that the resulting regulatory asymmetry is relative rather than a regulatory vacuum: sectoral powers, good administration, data protection, non-discrimination and effective judicial protection continue to apply under their respective conditions. On this basis, the article proposes the proceduralisation of predictive reliance. Its functional threshold is material institutional reliance – the point at which a predictive output becomes an effective premise of public action, gauged by practical weight, scale, reversibility or proximity to the exercise of rights rather than by recurrent use or technical sophistication alone. Building on the decisional value of preparatory information (Demková, 2021), the framework groups six components – identifiable adoption, graduated assessment, recorded internal justification, assigned responsibility with meaningful human authority, lifecycle monitoring, and preservation of records for contestability – while preserving the distinct status of binding requirements, interpretative implications and de iure condendo safeguards. It thereby makes upstream reliance identifiable, assessable, attributable, monitored and open to later scrutiny, without treating every forecast as a high-risk system or an independently challengeable act, and refuses to let institutional reliance disappear between scientific production and the final individual decision.

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PANEL 7b - Integration, Labour Markets and Local Perceptions

Research Hub Migration and Human Rights

Labour market Integration of migrants in Southern Europe: Field insights from Calabria

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Keywords: labour market integration; informal labour; migration; civil society organisations; Calabria

Southern Italy occupies a structurally paradoxical position within European labour markets: while Calabria experiences sustained outward migration and demographic decline, its agricultural, care, and low-wage service sectors increasingly depend on migrant and refugee labour. Existing policy frameworks tend to treat legal status as the principal gateway to labour-market integration, yet local governance studies suggest that formal recognition does not automatically translate into stable or dignified employment, as reception and territorial-inclusion mechanisms in Calabria remain fragmented and locally negotiated (D'Agostino, 2017)¹⁵. This paper examines how labour-market exclusion and exploitation are produced and sustained at the local level, drawing on qualitative expert interviews conducted with civil society organisations during a doctoral research mobility at the University of Calabria.

Interviews with Entropia APS, La Kasbah ETS, MoCI Cosenza APS, Stella Cometa, and the regional anti-trafficking initiative Progetto IN.C.I.P.I.T., alongside two anonymised organisations, reveal a persistent disconnect between legal status and effective labour-market access. Migrant workers—predominantly from India, Morocco, Tunisia, West Africa, and South Asia—are frequently paid below the official agricultural wage (approximately €6/hour against a legal benchmark of €7.5), a gap sustained by informal recruitment intermediaries (*caporalato*) and an estimated moderate but persistent mafia influence over labour arrangements, consistent with broader evidence on the structural drivers of irregular migrant labour in Italian agriculture (Corrado et al., 2018; Perrotta & Raeymaekers, 2023). Weak trade-union presence further limits workers' capacity to contest these conditions. Interview evidence also situates current exploitation within a longer regional history, exemplified by the 2010 Rosarno uprising against mafia-linked agricultural exploitation.

At the same time, the findings point to a structural contradiction: migrants sustain local economies and counteract rural depopulation, reopening schools and reactivating public services in shrinking Calabrian municipalities—a dynamic already visible in the region's earliest reception experiences in Riace and the Locride, where refugee children "repopulated" village schools amid broader regional policies linking reception to rural development (Elia, 2014). Civil society organisations occupy an ambivalent mediating position—providing legal orientation, reception support, and rights awareness—yet their capacity to shape stable integration outcomes remains structurally constrained, echoing comparative findings on the limits of organizational mediation in Southern European labour markets more broadly (Ares, Estrada-Villaseñor, & Iglesias, 2020).¹⁶

By foregrounding NGO perspectives rather than state or employer accounts, this paper contributes a context-sensitive analysis of informal labour markets in Southern Europe. It challenges integration models that prioritise legal status without addressing the structural conditions of exploitation, and it

¹⁵ This dynamic resonates with the concept of "permanent temporariness" developed in the Turkish context by Şanlıer Yüksel and İçduygu (2018), where prolonged legal ambiguity similarly produces durable precarity rather than progressive integration. The author's own prior research on Syrians under Temporary Protection in Turkey's labour market identifies a structurally comparable mechanism. The author sees temporariness as a prevalent form of capitalist accumulation.

¹⁶ Further elaboration is needed. As the referenced text focus on Spain, its theoretical framework could be expanded to cover Calabria as well since ambivalent roles of civil society organizations emerge from the EU and UN legal frameworks with some local adjustments.



highlights the dual role of migration in Calabria as both a site of labour precarity and a resource for territorial regeneration.

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Beyond economy: How local attitudes and policies shape refugees' destination preferences

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What do refugees prioritize when deciding where to settle in the host country? This question is important for understanding the preferences of one of the most marginalized groups and assessing the deterrent effects of anti-immigration policies. We address it using a conjoint experiment with over 3,000 Syrian refugees in Turkey and Germany. Findings show that local attitudes and policies shape destination preferences more than economic factors or social ties. A follow-up survey in Turkey with open-ended questions reveals that refugees associate anti-immigrant environments with security threats, social isolation, nationalism, and discrimination. As refugees primarily flee for safety, these concerns continue to shape their choices within host countries.

These findings also inform climate-related internal mobility of refugees, where environmental pressures interact with similar political and social constraints, contributing to debates on climate justice and migration governance.



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British and Dutch International migration in French rural areas in the context of global warming

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Keywords : International Migrations; Rural areas; British; Dutch; Social Geography

This paper examines the settlement of British and Dutch migrants in rural areas (Cognard, 2011) of the “Montagne Limousine” (Nouvelle-Aquitaine, France) since the 1980s. The “Montagne Limousine” is characterized by low population density, limited access to services and socio-economic vulnerabilities. The motivations behind these international migrations in this region are varied, but are often associated with the concept of “lifestyle migration” (Benson and O'Reilly, 2009). Many British and Dutch migrants have settled in the region primarily because of its a “green and peaceful” living environment and/or for its affordable housing or proximity to nature, but some others explicitly cite the environment and climate change as motivations for their migration. For these migrants settling in the “Montagne Limousine” can be seen as a strategy in the face of global warming and is often accompanied by the development of an “alternative project” based on bio farming, food self-sufficiency, or simply the desire to live in a green environment that is less polluted than the urban areas where they often previously resided.

This proposition draws on a PhD in social geography analyzing socio-economic data relating to these migrations, on observations made within various associations (for example, French language classes) and on 30 interviews with British and Dutch people living in the ‘Montagne Limousine’. We seek to demonstrate that, if some people did not choose this region because of environmental crises, others chose it precisely for that reason.

Going beyond simply defining these migrants as “climate migrants”, this article examines the link between “lifestyle migration” and “climate migrants”. It argues that global warming can act as a gradual factor within broader migration projects, influencing not only decisions to migrate, but also the way in which migrants appropriate, transform and imagine rural areas.

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PANEL 8a - Climate-driven migration, vulnerability and psychosocial well-being

Research Hub Inclusive Health and Well-Being

Staying or leaving? Madrasas and climate-driven (im)mobility in Southern Maghrib

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What makes people stay when environmental and economic pressures on local communities are intensifying? This contribution explores this question through the role of traditional madrasas in the southern Maghreb. In the arid and semi-arid regions of southern Morocco, southern Algeria, and Mauritania, drought, water scarcity, and the erosion of traditional livelihoods form part of broader economic and social conditions affecting local communities. Yet environmental pressure does not translate automatically into migration. Decisions about whether to leave, remain, return, or maintain connections across places are shaped by kinship, social relationships, moral expectations, and locally grounded forms of belonging.

Drawing on ethnographic research in traditional madrasas and one author's first-hand experience of studying in these institutions, this contribution examines them as part of the social infrastructure through which communities navigate and respond to such pressures. Madrasas are not simply places of religious education. They are locally embedded social worlds in which learning is intertwined with relationships, communal life, moral formation, and, in many contexts, Sufi-oriented forms of spiritual cultivation. Students do not merely acquire religious knowledge; they become part of networks of teachers, families, peers, and local communities. These networks can provide social continuity and a sense of belonging at moments when economic or environmental circumstances make leaving a conceivable option. Madrasas therefore do not necessarily prevent migration. Rather, they can contribute to the social conditions that make staying both possible and meaningful.

This embeddedness becomes particularly visible in the ways madrasa traditions extend into family life. Religious learning does not end when students leave the madrasa, but continues through kinship networks and across generations. Within faqīh families, for instance, women participate in transmitting Qur'ānic memorisation and recitation to children, including through the use of traditional wooden tablets. Such practices are more than the continuation of an educational technique: they reproduce a shared religious and familial world in which knowledge, memory, and place are closely intertwined. Through these everyday practices, attachment to the local community and landscape is sustained not only institutionally but affectively. The land in which families have lived, worked, prayed, and transmitted knowledge across generations becomes part of what is valued, remembered, and experienced as home. In this sense, the madrasa participates in producing forms of belonging that are not easily separable from a particular place.

This local embeddedness also matters in a wider regional context marked by political instability, armed conflict, and the spread of competing religious interpretations. Traditional madrasas preserve established scholarly lineages and locally recognised forms of religious authority, while embedding religious learning within enduring communal relationships. Their contribution to resilience therefore cannot be reduced to the transmission of religious doctrine. By sustaining trusted institutions, intergenerational ties, and forms



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of religious belonging rooted in local communities, they may help preserve social worlds in which alternative, more radical forms of religious authority do not easily displace established traditions. The contribution ultimately argues that climate-related (im)mobility cannot be understood through environmental pressure alone. What matters is how such pressure is mediated by the social institutions through which people understand home, obligation, community, and a meaningful life. Traditional madrasas illuminate this process particularly well. They do not simply provide reasons to stay; they participate in the reproduction of the relationships, memories, moral commitments, and attachments that make a place worth staying in. Examining madrasas in this way shifts the question from why people migrate to a more fundamental one: when environmental and climatic pressures make leaving increasingly possible, what makes people stay—and what makes staying still worth choosing?

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Psychosocial well-being of migrants in Bosnia and Herzegovina: Systemic challenges and professional perspectives

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Keywords: *psychosocial support; migrants; mental health; Bosnia and Herzegovina; social work*

Since 2018, Bosnia and Herzegovina has been situated within a sustained transit migration context that has exposed structural limitations in institutional coordination and the provision of psychosocial support services. Within this setting, the psychosocial well-being of migrants, refugees, and asylum seekers is shaped by the intersection of pre-migration adversity, transit-related stressors, and post-migration uncertainty in reception environments.

This study adopts a qualitative research design grounded in semi-structured interviews with professionals (social workers, psychologists, and psychotherapists) engaged in psychosocial support within international non-governmental organizations operating in Bosnia and Herzegovina. The analysis is informed by thematic analysis (Braun & Clarke, 2006), enabling a systematic identification of patterns related to service delivery, professional practice, and structural constraints.

The findings demonstrate that migrants are exposed to cumulative and layered vulnerability, consistent with ecological and trauma-informed understandings of forced migration contexts. While basic humanitarian assistance is available, psychosocial support remains unevenly institutionalized and insufficiently integrated into broader migration governance structures, particularly in the early phases of reception and accommodation. Key systemic barriers include fragmented inter-agency coordination, shortages of trained mental health professionals, and the absence of sustainable service frameworks.

Despite these limitations, the study evidences that trauma-informed and person-centered psychosocial interventions, encompassing individual counseling, group-based support, psychoeducation, and empowerment-oriented approaches, contribute to measurable improvements in emotional regulation, reductions in anxiety and depressive symptomatology, and enhanced coping capacities among migrants. The effectiveness of these interventions is strongly mediated by interdisciplinary collaboration, particularly through the engagement of cultural mediators and interpreters in service delivery.

The study concludes that the protection of migrant psychosocial well-being in Bosnia and Herzegovina requires a shift from *ad hoc* humanitarian responses toward an institutionalized, system-level model of integrated mental health and psychosocial support. Strengthening governance coordination, investing in specialized workforce development, and ensuring continuity and accessibility of services are essential for achieving sustainable psychosocial outcomes and supporting broader integration processes.

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Lost in migration: A narrative review of barriers to autism diagnosis and healthcare access for immigrant children

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International migration has become an increasingly important demographic phenomenon, with approximately 281 million people living outside their country of birth worldwide. Migrant and refugee populations are considered particularly vulnerable to inequalities in healthcare access due to structural, linguistic, cultural, and social barriers (Morinaga et al., 2021). These inequalities may have particularly serious consequences for children with autism spectrum disorder (ASD), for whom early identification, diagnosis, and intervention are critical for developmental outcomes. This narrative review aims to examine the barriers and facilitating factors affecting access to ASD diagnostic processes and related healthcare services among immigrant and refugee children (Sandbank et al., 2023). It specifically focuses on how migration and immigration status interact with language barriers, cultural differences, health literacy, discrimination, healthcare-system characteristics, and diagnostic delays, as well as the implications of delayed diagnosis for access to early intervention. A narrative review methodology was employed using a Population–Concept–Context (PCC) framework to structure the literature search and scope of the review. PubMed, Scopus, Web of Science, and Google Scholar were searched for studies published between 2011 and 2026. Eligible studies included research involving immigrant, refugee, or asylum-seeking children and/or their families or caregivers, with findings related to ASD diagnosis, developmental screening, referral processes, diagnostic delays, or access to healthcare and intervention services. Due to substantial heterogeneity in study designs, populations, healthcare systems, and diagnostic contexts, findings were synthesized narratively rather than through meta-analysis. Thematic synthesis was guided by the framework proposed by Popay et al. (2006). Four major thematic areas were identified: structural and systemic barriers to accessing ASD diagnosis; linguistic, cultural, and health-literacy-related barriers; the consequences of diagnostic delays for early intervention and developmental outcomes; and strategies proposed or implemented to reduce barriers, together with gaps in the existing evidence.

The findings indicate that barriers to ASD diagnosis among immigrant and refugee children are multidimensional and extend beyond individual or family-level factors to include healthcare-system and broader social structures. Language- and culturally responsive healthcare, improved health literacy, effective interpretation and communication services, non-discriminatory practices, and accessible referral pathways may contribute to more equitable diagnostic and intervention opportunities. Addressing these barriers is essential for promoting inclusive healthcare systems and ensuring that migration status does not become an additional obstacle to timely ASD identification and early intervention.

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Otherness: Empathy against artificial boundaries

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Keywords: body representations; interoception; somatic education; compassion; engagement

Human beings build their perception of the world through embodied experiences (Lundh and Foster 2025). Nevertheless, contemporary lifestyle tendencies increasingly drive towards an alienation from the bodies that we are, weakening the connection between embodied experience, self-perception and engagement with the surrounding world. Scientific evidence shows the inaccuracy of body perception during stressful and threatening contexts. In effect, anxiety, depressive symptoms and anger, among other emotional states, can alienate bodily self-control and self-perception (Xu et al. 2026). Conversely, the ability to perceive the internal organic functioning of the body—namely, interoception—as well as its somatic properties, has been shown to contribute to improved emotional regulation (Treves et al. 2025). As a consequence of this emotional regulation of the self, an improvement in social abilities may emerge (Canino et al. 2024). More specifically, a sense of security in self-preservation may lead to a greater disposition towards empathy, understood here as the ability to construct contextual representations of otherness from one's own embodied experience, thereby establishing a bridge between the perception of the self and the recognition of the other. Embodied work enhances self-awareness and facilitates the recognition of interdependence with external reality. On this basis, a method is proposed to foster greater tolerance of otherness, with potential implications for health, migration and environmental care. The proposal therefore considers the body not only as an object of perception, but also as a fundamental resource through which individuals experience themselves, others and their surroundings. There is a wide variety of body-awareness training programmes with demonstrated effects on mental and social components of daily living. The method proposed here is a sensorimotor training programme based on the Feldenkrais method, in which a guided attention constitutes a key tool for improving body representations of the self and otherness (Martin et al. 2024). Through embodied exploration, participants are invited to attend to their own bodily experience and to recognise how they perceive, organise and express themselves in relation to the space and creatures around them. When individuals are able to explore and learn through embodied experience who they are, how they behave and how they interact on a daily basis, the availability of empathic states may increase and with it, their capacity for compassion and ethical responsiveness. Fostering self-preservation through embodied emotional regulation may provide greater individual resources for imagining and creating representations of otherness and, consequently, for appreciating and participating in the interconnectedness of the world. From this perspective, the body becomes a bridge of tolerance between individual experience and eco-social engagement.

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PANEL 8b - Education, STEAM and inclusive knowledge for well-being and social cohesion

Research Hub Inclusive Health and Well-Being

Biophilic design from research to classroom: An experimental study on well-being and sustainability in primary education.

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Keywords: Nature; biophilic design; well-being; primary school

Biophilic design, reflecting humans' innate affinity for nature, or "biophilia" (Wilson, 2002), integrates elements of natural complexity into built environments. Supported by Attention Restoration Theory (Kaplan, 1995) and Stress Recovery Theory (Ulrich, 1981), such contexts may contribute to enhancing health and overall well-being. Educational settings represent a particularly relevant context for the application of biophilic design; recent studies (Barbiero et al., 2021) highlight the potential of nature-inspired design to foster more supportive learning environments. Moreover, although findings are not yet conclusive, existing evidence points to positive associations between connection with nature and aspects of socio-emotional learning (Lanza et al., 2023), which represent an important dimension of children's development, as school life continuously involves processes of self-regulation and social interaction. However, exposure to nature and connection with nature represent distinct dimensions: while exposure refers to contact with or the presence of natural environments, connection with nature concerns the psychological relationship individuals develop with the natural world. This distinction provides the rationale for the first stage of the present research, which aims to explore the relationship between connection with nature, socio-emotional competencies and school well-being among primary school students. Building on these preliminary findings, the second stage aims to investigate whether introducing biophilic design elements into classroom environments can enhance students' and teachers' well-being in primary school settings, adopting an evidence-based design approach and a comparative methodology that involves an experimental group and a control group. The assessment instruments include self-report questionnaires, attention measures and observational protocols. The research design consists of the following phases: (1) an initial context analysis through a baseline assessment; (2) integration of biophilic design elements into the experimental group's classrooms while the control group continues to use traditional classroom environments; (3) post-intervention assessment through a second administration of the research instruments in both groups to evaluate the effects of the intervention. Preliminary findings from the context-analysis phase among students suggest positive associations between connection with nature and school well-being, with socio-emotional competencies emerging as a partial mediator of this relationship. The finding of partial mediation indicates that other variables not considered at this stage may contribute to a deeper understanding of these relationships and should be explored in future studies.

These findings provided an initial reference point for the subsequent phases of the research, aimed at more directly investigating the role of biophilic design interventions in school settings. Grounded in an



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interdisciplinary perspective, in fact, this study integrates research findings into educational practices. It also highlights how biophilic design strategies align with sustainable development and ecological transition and can help mitigate health-related impacts of increasingly urbanized and climate-affected living conditions.

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Maker education, inclusion, and well-being: Symbolic mediation practices for students with a migration background

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Keywords: Maker Education; Intercultural Inclusion; Well-being; Symbolic Mediation; Migration Background

In contemporary educational contexts characterized by increasing cultural heterogeneity, promoting inclusive well-being has become a priority for school systems across Europe and beyond. Students with a migration background frequently encounter linguistic, social, and cultural barriers that negatively affect their socio-emotional well-being and capacity to participate actively in educational processes. From this perspective, inclusion cannot be understood merely as formal access to schooling; rather, it must be conceived as a concrete opportunity to participate meaningfully in learning environments, thereby fostering a sense of belonging, agency, and recognition.

This contribution investigates the role of Maker Education (ME) as a pedagogical dispositivo capable of promoting inclusive well-being through practices of symbolic mediation and active participation. Grounded in a socio-constructivist and semiotic framework, the study draws on Papert's constructionism, Dewey's philosophy of experience, and Nussbaum's Capability Approach to explore how Maker environments can support meaning-making processes that facilitate forms of inclusion positively affecting the well-being of pupils with a migration background.

The research is structured around three main questions: (1) How do Maker practices contribute to emotional well-being through collaborative and multimodal activities? (2) What role do artifacts play in mediating participation processes and overcoming linguistic and cultural barriers? (3) In what ways do these practices foster social skills, a sense of belonging, and active participation within school contexts?

The study is designed as a qualitative case study conducted at the I.C. "Borsellino-Ajello" in Mazara del Vallo (Sicily), a high-migration-density context in Southern Italy. The methodological design adopts a naturalistic inquiry approach, prioritizing the analysis of educational processes within their authentic everyday context. The sample was selected through purposive sampling and includes 73 participants: 46 primary and lower secondary school students (across three classes with a high incidence of pupils from migration backgrounds), 5 teachers, and 22 family members. Data collection employed a multi-method strategy encompassing non-participant observations, focus groups, semi-structured interviews with teachers, students and families, document analysis, and open-ended questionnaires. Instruments were adapted for multilingual accessibility, with Arabic validation performed by a Tunisian-native cultural mediator employed at the school — a deliberate methodological choice that itself reflects inclusive practice. Data were analyzed through Reflexive Thematic Analysis (Braun & Clarke, 2019) using ATLAS.ti Version 22, producing 3,690 coding occurrences across 24 codes organized into four thematic categories.

Results highlight how Maker environments configure inclusive spaces where well-being emerges from the interaction between subjects, practices, and artifacts. A key finding is a hierarchy of experience in which emotional belonging and relational competence precede and condition STEAM skill development — a result that repositions affective and social dimensions as central, not peripheral, to learning. The dimension of "making together" fosters participation even in the absence of full linguistic competence, reducing isolation and promoting collaborative dynamics. Student-produced artifacts function as vehicles of symbolic mediation, enabling self-expression, mutual recognition, and the co-construction of shared meanings. Well-being is thus configured as a relational and situated process, closely connected to the opportunity to participate actively and to be recognized as a competent member of the school community. Maker Education emerges as a pedagogical approach capable of supporting not only



competency acquisition but also the development of inclusive educational environments oriented toward justice, belonging, and peace.

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Beyond stereotypes: Italian key informants' perspectives on youth education about human trafficking

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Keywords: art-based activities; education intervention; qualitative analysis; human rights; human trafficking

Human Trafficking (HT) can be described as the recruitment, transportation, transfer, harbouring or receipt of people (men, women and children of all ages) through force, fraud or deception, with the aim of exploiting them for profit. It represents a serious violation of fundamental human rights as well as a complex transnational phenomenon that takes multiple forms, including sexual and labour exploitation. The recent Legislative Decree no. 115 of 12 June 2026, implementing Directive (EU) 2024/1712 on preventing and combating trafficking in human beings and protecting its victims, has added surrogacy, forced marriages, illegal adoptions, and the performance of illegal activities involving the exploitation of the victim to the list of types of exploitation. Despite substantial developments in European and national legislation and policy, important challenges remain in preventing HT, identifying and supporting victims, responding to emerging forms of exploitation, and strengthening cooperation among the different actors involved (Farinpour, 2025). Recent European initiatives underline an increasing recognition that effective anti-trafficking strategies require an integrated and evidence-based approach combining prevention, victim protection, prosecution, research, and cooperation across sectors and national borders (European Parliament & Council of the European Union, 2024).

Prevention and awareness-raising are particularly relevant within this broader framework, especially among young people, who increasingly encounter information, relationships, and potential risks within digitally mediated environments (e.g., Beato et al., 2024; Hoban et al., 2026).

In this national and European framework, FUTURE-ART is an Erasmus+ project combining research, education, artistic expression, digital innovation, and youth engagement to strengthen human trafficking prevention strategies.



This contribution explores how professionals with different forms of expertise related to HT understand this phenomenon, and which issues they consider most relevant for developing youth-oriented educational and awareness-raising activities. As part of this formative stage of the FUTURE-ART project, five Italian key informants were purposively selected on the basis of their professional experience in human-trafficking prevention, identification, prosecution and victim support. The participants included a physician, a prosecutor, a lawyer, a frontline practitioner and a national helpline coordinator. This selection was intended to capture different institutional and professional perspectives rather than to provide a representative account of Italian anti-trafficking professionals. The interviews were conducted in Italian, audio-recorded with participants' consent and transcribed verbatim. All participants provided informed consent, and identifying information was removed from the transcripts. They were analysed through a complementary combination of computational text-mining and qualitative thematic analysis. As data collection is still ongoing, the findings presented here should be understood as preliminary and exploratory.

Findings suggested marked heterogeneity across informants, each characterized by distinctive lexical profiles, ranging from health- and agriculture-related terms to investigative, institutional, and frontline-victim language. Labour exploitation emerged as the most salient theme, mentioned more than twice as often as sexual exploitation, echoing recent international evidence on the growing relevance of forced-labour trafficking. Thematic analysis identified five interconnected dimensions (legal/policy frameworks, victim support, violence/exploitation, migration/international cooperation, and labour/sexual exploitation) unevenly emphasized according to professional standpoint: legal/policy dominated the prosecutor's account, violence/exploitation the operator's, while labour/sexual exploitation was most prominent for the physician and coordinator.

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PANEL 9 - Peace and Political, civil and religious movements

Research Hub Security and Conflict Transformation

Climate change and ethnic electoral competition

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This paper examines the role of non-ethnic issues in Northern Ireland's ethnic party system, with particular attention to climate change as a potential source of cross-cutting political competition. Building on Horowitz's concept of ethnic party systems and the literature on consociational democracy, the study considers whether policy issues that do not directly correspond to the traditional unionist–nationalist cleavage can introduce new dimensions of party competition. In ethnic party systems, political competition is predominantly structured around ethnic identity, with electoral support tending to remain within communal boundaries and other political cleavages consequently playing a secondary role. Northern Ireland represents a particularly relevant case because its post-1998 institutional framework combines these dynamics with a consociational arrangement.

Existing research indicates that economic, social and environmental differences between Northern Irish parties have developed without displacing the constitutional and ethno-national cleavage as the principal axis of political competition. Consociational institutions appear to have contributed to greater moderation among political parties while not necessarily producing a broader de-ethnicisation of the party system. Parties can therefore adopt more pragmatic and differentiated positions on public policy while continuing to act as representatives of their respective ethno-national communities. Against this background, climate change offers an especially useful case for examining the emergence of transversal political competition. The adoption of Northern Ireland's Climate Change Act and growing public concern about environmental policy have increased the political relevance of the issue. Although climate action receives considerable support among the electorates of the five main parties, meaningful differences exist between them. Alliance and SDLP supporters display particularly strong environmental concerns, while differences within the unionist bloc can in some cases exceed those observed between unionist and nationalist voters. Party manifestos broadly reflect these variations. These findings suggest that climate policy may generate forms of political differentiation that do not correspond neatly to established ethnic boundaries. Nevertheless, the unionist nationalist cleavage remains dominant, and the long-term capacity of climate change—and other issues such as immigration—to transform Northern Ireland's ethnic party competition requires further research.

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Climate-induced migration and the securitisation of European politics

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Keywords: climate-induced migration; securitisation; far-right movements; human security; conflict transformation

Climate change is increasingly recognised not only as an environmental challenge but also as a driver of human mobility, insecurity, and political contestation. Climate-induced migration represents a particularly complex challenge for European societies, where population movements intersect with political polarisation, socioeconomic inequalities, and debates over national security. This contribution examines how climate-induced migration is framed as a security threat in European political discourse and analyses the sociopolitical consequences of this process for peace, justice, and inclusive societies. The paper addresses the following research problem: how does the securitisation of climate-induced migration contribute to political polarisation and the strengthening of exclusionary and far-right narratives in Europe, and what alternative approaches can support more peaceful and inclusive responses?

The main objective is to analyse the relationship between environmental stressors, migration, securitisation, and political stability while identifying pathways that move beyond restrictive and predominantly security-oriented approaches to migration governance.

The theoretical framework combines securitisation theory, human security, and contemporary peace and conflict studies. Drawing on Buzan, Wæver and de Wilde (1998), “securitisation is understood as a process through which political actors construct migration as an existential threat, thereby legitimising exceptional policy responses”. This perspective is complemented by McDonald’s (2013) analysis of climate security discourses, which demonstrates how environmental change can be politically constructed through particular understandings of risk and insecurity. The paper further draws on McAdam (2012) to situate climate-induced mobility within the broader legal and political challenges associated with climate-related displacement.

Methodologically, the study employs qualitative comparative analysis of selected cases from Southern and Eastern Europe, focusing on political discourse, policy responses, and narratives surrounding migration and climate-related insecurity. The analysis is informed by a conflict transformation perspective, with particular attention to the structural conditions that generate insecurity and social exclusion. The paper argues that the securitisation of climate-induced migration can intensify perceptions of threat, reinforce social divisions, and create political opportunities for far-right movements. Such approaches may undermine social cohesion and democratic norms while obscuring the structural inequalities that shape vulnerability to climate change. In contrast, a human-security approach, informed by the broader understanding of security promoted by UNDP (2022), places individuals and communities at the centre of policy responses. Furthermore, Galtung’s (1969) concept of positive peace provides a basis for understanding peace not simply as the absence of direct violence, but as the transformation of structural conditions that reproduce inequality and exclusion. The contribution therefore argues that inclusive and justice-oriented approaches to climate-induced migration can strengthen human security, reduce social tensions, and contribute to sustainable conflict transformation and resilient, peaceful European societies.



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The value of positive peace in the Anthropocene: The ‘culture of care’ in the Perugia-Assisi March

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Keywords: Positive Peace; Anthropocene; Perugia-Assisi Peace March; Climate Justice; Grassroots Diplomacy

This article analyses how the political culture of positive peace has evolved in the Anthropocene Era, taking the Perugia-Assisi Peace March as its primary case study. Grounded both in Capitini’s vision of peace, disarmament, and human brotherhood, and in Galtung’s framework for dismantling the culture of violence to achieve peace as Social Justice, this study demonstrates how the movement’s discourse has progressively expanded. It embraces climate justice and the paradigm of integral ecology introduced by Pope Francis’s encyclical *Laudato Si’*, directly responding to the human-caused planetary transformations affecting our world.

The study addresses a central question: how has the integration of ecological imperatives into official calls to action over the past decade (2016–2025) influenced and reshaped the active participation of local actors, particularly schools, local authorities, and civil society organizations? Furthermore, how does this *Global Civil Society* seek to build peace through practices of grassroots diplomacy?

Methodologically, the paper combines a qualitative discourse analysis of official appeals from the last five “regular” editions (2016, 2018, 2021, 2023, and 2025) with an empirical evaluation of participation trends. It traces key discursive shifts, from framing the climate emergency as a “war against the planet” to promoting the idea that “Care is the new name for Peace”. In examining whether this seamless ideological transition from Capitini’s universal care to Don Milani’s *I Care* motto served as an effective engagement strategy for the new millennium, the paper assesses its impact on both quantitative and qualitative actor engagement.

The central argument holds that the ecological turn within the Perugia-Assisi movement is not merely a rhetorical update to contemporary global threats, but a structural catalyst for mobilization. By reframing the ecological transition not as a technical policy issue, but as an essential component of human rights and nonviolent civic responsibility, the movement has reinforced its alliance with educational institutions and municipal networks grappling with the challenges of the Anthropocene’s climate crisis. Ultimately, this research demonstrates how the Perugia-Assisi experience broadens the culture of Positive Peace in the Anthropocene, offering a model that positions Social Justice and Climate Justice as key pillars of peacebuilding through bottom-up democratic participation.

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PANEL 10a - Sustainable Technologies for Climate Resilience and Resource Security

Research Hub Climate Science and Just Transition

Reconverting carbon dioxide into high value added products

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The rapid industrialization of society and population expansion has led, during the decades, to a huge consumption of fossil fuels, with a significant over-release of carbon dioxide in the atmosphere. This has led to serious environmental issues deriving, in particular, from global warming. Accordingly, huge efforts are currently devoted to CO₂ capture and storage (CCS). Another very attractive way for “environmental decarbonization” is based on chemical conversion of CO₂ into more reactive carbon species (such as carbon monoxide), fuels, or other important organic compounds (bioactive molecules, materials, and so on). The present lecture will focus on some innovative catalytic methods that have been developed by the my research group (at the Laboratory of Industrial and Synthetic Organic Chemistry – LISOC – of the University of Calabria) for the chemical valorization of carbon dioxide by its direct as well as indirect catalytic conversion into high value added products.



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From BMP tests to semi-continuous reactors: Experimental optimisation of anaerobic co-digestion for enhanced Biogas production

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Keywords: Anaerobic co-digestion; biogas; C-Fe nanoparticles; BMP tests; semi-continuous reactor

Anaerobic co-digestion (AcoD) combines complementary organic residues to support circular waste management and decentralised renewable gas production, directly linking waste valorisation to climate resilience and resource security (Archana et al., 2024). However, benefits identified in biochemical methane potential (BMP) assays do not necessarily persist when reactor volume and feeding regime change. Conductive and redox-active iron-based additives may enhance electron transfer and process resilience, but their effects depend strongly on dose, material and substrate matrix (Elreedy et al., 2025; Wang et al., 2023). This study assessed how scale and C-Fe nanoparticles (NP) influenced the performance of sludge/agri-food co-digestion.

Three configurations were compared at 38 °C: 21-day 1 L BMP assays, 2 L stirred batch reactors and a 42-day semi-continuous reactor with daily feeding. Tests were conducted with and without NP at 2 g kg⁻¹ total volatile solids. Biogas production and composition were monitored alongside key digestate indicators; BMP results were statistically evaluated at a 5% significance level. After 21 days, cumulative normalised biogas reached 19.99 Nm³ m⁻³ sludge for AcoD, compared with 10.67 Nm³ m⁻³ sludge for sludge mono-digestion, an 87.4% increase. NP-amended AcoD reached 21.13 Nm³ m⁻³ sludge, 5.7% above untreated AcoD, although daily production remained higher from day 8 onwards. This improvement was not consistently statistically significant, and the clearest variance effects were observed for hydrogen. At 2 L batch scale, the NP-amended reactor showed higher methane fractions on days 9, 10 and 14, but methane became undetectable in the NP-amended reactor after day 15, while hydrogen showed the opposite trend. This points to scale-dependent process dynamics rather than uniform enhancement. In semi-continuous operation, regular feeding damped transient peaks in secondary gas species and sustained hydrogen associated with ongoing hydrolysis. However, failed semi-continuous bottle controls and unreliable volumetric gas measurements restricted the assessment to gas composition and prevented causal quantification of the NP effect. Overall, AcoD produced the most robust benefit, whereas the tested NP dose yielded only a modest late-stage improvement in BMP assays and no consistent advantage across configurations. Reliable flow monitoring, more replicates and joint optimisation of NP dose and residence time are needed before scale-up, together with reactor designs adapted to heterogeneous feedstocks (Shah et al., 2024).

Beyond process optimisation, these results support the development of circular, locally sourced renewable-gas systems that recover energy from underused residues and contribute to a more diversified and resilient energy supply. For the Climate Resilience and Resource Security panel, the study contributes experimental evidence on both the potential and the scale-up constraints of waste-based energy technologies. Within EUPeace, the multi-scale approach offers a transferable framework for



comparing regional residue portfolios and operating conditions and for developing joint research and evidence-based teaching on circular and just energy transitions.

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Rethinking API synthesis through deep eutectic solvents: Towards greener and climate-responsible pharmaceutical manufacturing

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Keywords: Deep eutectic solvents; active pharmaceutical ingredients; green chemistry; sustainable pharmaceutical manufacturing; green transition

The pharmaceutical sector faces the dual challenge of ensuring access to essential medicines while reducing the environmental and resource burden associated with their production. The synthesis of active pharmaceutical ingredients (APIs) is particularly relevant in this context, as conventional manufacturing frequently relies on solvent-intensive multistep procedures, volatile organic compounds (VOCs), excess reagents and chromatography-based purification, resulting in substantial material and energy consumption. Deep eutectic solvents (DESs) have emerged as promising alternatives to conventional solvents because of their low volatility, tunable properties and ability to integrate multiple functions within a synthetic process. Rather than simply replacing one solvent with another, DESs can contribute to rethinking the overall process design by combining reaction, separation and product-recovery operations. Here, two complementary DES-based approaches for the synthesis of the APIs atenolol and lidocaine are presented as case studies for more resource-efficient pharmaceutical manufacturing (Procopio et al., 2024; Perri et al., 2026). In the synthesis of atenolol, a choline chloride glycol DES (1:2 molar ratio) enabled a one-pot, two-step sequence starting from 2-(4-hydroxyphenyl)acetamide. The reaction with epichlorohydrin followed by direct treatment with isopropylamine proceeded at 40 °C without additional bases or catalysts. Addition of water induced direct precipitation of atenolol, avoiding chromatographic purification. The API was obtained in 95% overall yield and high purity, while scale-up from 1 g to 10 g of starting material confirmed the robustness of the process. Importantly, the DES could be recovered and reused in the first reaction step with only a minor decrease in performance. CHEM21 metrics showed improved material efficiency compared with previously reported procedures, with a reaction mass efficiency (RME) of 54% and a process mass intensity (PMI) of 3.9. The lidocaine case further demonstrates the potential of DESs to integrate synthesis and downstream processing. A choline chloride DES (1:2 molar ratio, reline) enabled the two-step acylation–amination sequence under mild, metal-free conditions. The intermediate α -chloro-2,6-dimethylacetanilide was isolated in 92% yield after only 20 min at room temperature, while subsequent SN2 substitution with diethylamine afforded lidocaine in 90% isolated yield. No chromatographic purification was required. To further reduce the solvent burden associated with product recovery, lidocaine was directly transferred from the reaction medium into a hydrophobic L-menthol acid DES (1:1) through an eutectic-to-eutectic liquid–liquid extraction. GC-MS and FT-IR analyses confirmed the selective partitioning of lidocaine into the hydrophobic phase. The integrated process achieved a PMI of 6.4 and a solvent PMI of 4.8, demonstrating a substantial reduction in solvent



consumption compared with conventional approaches. Together, these case studies illustrate a shift from solvent substitution towards process redesign, in which DESs can act as reaction media, process-enabling separation phases and, in the case of lidocaine, formulation-compatible media. The combination of reduced VOC use, simplified purification, DES recovery and improved material efficiency highlights the potential of eutectic systems to contribute to a more resource-conscious and climate-responsible pharmaceutical sector. These results support the broader adoption of DES-based process intensification as a practical strategy for advancing the green transition in API manufacturing.

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Design and implementation of a three-level load priority inverter system for residential energy management

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Electricity supply in many regions remains unreliable, and households increasingly depend on inverter systems that must operate autonomously through extended outages. Prolonged interruptions carry measurable social and economic costs, particularly in sub-Saharan Africa, where they constrain health services, education and small enterprise (Farquharson et al., 2018). Conventional residential inverters treat all connected loads identically, so a supply shortfall either collapses the whole installation or requires the occupant to intervene manually. This contribution addresses that gap by presenting a three-level load priority inverter that automates this decision instead, disengaging loads based on two independent signals rather than manual switching. High power loads respond to instantaneous power availability from PV and grid sources, while medium-priority loads respond only to battery state of charge, supported through short-term interruptions, while critical loads such as lighting remain permanently connected under all conditions.

The system is built around a single-phase, three-level neutral-point-clamped (NPC) full-bridge inverter configuration, of which remains among the most widely applied in photovoltaic conversion (Sharma et al., 2025). The design was validated through matched PLECS circuit simulation, which combines two three-level legs to produce a five-level output closely matching the 230 V RMS residential target with substantially lower harmonic distortion than an equivalent two-level design. The three priority tiers connect directly onto existing residential wiring-gauge groupings: priority 1 (lighting), priority 2 (sockets), and priority 3 (higher appliance) circuits requiring no rewiring of existing installations, addressing a practical barrier to adoption in retrofit contexts. It complements recent work on residential converter interfaces integrating photovoltaic and battery generation (Ali and Raisz, 2025) and on supervisory energy management for household photovoltaic microgrids (Tradacete-Agreda et al., 2025), neither of which addresses tiered shedding at the converter design stage.

Simulation results across multiple scenarios, including a worst-case grid outage, a mixed irradiance-drop/recovery event, and a fully off-grid multi-day test, show that the dual-signal strategy extends backup runtime for critical loads (priority 1) by a factor of approximately 14 relative to an unprioritized baseline. In the off-grid test, the system sustained continuous power to critical loads every night without blackout, with medium-priority loads (priority 2) shedding only briefly when battery state of charge fell below 20%, preserving enough capacity to keep essential supply steady until the battery recharged the following day.

This work contributes a dual-signal load-priority control strategy distinguished from existing single-signal approaches, a practical retrofit-compatible connection strategy, and a multi-scenario validation methodology going beyond single-event validation typical of comparable studies. The findings suggest decoupling shedding decisions across independent signals offers a viable path toward more reliable, less disruptive residential power management in regions with unreliable grid supply.



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From Peel to Biofilm: The virtuous cycle of green chemistry

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Keywords: Deep Eutectic Solvents; citrus peel; pectin; active food packaging; waste valorisation

The transition towards sustainable and climate-resilient food systems requires a shift from linear production models towards circular approaches capable of reducing both resource consumption and waste generation. Within this framework, food-processing by-products should not be regarded merely as waste, but as renewable feedstocks for the development of high-value materials and products. This work explores such a circular pathway by transforming citrus-processing residues into active, biodegradable packaging materials. Clementine and orange peels are abundant by-products of the agri-food industry and represent a valuable source of pectin and other naturally occurring compounds, including phenolics and flavonoids. Pectin is a particularly attractive biopolymer for sustainable packaging because of its film-forming ability, biodegradability, and potential compatibility with food-contact applications. However, conventional pectin extraction generally relies on acidic media and relatively energy-intensive processing conditions. In this study, Deep Eutectic Solvents (DES) are investigated as alternative extraction media. Their tunable composition and physicochemical properties offer the possibility of tailoring the extraction environment while reducing reliance on conventional hazardous reagents and supporting milder processing conditions. The extracted pectin is subsequently used as a renewable building block for the preparation of active pectocellulosic films. A further advantage of the proposed approach is the possibility of employing DES as functional plasticizers during film formulation, potentially improving flexibility, cohesion, and processability while reducing the need for additional formulation components. Moreover, the valorization pathway is designed to preserve naturally occurring phenolic and flavonoid compounds from the citrus biomass. Their antioxidant and antimicrobial properties may provide intrinsic functionality to the resulting films, offering an additional strategy to delay food deterioration and extend the shelf-life of packaged products. The proposed concept therefore connects two major challenges of contemporary food systems: plastic pollution and food loss and waste. By replacing petroleum-based packaging materials with biodegradable alternatives derived from agro-industrial residues, the approach contributes to resource efficiency and waste valorization. At the same time, active packaging can help reduce food losses by providing functional protection during storage and distribution. Beyond the development of a new packaging material, the proposed approach establishes a virtuous cycle in which an agro-industrial residue is transformed into a valuable resource through green extraction and subsequent conversion into a functional biodegradable material. The integrated valorization of citrus peels, from the recovery of pectin to the development of active biofilms, demonstrates how green chemistry can connect waste valorization, renewable resources, sustainable materials, and food preservation within a single circular pathway. In the broader context of a just transition, this approach can contribute to more resilient and resource-efficient food systems by reducing



dependence on fossil-based materials, limiting environmental pressures associated with plastic waste, and promoting the sustainable use of agro-industrial resources.

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Sustainable Chemistry: Social dimension and teaching

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Over the past hundred years, industrial production, led by the chemical industry, has significantly contributed to economic growth, improved public health, and the development of materials, products, and technologies that have improved the quality of life, but their application has also come at a high social and environmental cost, borne mostly by workers, local communities, ecosystems, and the climate. Due to the need for greater safety and sustainability, 12 Principles of Green Chemistry (Anastas and Warner, 1998) have been developed, aimed at reducing waste, harmful substances, and the efficient use of resources, while Sustainable Chemistry represents a broader, holistic approach that, in addition to chemical innovations, also includes economic, ecological, and social dimensions (UNEP, 2021). By introducing the social dimension, the scientific community addresses public concerns regarding chemical safety and pollution, effectively transforming the image of chemistry from a source of risk into a solution for global sustainability. This approach requires a rationalization of chemical processes to reduce costs and health hazards, ensuring that chemical progress benefits society as a whole, both today and in the future.

The Sustainable Chemistry is not merely a sub-discipline but a mandatory mindset for the next generation of scientists. The goal of Sustainable Chemistry is to prepare the next generation to be responsible citizens and professionals who contribute to the sustainable development of society. According to widely recognized models for incorporating Education for Sustainable Development into chemistry education (Burmeister et al., 2012), integration of green chemistry principles and industrial examples into the curriculum makes learning more meaningful by connecting chemical concepts to everyday processes and sustainable development. Some model connects chemistry learning with current debates through controversial socio-scientific issues, encouraging students to think critically and make decisions for a sustainable future. At our university, students learn about and for sustainable development through independent research on topics with a social dimension. *Green corrosion inhibitors* offer a perfect case study for teaching the social dimension of sustainable chemistry, as they directly bridge industrial economics, human health, and eco-justice. Corrosion resistance has become a critical concern, as the widespread use of metallic materials in modern society has resulted in increasingly



aggressive ecological conditions. The majority of commercial inhibitors are expensive and extremely harmful to both people and the environment; thus, the shift toward bio-based alternatives offers a rich intersection of science, ethics, and environmental justice. The work combines a socio-critical analysis with a practical laboratory experiment that measures inhibitory efficiency using potentiodynamic polarization and electrochemical impedance spectroscopy (Martinović et al., 2023). This dual approach enables students to analyze chemical efficiency while navigating real-world ethical dilemmas, a process that develops their ethical responsibility, systems-thinking capabilities, and motivation to pursue sustainable scientific solutions. The goal of teaching is to produce chemists who prioritize ethics and sustainability by default. Ultimately, the synergy between social awareness and specialized education ensures that chemistry remains a vital, responsible, and trusted pillar of modern society.

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PANEL 10b - Climate Risk, Environmental Transitions and Resilient Infrastructure Research Hub Climate Science and Just Transition

Explainable AI for compound extreme events: supporting climate adaptation through robust risk analysis

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Keywords: explainable AI; compound extreme events; climate adaptation; risk analysis; climate justice

Climate change is increasing the frequency, intensity, and complexity of extreme events, while their impacts are often most severe for communities with limited adaptive capacity (IPCC 2022). In many regions, risks no longer emerge from single hazards alone, but from compound extreme events, such as the co-occurrence or succession of heatwaves, droughts, heavy precipitation, floods, and other interacting climate stressors (Zscheischler et al. 2020). These events can affect food security, water availability, public health, infrastructure, livelihoods, and social stability. Understanding them is therefore not only a technical challenge in climate science, but also a matter of justice, preparedness, and inclusive risk governance.

This contribution presents an explainable artificial intelligence (XAI) framework for detecting, characterising, and interpreting compound extreme events in climate data. The approach builds on deep learning-based climate analytics and downscaling methods (Fuentes-Franco et al. 2025) to identify high-risk spatiotemporal patterns, while integrating interpretable machine learning and post-hoc explanation techniques, including feature attribution, attention-based analysis, and spatial relevance mapping (González-Abad et al. 2023), to clarify which variables, regions, time periods, and interactions contribute most strongly to model decisions. Rather than treating AI models as black-box prediction systems, the proposed framework emphasises interpretable evidence: why a certain event is classified as high risk, which climatic drivers are most relevant, and how different hazards interact across space and time (Camps-Valls et al. 2025).

The contribution is particularly motivated by the need to make advanced climate-risk analysis usable for adaptation planning and decision-making. In vulnerable regions, limited observational coverage, uncertainty in projections, and the complex nature of compound hazards can make risk assessment difficult. Explainable AI can help bridge the gap between technical model outputs and actionable knowledge by producing transparent indicators, relevance maps, and risk explanations that support dialogue among scientists, planners, and stakeholders. Such explanations can strengthen more accountable adaptation strategies, especially where decisions about infrastructure, agriculture, health protection, and disaster preparedness must be made under uncertainty.

By linking robust AI-based modelling with interpretability, the work contributes to broader discussions on peace, justice, and inclusive societies in times of global challenges. Climate extremes can deepen existing inequalities when vulnerable groups lack access to early warnings, protective infrastructure, or institutional support (IPCC 2022). Therefore, improving the transparency and reliability of climate-risk tools is essential for fair and evidence-informed adaptation. This contribution argues that explainable AI should be understood not merely as a technical add-on, but as a key component of trustworthy climate services that support resilience, reduce vulnerability, and strengthen inclusive decision-making in the face of accelerating climate risks.

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Protecting vulnerable communities: Levee failure under climate-driven multi-hazard Events

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Climate change is exacerbating flood risk by increasing the frequency and intensity of extreme hydrological events, thereby amplifying the hazards faced by vulnerable communities protected by river levee systems. At the same time, seismic events can significantly compromise the structural integrity and protective capacity of these infrastructures. When an earthquake is followed by a flood event, the interaction between the two hazards may result in cumulative and interconnected damage mechanisms, progressively reducing levee performance and potentially leading to failure or collapse. Such cascading effects pose critical challenges to infrastructure safety, emergency management, and the social and economic stability of exposed territories.

This study proposes a multi-hazard framework for assessing the vulnerability and performance of river levees under sequential earthquake–flood scenarios, explicitly accounting for the temporal evolution and accumulation of damage induced by consecutive hazard events. The framework integrates the effects of earthquake-induced damage with those associated with subsequent flood loading, while incorporating the projected increase in flood frequency and intensity driven by climate change. By modeling damage accumulation and the progressive degradation of system performance, the proposed approach identifies critical combinations of hazard intensity, damage state, and loading conditions that may lead to the exceedance of safety thresholds and ultimately to levee failure. This enables a more comprehensive assessment of risk than conventional approaches based on the independent analysis of individual hazards.

Outcomes of this study highlight the importance of considering multi-hazard interactions and climate-driven changes in hazard characteristics within infrastructure risk assessment and adaptation planning. In particular, the proposed framework can support the identification of highly vulnerable levee sections, the prioritization of maintenance and reinforcement measures, and the development of more effective emergency preparedness and risk mitigation strategies. Integrating multi-hazard risk into climate adaptation policies is therefore essential to enhance the resilience of critical flood protection infrastructure and reduce disproportionate impacts on at-risk populations. By providing a framework for integrating data, predictive models, and technical-scientific knowledge into decision-making processes, this study contributes to a more equitable and resilient approach to climate adaptation and disaster risk reduction.



Life cycle assessment and multi-criteria approach for seismic protection of base-isolated hospitals

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Keywords: Horizontal and Vertical Base-Isolated Hospital; Critical Medical Equipment; Near-Fault Ground Motion; Life cycle assessment; Environmental impacts

The seismic protection of buildings is a fundamental requirement for reducing human, economic and functional losses caused by earthquakes. This need is particularly critical for strategic facilities, such as hospitals, which must remain operational during and immediately after an earthquake (Guamán-Cabrera et al., 2024). Although conventional seismic design primarily aims to prevent structural collapse, the continuity of essential services also depends on limiting damage to non-structural components and equipment. Base isolation is one of the most effective strategies for reducing seismic demand by decoupling the superstructure from ground motion. However, in near-fault areas, earthquakes may also exhibit a significant vertical component, which can generate high floor accelerations and compromise the functionality of unanchored medical devices (Mazza et al., 2026a). Therefore, the comparison between systems providing horizontal isolation only and solutions combining horizontal and vertical isolation is essential for a more comprehensive assessment of hospital resilience (Pourmasoud et al., 2025). This study proposes an integrated methodology for evaluating the seismic and environmental performance of base-isolated hospital buildings subjected to near-fault ground motions (Mazza et al., 2026b). The structural response of a five-storey reinforced concrete (RC) medical facility pavilion, located in Avellino (Campania, Italy), is examined together with the behaviour of selected medical equipment located on representative hospital floors: i.e. six emergency rooms at the ground floor, two dedicated intensive care at the third floor and three technologically dense operating rooms at the fourth floor. Particular attention is paid to the sliding of unanchored devices, since collisions with walls or adjacent equipment may cause malfunction or failure even when the main structure remains undamaged. The resulting equipment damage is then associated with replacement requirements and transformed into environmental impacts through Life Cycle Assessment.

The environmental analysis considers the materials, electronic components, manufacturing processes, transport and end-of-life treatment associated with each medical device. Inventory data are obtained from the Ecoinvent database, while impact assessment is performed in SimaPro using the Environmental Footprint 3.1 method (Sola et al., 2018). In this way, the study evaluates not only greenhouse-gas emissions, expressed as CO₂-equivalent, but also a broader set of environmental effects



connected with the production and disposal of damaged equipment. This perspective extends the concept of seismic resilience beyond life safety and repair costs by including embodied impacts, resource consumption and waste generation during post-earthquake recovery.

Finally, a multi-criteria decision-making procedure integrates seismic performance, equipment functionality and environmental indicators to compare alternative isolation strategies. The proposed framework supports the identification of structural solutions capable of protecting both the building and its essential contents, while reducing the environmental burden associated with earthquake damage and replacement. The results highlight the potential benefits of combined horizontal and vertical isolation and demonstrate that sustainability can be incorporated directly into the seismic design and resilience assessment of critical facilities.

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Climate change impact on protected natural areas of Sarajevo Canton

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Keywords: biology; ecology; climate change; protected natural areas; ecosystems

The Sarajevo Canton contains five protected natural areas: Skakavac, Vrelo Bosne, Bijambare, Trebević, and Bentbaša. Each of these areas is characterized by specific geomorphological, hydrological, pedological, biological, and ecological features and serves as an important center of biological diversity for flora, fauna, and fungi (Mašić et al., 2025). This paper examines the impacts of climate change on protected natural areas in the Canton Sarajevo, with a particular focus on ecosystem stability, biodiversity, and management challenges. Protected natural areas are increasingly under pressure from climate change, as reflected in reduced hydrological regimes, the loss of native and valuable species and populations, and the spread of invasive species. Using climatological data measured and observed at meteorological stations, together with field research on ichthyofauna, peatland ecosystems and forest ecosystems, several significant changes were identified. The average annual temperature during the most recent ten-year period was 1.2 °C increased. In addition, annual precipitation decreased from 1,082.7 mm in 2014 to 807 mm in 2024 (University of Sarajevo – Faculty of Civil Engineering, 2025). Monitoring of aquatic ecosystems and ichthyofauna in the protected natural areas revealed a decline in the populations of some native species, such as *Salmo trutta* as well as the presence and spread of invasive species such as *Cottus gobio*. Reduced precipitation poses a threat to endemic and stenoendemic species, including *Gammarus bosniacus* and *Niphargus ilidžensis*, which inhabit riverbeds and depend on stable water flow conditions (University of Sarajevo – Faculty of Science, 2023). Peatland monitoring has also revealed the drying of peatland ecosystems and a decline in populations of characteristic *Sphagnum* species. The following species were recorded in the monitored peatland habitats: *Lychnis flos-cuculi*, *Potentilla erecta*, and *Nardus stricta*. Their presence indicate changes in microclimatic conditions, particularly increased solar radiation and reduced moisture availability within the habitats. The drying of peatlands represents an even greater concern because peatlands are important global carbon stores, containing approximately 30% of the world's carbon. In the specific peatland ecosystem within the Protected Landscape of Bijambare, the peat deposits are estimated to be approximately 1,000 years old and reach a depth of around one metre (University of Sarajevo – Faculty of Science, 2023). Climate change also has a significant negative influence on forest ecosystems within the protected natural areas of the Sarajevo Canton, particularly spruce-dominated ecosystems. Increasing temperatures have created more favourable conditions for the spread and development of the spruce bark beetle, *Ips typographus*, which contributes to increased stress and mortality of spruce trees (Mujezinović et al., 2023). These findings indicate that climate change is significantly affecting protected natural areas in the Sarajevo Canton, particularly their rare and valuable species, populations, and ecosystems. Changes in temperature and precipitation regimes are contributing to alterations in hydrological conditions, peatland drying, changes in forest health, species population declines, and the spread of invasive species. The findings of this study aim to support decision-makers in developing more effective, science-based approaches to the management and conservation of protected natural areas under changing climatic conditions.

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Microplastic occurrence in high-mountain lakes of Sierra de Guadarrama National Park: Assessing the potential seasonal influence and the impact of tourism

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Keywords: Microplastics; mountain lakes; micro-FTIR; tourism

Microplastic (MP) pollution is an increasingly concerning issue. It is closely connected to climate change, and it has a huge impact on ecosystems and human health. The increase of temperatures and the extreme weather events accelerate MP pollution and lead to higher concentrations of MPs in the atmosphere. Remote and preserved regions are being increasingly affected by these pollutants, as well as their flora and fauna. This study examines MP occurrence in one high-mountain lake of Sierra de Guadarrama National Park, Laguna Grande de Peñalara located at an elevation of 2019 m above sea level, through a two-year sampling campaign starting in summer 2025. The goal is to quantify the presence of MPs and assess whether there are seasonal variations (caused by winds, differences in rainfall, and snowmelt), and whether seasonal tourism activity (much more pronounced in summer) may influence the influx of MPs into these remote protected ecosystems.

During each sampling session, water samples were collected from the lake at three different points (north shore, south shore, and lake's outlet), as well as from a stream near the information center, located about 2 km from the lake. This stream collects water from various mountain lakes and from rainfall, and it is more exposed to human impact since it is not located in a protected area. This last water sample serves to compare a protected area with an unprotected area that experiences high tourist traffic.

Preliminary results have shown that the microparticles analyzed are primarily organic in nature (e.g., cellulose, wool, or linen). They account for more than 75% of the microparticles in the water samples from Peñalara, and 45% in the water from the stream at the interpretation center. This shows that the concentration of polymeric fibers is higher in the unprotected area with greater foot traffic than in the mountain lake. MP mean concentrations, synthetic nature, varied from 22 to 34 MPs/L in Peñalara lake samples, and were 191 MPs/L in water samples from the stream. Fibers was the dominant morphological type. Most common polymers found were polyester, PET (polyethylene terephthalate), PP (polypropylene), and nylon. PVC (polyvinyl chloride) MPs were also, and only, found in water samples from the stream. Based on the samples collected to date, no significant impact of the presence of tourists around the Peñalara lake on MP levels has been observed. This seems to highlight the important role of atmospheric transport of MPs in this type of lake, located at high elevation in a small glacial basin with very low human activities. The research contributes to understanding contamination pathways in vulnerable freshwater habitats and supports improved monitoring of anthropogenic pressure in mountain environments.



Temporary shelters with thermal energy storage-integrated solar heating and cooling systems for climate resilient societies

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The number of people affected by sudden-onset climate-related hazards (e.g., hurricanes, floods, and wildfires) is increasing annually, while geopolitical instability continues to drive displacement. According to the United Nations High Commissioner for Refugees, forcibly displaced populations exceeded 117 million by mid-2025. This creates a growing demand for offgrid temporary shelters capable of maintaining acceptable thermal comfort under limited infrastructure conditions. This study presents a solar-driven heating and cooling system with integrated thermal energy storage (TES) tailored for such applications. The system utilizes solar thermal collectors for dual-mode operation; horizontal deployment enables both solar heat gain and nocturnal radiative cooling. Two latent heat storage units are employed for separate hot and cold energy storage. Long-term monitoring data are analyzed to assess system performance, thermal efficiency, and its potential contribution to resilient, low-energy shelter solutions.



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Renewable energy communities as models of Peace in just transition

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Keywords : urban planning; climate change; renewable energy communities; energy transition; renewable sources

The European climate crisis of recent years highlights the need to define transition models capable of integrating environmental sustainability, social justice and territorial stability (Bashir et al., 2025). The effects of climate change do not produce uniform consequences in urban areas, but instead accentuate pre-existing vulnerabilities in territories characterized by socio-economic fragility, low urban quality and high exposure to environmental risks (Wang et al., 2025).

In this context, Renewable Energy Communities (RECs) represent a production model of sharing and collective management of energy from renewable sources, based on collaboration between citizens, businesses, public bodies and local entities (Ceglia et al., 2022). In addition to the energy dimension, they perform a social function, by promoting solidarity, participation and new forms of territorial cooperation. Their relevance in urban and territorial planning processes lies in their ability to integrate energy production, demand and management within new forms of territorial governance. From this perspective, local public administrations assume a strategic role as promoters of the transition, capable of integrating RECs into urban policies and directing their location towards the areas most exposed to criticality.

The aim of the study is to identify the potential of RECs as models capable of combining climate adaptation, the fight against energy poverty and social inclusion (Śmiech et al., 2025), through the definition of an integrated approach for their localisation. It is based on the mapping, carried out in a GIS environment, of the most suitable urban areas for the construction of RECs, integrating environmental indicators, with particular reference to the climatic sphere, and urban indicators, with a focus on socio-housing aspects. In particular, the analysis allows for the identification of the areas most exposed to the urban heat island, overlapping them with social housing neighbourhoods, which are considered priority areas as they are frequently affected by the coexistence of environmental, construction, and social issues that increase the level of risk exposure. The proposed approach highlights how the choice of areas should not be guided exclusively by energy criteria, but also by the need to ensure a fair distribution of the benefits generated, thus assuming a strategic value within urban planning processes.

The preliminary results of the experimentation in the urban area of the city of Cosenza (Italy) show how REC planning based on the integration of climate effects and social conditions related to housing can represent an operational model capable of connecting energy actions and urban strategies.

In conclusion, the study highlights the political and territorial dimension of the energy transition in relation to the possibility of addressing, for example through RECs, the climate crisis by ensuring fair and dignified living conditions for local communities. From this perspective, energy produced from renewable sources goes beyond the dimension of a simple technical resource, assuming the role of an element of cooperation and development (He, 2026). Finally, it should be noted that the research activities presented are part of a broader project conducted under the scientific supervision of Professor Annunziata Palermo, funded by Ministerial Decree 629/2024 (Next Generation EU – PNRR).



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PANEL 11 - Gender, Vulnerability and Forced Mobility

Research Hub Migration and Human Rights

Experiences of immigrant physicians in Hatay, Türkiye: A qualitative study

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Keywords: Migrant physicians; Forced migration; Discrimination; Cultural competence; Medical education curriculum

Forced migration has heightened the need to address intercultural communication, human rights, health inequalities, and global health competencies (World Health Organization, 2022). These priorities are particularly relevant in Türkiye, which has received substantial migration since the Syrian civil war. The Turkish National Core Curriculum for Undergraduate Medical Education (UÇEP 2020) includes discrimination, bias, stigmatisation, migration, globalisation and health, work and health, and priority and disadvantaged groups among its core situations (Tıp Dekanları Konseyi, 2020). Migrant physicians may navigate some of the same legal, linguistic, and social constraints as migrant populations while working within the health system. Their accounts therefore offer a distinctive perspective on institutional practices and locally grounded material for medical education. This study explored discrimination, perceived inequalities, and adaptation among Syrian migrant physicians in Hatay, Türkiye, to inform undergraduate medical curriculum development.

Potential participants were approached using purposive sampling; six Syrian migrant physicians agreed to participate. Data were collected through semi-structured in-depth interviews conducted in Turkish. Four participants also cared for Turkish patients and completed the interviews without language difficulty. For two physicians in Migrant Health Centres, an interpreter was present as a precaution but did not intervene. Interviews addressed cultural and social adaptation, professional experiences, and encounters with discrimination. Data were analysed using content analysis, with coding conducted by two researchers.

Participants reported discrimination and racism less frequently in professional settings than in everyday social life. They attributed the comparatively limited difficulties encountered in Hatay to its substantial migrant population and strong cultural similarities between local and Syrian migrant communities. Participants perceived remuneration disparities between physicians in Migrant Health Centres and those in other Ministry of Health units as demotivating. All participants expressed reluctance to work in hospitals, which they described as overcrowded and chaotic. High patient volumes and inadequate physical conditions were their main workplace concerns. Despite these challenges, all participants reported being generally satisfied with living in Türkiye and were not considering onward migration.

The findings indicate that fewer reported experiences of workplace discrimination coexisted with perceived institutional inequities and challenging working conditions. Concerns about remuneration are consistent with evidence linking perceived income adequacy with job satisfaction among Syrian healthcare workers (Zikusooka et al., 2021). In another context, research on refugee physicians in the United States has highlighted institutional barriers to professional integration, particularly medical licensure (Bell and Walkover, 2021). Interpreted alongside a refugee and migrant health curriculum



framework, the findings suggest educational priorities related to discrimination and bias, cultural competence, migrant health, and institutional conditions shaping professional integration (Gruner et al., 2022). Educational responses should complement, rather than substitute for, institutional measures addressing working conditions and perceived inequities. Given the context-specific qualitative design, transferability should be considered in relation to the Hatay context and participant characteristics. Concerns about potential adverse consequences of participation may also have constrained disclosure of discrimination.

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The Gendered borders of climate change: How pre-existing social dynamics shape climate mobility

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Keywords : trapped populations; gendered immobility; intersectionality and vulnerability; climate-driven displacement

This paper analyses how pre-existing vulnerabilities interact with climate-driven displacement. Drawing on the "trapped populations" concept, the research explores how climate change intersects with gender and socio-economic capital to shape mobility patterns. While migration involves individual choices, this paper argues that gender and socio-economic capital largely determine the pathways of immobility, internal displacement and international migration. A qualitative approach, based on a critical literature review and analysis of existing reports produced by relevant organizations, is used to identify patterns of gendered immobility.

The IOM (2024) acknowledged that climate change, environmental degradation, and natural disasters in the MENA region create specific risks for women due to systemic social, economic, cultural, and political inequalities. In particular, IOM reported that lacking land access and adaptive capacity, women are more likely to be forced into poverty or compelled to migrate under vulnerable circumstances. Furthermore, gendered social practices place women at a higher risk of mortality when crossing the Mediterranean.

Empirical studies further illustrate these systemic barriers. Ullah et al. (2024) investigated forced migration among women in vulnerable areas of Pakistan, showing that economic, socio-cultural, and health factors expose women to severe social injustice. Furthermore, their findings highlighted that decisions regarding migration were mainly taken by the household heads, who in most cases were men. Similarly, Zickgraf (2022) examined climate mobility in a Senegalese fishing community (Guet Ndar, Saint-Louis), observing that women migrated significantly less than men due to domestic responsibilities and gender-specific roles in the fishing industry.

Boldrini & Saggiomo (2026) examined the gendered dynamics of climate-related migration and immobility in rural Ghana, in the Bono and Bono East regions. Their analysis showed that women's immobility is a socially produced and gendered condition rooted in care responsibilities and uneven access to resources. The authors also introduced the concept of "care-based immobility", conceptualizing women's staying as a socially produced condition where responsibilities in economic management, food security, and caregiving, anchor women geographically while enabling household and community survival.

Finally, a study conducted in the Dhanusha district of Madhesh province in Nepal by Henriksen et al. (2024), highlighted how women felt that migration was not a possibility for them because of social and gendered expectations, care responsibilities, lack of education and job opportunities, and their families' debts. The authors also noted that the women had very limited freedom of movement because they often cannot leave their houses without the men who migrated.

Ultimately, this critical literature review and analysis of existing reports demonstrates how pre-existing social inequalities disproportionately restrict women, often preventing their ability to migrate internally or internationally. This contribution aligns with the conference's focus by highlighting how climate stress multiplies structural exclusion and shapes patterns of human mobility.

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Reimagining pedagogy in the context of climate-induced migration: A feminist perspective on human rights and education

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Keywords: Climate-induced migration; feminist pedagogy; vulnerability; situated knowledge; human rights

Climate-induced migration is an increasingly urgent global challenge whose consequences are unevenly distributed across populations. Recent research shows that climate-related mobility cannot be understood through aggregate numbers alone, as demographic characteristics influence both the aspiration and the ability to migrate (Benveniste, Huybers and Proctor, 2025). Women may experience particular forms of exposure to climate-related displacement as a result of intersecting inequalities involving gender, socioeconomic conditions, access to resources, and social power. Yet, framing migrant women primarily as “vulnerable subjects” risks reducing complex and socially situated experiences to a fixed identity. This paper asks whether education can become a space in which such representations are questioned and transformative models are articulated.

The contribution develops a feminist and critical pedagogical perspective through a conceptual dialogue between Judith Butler, Kimberlé Crenshaw, Donna Haraway, and bell hooks. Butler's reflections on precarity and vulnerability provide a framework for questioning how vulnerability is experienced, recognised, and politically distributed, while also drawing attention to human interdependence (Butler, 2020). Crenshaw's intersectional approach challenges homogeneous representations of women by showing how gender is experienced in relation to race, class, and other structures of inequality (Crenshaw, 1989). Haraway's concept of situated knowledges further challenges universal and supposedly neutral forms of knowledge, making it possible to recognise displaced women not merely as subjects represented by others, but as situated subjects whose experiences constitute forms of knowledge (Haraway, 1988). Finally, drawing on bell hooks' engaged pedagogy and understanding of education as a practice of freedom, the paper considers education as a transformative space in which marginalised voices can participate actively in the production of knowledge and in the redefinition of social relations (hooks, 1994).

Methodologically, the paper adopts a critical-conceptual approach, bringing feminist theory, critical pedagogy, and scholarship on climate-induced migration into dialogue. Rather than denying the differentiated vulnerabilities experienced by migrant women, it argues for moving beyond a vulnerability-centred framework towards one that also recognises agency, situated knowledge, participation, and dignity. In this perspective, feminist pedagogy can contribute to a shift from understanding climate-induced migrant women as objects of protection to recognising them as subjects of knowledge and social transformation. Education, therefore, is not conceived merely as a means of integrating vulnerable populations into existing structures, but as a potential space for questioning and transforming the structures that shape vulnerability itself. Ultimately, such a reorientation can contribute to more inclusive and justice-oriented approaches to human rights and migration governance, placing dignity, participation, and the voices of displaced people at the centre of educational and social responses to global climate challenges.

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The impact of post-migration living difficulties on young migrants' mental well-being

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Keywords: migration, trauma, post-migration living difficulties, mental health.

Introduction

Several studies (Aragona et al., 2020; Spaaij et al., 2023) have highlighted the role that post-migration events have on the psychological well-being of young migrants, generating or worsening the conditions of vulnerability already present due to previous traumatic experiences.

Post-migration living difficulties include intrapersonal stress (fear of the future, fear of expulsion, homesickness, sense of uprootedness, minority stress, frequent relocations or moves), interpersonal stress (social isolation, episodes of racism, lack of social and community support and social or family conflicts), cultural stress (clash with different cultures and language difficulties) and social stress (inadequate housing or working conditions, discrimination, effect of asylum laws and mass media, complicated family reunification, difficulty accessing school and health services - Skiess-Jokanovic et al., 2021).

Unaccompanied foreign minors, compared to adult migrants, often face additional stressors related to traumatic separation from their families, greater exposure to physical and sexual abuse and human trafficking, dissatisfaction with their school/educational situation, but also the lack of relationships with peers outside reception centers, frequent community transfers with the consequent loss of reference relationships, and difficulties in being able to financially support their families (Pfeiffer, Garbade & Sachser, 2024).

Method

25 young migrants, all males, aged between 18 and 22 hosted in reception centers in Calabria were interviewed. A qualitative-quantitative methodology was used with the aim of investigating the perception of individual well-being and the direct or indirect experience of potentially traumatic post-migration events. The *Warwick Edinburgh Mental Well Being Scale* and the *Post-Migration Living Difficulties-Checklist* tests were used to measure individual psychological well-being and post-migration life difficulties.

Results

Young migrants reported experiencing different potentially traumatic post-traumatic events mainly



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related to difficulties in accessing health services, recognition of a legal status, fear of expulsion and isolation. A negative correlation was highlighted between the level of psychological well-being and exposure to potentially traumatic post-migration events ($r=.709$; $p<0,001$). Young migrants report a widespread fear regarding the future, which appears uncertain—particularly for those struggling to obtain legal recognition, a hurdle that limits their ability to build an independent life plan.

Discussion

The results of the research are in line with what has already been described in the literature. As exposure to potentially traumatic post-migration events increases, the perception of psychological well-being decreases and, consequently, the state of psychological distress increases. Young migrants experience specific post-migration living difficulties compared to adult migrants, due to the early loss of their familiar social and family environment and the challenges and uncertainties encountered particularly during the transition from childhood to adulthood.

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PANEL 12a - Health systems, inequalities, governance and crisis management**Research Hub Inclusive Health and Well-being****Telemedicine for inclusive and resilient health systems in climate – related crises****Davide TERRANOVA**

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Keywords: Telemedicine; Health system resilience; Climate-related crises; Health equity; One Health.

Climate-related crises increasingly act as systemic disturbances to health systems, affecting infrastructure, population mobility, supply chains, and the delivery of essential services. These disruptions can compromise the capacity of health systems to provide continuous and effective care, while their consequences are disproportionately borne by vulnerable populations (Sherman et al., 2023). Evidence from climate-related disasters further demonstrates how healthcare disruptions can interrupt treatment pathways and continuity of care, particularly for patients requiring regular and long-term care (Ginex et al., 2023). From a systems perspective, the resulting challenge is therefore not limited to emergency response but concerns the capacity to maintain critical healthcare functions and continuity of care under conditions of disruption. Within this context, telemedicine can be positioned as an operational component of health-system resilience. Beyond remote consultations, telemedicine can support distributed pathways for the acquisition, transmission, and remote interpretation of health data, enabling selected monitoring and clinical assessment functions to remain operational when conventional healthcare delivery is constrained. Digital and remote care strategies can consequently contribute to maintaining service continuity and strengthening the adaptive capacity of healthcare systems during crises (Mosadeghrad et al., 2024). By partially reducing dependence on physical proximity, telemedicine may provide alternative pathways for selected care functions, particularly for patients with chronic conditions and populations in geographically underserved or isolated settings.

However, technological capacity alone does not ensure inclusive resilience. The ability to access and benefit from telemedicine depends on connectivity, infrastructure, technological accessibility, digital literacy, and socioeconomic resources. The digital divide can therefore reproduce or amplify existing health disparities, limiting the equitable distribution of the benefits associated with digital healthcare (Saeed & Masters, 2021). Broader social, environmental, and territorial determinants consequently shape both population vulnerability to climate-related disruption and the capacity to access alternative healthcare pathways. This contribution aims to develop an engineering-informed conceptual framework for examining how telemedicine can support the maintenance of continuity of care and inclusive health-system resilience during climate-related disruptions. Resilience is understood as the capacity to absorb disturbances, maintain selected critical functions, adapt service delivery, and recover from disruption. Within this framework, continuity of care represents a critical system function, while telemedicine constitutes a distributed operational mechanism capable of supporting its maintenance under constrained conditions. Inclusive resilience requires that the performance of such mechanisms be evaluated not only in terms of technical availability but also in relation to the populations able to access and benefit from them. The One Health approach provides an integrative framework for extending this analysis beyond the healthcare system itself, recognising the interdependence between health and broader environmental and socioeconomic conditions. Within this perspective, sustainable food systems



represent an important upstream dimension of health resilience, linking environmental sustainability, nutrition, equity, and population health (Rockström et al., 2025). The proposed framework thus connects technological adaptation with the broader determinants that shape vulnerability and resilience, supporting a transition towards health systems that are not only capable of responding to climate-related crises but also more inclusive, resilient, and sustainable.

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Integrating social perspectives into One Health for equity in a changing climate

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Keywords: One health, climate change, infectious disease, Social determinants of health

Zoonotic and vector-borne diseases represent a major global health challenge, with environmental, ecological, and socioeconomic conditions facilitating their persistence and spread (1). Climate change is expected to further intensify these dynamics by altering vector distributions, ecosystems, and human mobility patterns, thereby increasing the risk of emerging and re-emerging infectious diseases. These changes are also relevant for Europe, where global warming, migration dynamics, and growing social inequalities create new challenges for infectious disease prevention and control. As climatic conditions become increasingly suitable for the introduction and transmission of vector-borne diseases, pathogens traditionally associated with tropical regions are becoming increasingly relevant for Europe, as already illustrated by dengue virus (DENV).

In Latin America, DENV remains the leading cause of acute febrile illness (2). However, approximately half of febrile cases remain without a confirmed diagnosis, highlighting important gaps in disease surveillance. Our research in the Peruvian Amazon has identified several underrecognized viral pathogens, including Venezuelan equine encephalitis virus, Rio Mamoré hantavirus, and Oropouche virus, through the application of molecular and serological approaches such as RT-PCR, whole-genome sequencing, immunofluorescence assays, ELISA, and plaque reduction neutralization tests (3–5). These findings reveal the diverse aetiologies of febrile illness in the region and emphasize the need for strengthened surveillance systems capable of detecting emerging pathogens (6). The experience of Latin America in dealing with emerging and neglected infectious diseases can therefore provide valuable lessons for Europe as it faces changing infectious disease risks.

The One Health approach promotes interdisciplinarity to address interactions between human, animal, and environmental health for disease prevention and control. Understanding infectious disease emergence, however, requires more than biological surveillance alone. Social determinants of health, including housing conditions, access to clean water, urbanization, mobility patterns, socioeconomic inequalities, and healthcare accessibility, strongly influence exposure risk, transmission dynamics, and disease outcomes (7). These determinants are not exclusive to Latin America but are also relevant to European populations. Integrating these dimensions is essential for a comprehensive understanding of outbreak emergence and impact, particularly as climate change increasingly connects environmental change, human mobility, and health.



To address this challenge, we are examining how social dimensions are incorporated into One Health research globally. Through a systematic analysis of One Health literature from the last decade, we evaluate the inclusion of social determinants, community perspectives, and decolonial approaches within current frameworks. Our findings suggest that social dimensions remain underrepresented despite their critical role in shaping health outcomes.

Together, our research highlights the importance of integrating virological surveillance with social science perspectives. Strengthening diagnostic capacity while incorporating social, ecological, and environmental drivers will be essential for developing equitable and effective responses to infectious disease threats. Lessons from regions already facing a high burden of emerging and neglected infectious diseases can help inform European preparedness. Such an approach is particularly relevant in the context of global warming, increasing human mobility, and growing social inequalities, and can contribute to more inclusive and climate-resilient health responses in Europe.

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Mathematical modeling for cognitive well-being: A steam approach to inclusive artistic research

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Keywords: Mathematical Modeling; Cognitive Well-Being; STEAM; Artistic Research; Inclusive Education

We are living in an era characterized by increasing systemic stress: cognitive well-being depends not only on the reduction of external pressures but also on the development of sustainable ways of managing complexity. This need is particularly evident at this historical moment, characterized by accelerated information flows, fake news, fragmented attention and an increasing expectation of immediate results. Musical interpretation represents a challenging case: interpreting a complex score requires the simultaneous coordination of attention, physical control, memory, listening, and expressive intention. When these processes become an accumulation of chaotic information, they may generate cognitive bottlenecks that affect conscious learning, self-confidence, and the performer's decision-making, especially under pressure. In this contribution, we explore how mathematical and structural thinking can make complexity more intelligible and cognitively manageable. We propose an interdisciplinary STEAM framework integrating mathematics, cognitive psychology and music within practice-based artistic research (Borgdorff, 2012). The central hypothesis is that mathematical modelling is not merely an ex post description of musical structures, but can be used as an epistemic tool: the score is decomposed into significant musical layers and mathematically reorganized into meaningful units and relationships. Recurrent patterns, transformations and repetitions provide the performer with a multidimensional representation, enabling a shift from note-by-note processing towards a more coherent understanding of the musical architecture (Chaffin and Imreh, 2002). Such structural awareness contributes to better interpretive choices and to the development of more sustainable strategies for managing cognitive load. Methodologically, this approach combines heuristic decomposition and simplification (Pólya, 1945), Gestalt principles of perceptual organization (Koffka, 1935), pattern and relationship recognition through mathematical and logical representations, and experimentation at the piano. An illustrative case from Ruggiero Leoncavallo's *Playeras Ancienne* shows how a short musical passage can be deconstructed into mappings of harmonic anchors, structural blocks and melodic-motor relationships (Carbone, 2026). The aim is not to replace formal musical analysis, but to use mathematical thinking to clarify what the performer perceives, anticipates and coordinates. The resulting synthesis can reduce complexity and cognitive load without limiting expressive freedom; rather, it guides that freedom through greater structural awareness. Seeing classical music through mathematical tools challenges the perception of knowledge as compartmentalized, supports interdisciplinarity, and makes two disciplines often perceived as reserved for a select few feel more "human". This approach also restores value to the time required for understanding: sustained attention, reflection and the gradual reorganization of complexity are not limitations, but essential components of cognitive awareness and inclusive learning, fostering a more sustainable relationship with knowledge and the development of more conscious and critically engaged citizens. Mathematics can therefore support cognitive well-being, awareness and resilience under pressure; by making tacit or intuitive cognitive processes explicit, it can also render artistic learning more accessible and transferable to a broader audience. Artistic research thus becomes a space in which mathematical reasoning, embodied practice and interpretative reflection interact in the production of knowledge, with possible developments in STEAM education, embodiment, semiotics and participatory learning, thereby contributing to the development of healthier, more reflective and inclusive educational communities.



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Integrating the syndemic framework into medical education for health equity: A scoping review

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Keywords: syndemics; medical education; health equity; curriculum development; scoping review

The syndemic framework explains how co-occurring health problems, produced and sustained by structural inequalities, interact synergistically to generate outcomes worse than the sum of their independent effects (Singer et al., 2017). Its defining claim is therefore not co-occurrence alone, but the interaction between health conditions and the social and structural forces that shape them. How this framework has been translated into medical education remains unclear.

This review aims to map how the syndemic framework is conceptualised, taught and assessed in undergraduate and postgraduate medical education, and to identify gaps relevant to curriculum development.

This scoping review follows JBI methodological guidance (Peters et al., 2020) and is reported using PRISMA-ScR (Tricco et al., 2018). Eligibility was defined using a Population–Concept–Context framework: medical students, postgraduate trainees or their educators; substantive engagement with the syndemic concept in an educational context; and undergraduate or postgraduate medical education. Continuing professional development and general higher education were excluded. Mixed health-professions sources were eligible only when medical-education-specific findings, educational practices, curricular content or recommendations could be separately identified and extracted; empirical studies reporting only pooled interprofessional findings were excluded. Six bibliographic databases were searched in August 2026 without date restriction: Scopus, Web of Science, PubMed/MEDLINE, ERIC, ProQuest and TR Dizin. Supplementary searching included Google Scholar, the Turkish National Thesis Centre and MedEdPORTAL. Reference-list searching will follow completion of full-text screening. Screening is being conducted independently by two reviewers.

Of 809 records identified, 216 duplicates were removed and 593 entered screening. Screening is ongoing; six sources have been confirmed eligible to date. All six are U.S.-centred and are predominantly conceptual, perspective, policy-oriented or descriptive rather than evaluative. Across the eligible sources, syndemic thinking is used to connect interacting health problems with structural racism, socioeconomic inequality, social determinants of health and, in one recent source, HIV-related disease clusters.



Educational responses operate across three levels: curricular content, pedagogical or experiential approaches, and institutional or system-level reform. Reported applications include required medical-school coursework integrating social determinants of health, dialogue and faculty development (Muldoon, 2022), as well as syndemic-oriented pathways and training recommendations in HIV care (Bolduc et al., 2025). Formal educational evaluation is limited; no eligible source identified to date reports performance-based learner outcomes or patient-level outcomes attributable to syndemic-informed education. A further observation emerged during full-text screening: two publications situated directly within medical education were excluded because syndemics were invoked without substantive conceptual or educational operationalisation. This distinction suggests that increasing use of syndemic terminology does not necessarily reflect integration of syndemic reasoning into medical education.

Preliminary evidence suggests that syndemic thinking is entering medical education mainly as a framework for linking biomedical problems to their social and structural production. Its translation into explicitly defined, longitudinal and assessable educational competencies remains limited. Future work should operationalise syndemic reasoning, connect structural analysis with clinical decision-making, and evaluate context-sensitive curricular models beyond the currently U.S.-centred evidence base.

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PANEL 12b - Climate -related risks and environmental stressors in reproductive population health

Research Hub Inclusive Health and Well-being

Impact of climate change awareness and anxiety on health-seeking behaviors among women of reproductive age

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Keywords Reproductive age; women; climate change; anxiety; health-seeking behaviour

Climate change is the most significant global health issue of the 21st century. Climate change can have physical, social, and psychological effects on human health and is a widespread potential threat to humanity (WHO, 2023). Women are one of the most vulnerable groups affected by the impacts of climate change (WHO, 2023; Di Napoli et al, 2022). This study aimed to examine the effects of climate change awareness and eco-anxiety on the health-seeking behaviors of women of reproductive age. This descriptive, cross-sectional study was conducted among women of reproductive age (15–49 years). The sample size was determined using G*Power 3.1.9.2 software. An a priori multiple regression power analysis was performed with a medium effect size, a statistical power of 0.99, 27 predictor variables, and a significance level of 0.05, resulting in a minimum required sample size of 317 participants. To account for potential dropout, the sample size was increased by approximately 20%, and 380 women were planned to be included in the study. Data were collected from women of reproductive age residing throughout Türkiye via online questionnaires distributed through social media platforms using Google Forms. Data collection instruments included the Personal Information Form, the Climate Change Awareness Scale, the Eco-Anxiety Scale, and the Health-Seeking Behavior Scale (HSBS). In addition to descriptive statistical methods (mean and standard deviation), appropriate statistical tests based on the data distribution were used to compare quantitative variables. Statistical significance was evaluated at a 95% confidence interval and a p-value of <0.05. According to our results; The mean age of the participants was 31.06 ± 9.98 years. Among the participants, 60.5% were unemployed, 63.7% had a university degree, and 68.0% resided in urban areas. The mean score for the Climate Change Awareness Sub-Scale, Eco-Anxiety Scale score and Health-Seeking Behavior Scale were 18.96 ± 6.21 , 24.58 ± 6.38 , and 41.26 ± 9.08 , respectively. Significant differences were found between the total scores of the CCAS



and the variables of age, employment status, perceived income level, number of pregnancies, and having a chronic disease ($p < 0.05$; $p < 0.001$). Furthermore, significant differences were found between the total scores of the EAS and the variables of employment status, place of residence variables and HSBS scores, and the number of pregnancies variable ($p < 0.05$; $p < 0.001$). A Spearman correlation analysis, conducted to determine the relationships between the scales, revealed a positive, weak, and statistically significant correlation between the total EAS score and the total HSBS score ($r_s = 0.173$; $p < 0.001$). Multiple linear regression analysis revealed that the Personal Impact sub-dimension of eco-anxiety positively and statistically significantly predicted health-seeking behavior ($B = 0.660$; $\beta = 0.150$; $t = 2.112$; $p = 0.035$; 95% CI: 0.046–1.274). This study found that women of reproductive age had low levels of awareness of climate change, moderate levels of eco-anxiety, and high levels of health-seeking behavior. Furthermore, it was determined that as women's eco-anxiety increased, their health-seeking behavior also increased, and the personal impact score, a subscale of the eco-anxiety scale, was a predictor of health-seeking behavior.

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Distributed lag effects of meteorological and air pollution exposures on pregnancy and cardiopulmonary hospitalizations in Marburg, Germany

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Keywords: Climate change; pregnancy; cardiopulmonary; DLNM

Exposure to meteorological conditions and air pollution has been linked with various adverse effects on pregnancy and cardiopulmonary health outcomes. Environmental exposures such as weather conditions and air pollution are associated with cardiovascular and respiratory morbidity, with varying effects across diseases and exposure conditions (Abed Al Ahad et al., 2020; Taleb et al., 2026). Air pollutants including PM₁₀, NO₂, SO₂ and CO have been associated with cardiovascular and respiratory hospital admissions (Abed Al Ahad et al., 2020; Shah et al., 2013). Heart failure has specifically been associated with short-term exposure to CO, NO₂, SO₂ and particulate matter (Shah et al., 2013; Yang et al., 2023). Environmental effects may be non-linear and delayed requiring consideration of both exposure level and lag period (Gasparrini et al., 2010). Similar time-dependent effects may occur during pregnancy, where environmental exposures can be related to severe hypertensive disorders.

This study investigates short and medium-term associations between weather conditions, air quality and hospitalizations for hypertensive disorders of pregnancy, cardiovascular conditions and respiratory diseases in Marburg, Germany. We analyzed hospital admission data from the University Hospital in Marburg and Giessen (UKGM) matched with environmental exposure data, including daily meteorological variables and air pollutants. Distributed lag non-linear models (DLNM) with spline-based cross-basis functions were applied to estimate exposure-response relationships and delayed effects across different lag periods. DLNM allows simultaneous assessment of the exposure-response relationship and delayed effects (Gasparrini et al., 2010).

Preliminary results suggest heterogeneous lag structures across exposures and non-linear relationships. For cardiopulmonary outcomes, associations varied by outcome, exposure and lag period. Non-linear patterns were observed for humidity and atmospheric pressure, with higher RR observed at both low and high humidity for heart failure. Some associations appeared at short lags, while others emerged at intermediate lags in a 30-day lag period. For pregnancy complications, environmental exposures showed



non-linear associations with severe hypertensive disorders. Mid-gestation, around Week 20, showed the strongest and most consistent associations, while multiple exposures exhibited threshold-like response patterns. The findings support further investigation of the possible role of comorbidities and personal characteristics of patients in these associations.

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Effects of weather and air quality conditions on mental health of children and adults

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According to the World Health Organization (WHO), climate change is a major health threat. The Lancet Countdown monitors the impacts of climate change on health and in its 2023 report highlights the effects of global heating on morbidity, death records, and labour capacity loss (Romanello et al., 2023). The Lancet Report on Youth Mental Health (McGorry et al., 2024) also identified climate change as one of five global mega-trends that impacts mental health especially in youths. Between 2007 and 2020-2022 mental health and well-being has decreased world-wide for both young men and women while poor mental health and mental disorders have substantially increased (McGorry et al., 2024). To date there is no sufficient knowledge on acute weather and environment related disorder processes, especially with respect to mental health (Walinski et al., 2023).

In the current study, KODAP data of were analysed in conjunction with weather data. We use the children and adults' symptom reports in the diagnostic assessments of the KODAP survey and match these using the approximate location (postal code of clinic) with the average weather and air conditions in the same month in that area. Ordered logit regressions are applied to identify the relationships between meteorological and air conditions (maximum daily temperature, relative humidity, precipitation, air pressure, cloud cover, NO₂, O₃, PM10, SO₂, and CO) and mental states (suicidality, concentration, fatigue, irritability).

The preliminary results are presented in Table 1. For both, adults and children, we find the strongest relationships for air pressure. Low air pressure is related to fatigue and higher irritability, while high air pressure is associated with increased suicidality. The relationship of air pressure with concentration is different for adults and children. High temperatures and strong cloud cover are further factors that often come together with negative mental states in adults and children. Air pollution seems to play a stronger role for adults.

Table 1: Preliminary results: Significant relationships between meteorological and air conditions and negative mental states (+: positive relationships, -: negative relationships)

Condition	Fatigue		Suicidality		Irritability		Concentration difficulties	
	Adults	Children	Adults	Children	Adults	Children	Adults	Children
Maximum temperature		+	+		+	+		
Relative humidity				+				
Precipitation								
Air pressure	-		+	+	-	-	-	+
Cloud cover		+	+	+	+			
NO ₂					+		+	
O ₃		+					+	



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PM10
 SO₂ +
 CO +

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PANEL 13 - Governance of the commons in the context of climate change and AI

Research Hub Security and Conflict Transformation

Governance by Consent in Conflict Contexts: Reverse Causality and the Principled Boundary of Algorithmic Obligation Architecture

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Keywords: conflict governance; reverse causality; algorithmic ethics; asymmetric power; constitutional limits

The academic literature on international governance failure converges on three structural diagnoses. Weak institutional governance (Ostrom, 1990) explains why obligations agreed in one venue are unenforceable in another. The temporal gap between commitment and action explains why decisions arrive after the window that would have mattered has closed. Information asymmetry between mandating authorities and field-level actors (Stiglitz, 2002) explains why accurate warnings are not converted into authorised action. Each diagnosis is documented in three of the most extensively reviewed institutional failures of the modern era: the UN's failure to act on ten weeks of advance warning before the Rwandan genocide (UN, 1999a); the fall of Srebrenica in 1995, framed by the UN's own inquiry as a failure built into the safe-area arrangement's design (UN, 1999b); and the Rohingya crisis of 2017, characterised by the Rosenthal Report as a "systemic failure" of the UN system (Rosenthal, 2019). The three diagnoses identify what was absent. This paper addresses what the response should be.

A novel constitutional governance architecture (Kennedy, 2026), termed Smart-Time and constitutionally bound in the sense that consent and algorithmic obligation standards operate as genuine complements rather than false friends, addresses each of the three diagnostic conditions in climate finance, migration, and global health. It is fully specifiable for conflict payment structures as well; every structural element can be written. This matters, because the argument is not that the architecture cannot be built in conflict; it is that it must not be. Rwanda demonstrates that in 1994 the missing element was not information: the warning existed, ten weeks in advance, no authority acted on it, and an algorithm cannot create authority where none exists. Srebrenica demonstrates that the 1993 demilitarisation agreement used the vocabulary of consent for an arrangement made under siege; an architecture that certifies coerced arrangements as consensual launders the coercion into the vocabulary of legitimate governance. Rohingya demonstrates that the pattern is not historical.

Governance by consent requires institutional symmetry as a precondition. In active conflict that symmetry is systematically destroyed: one party may control communications while another lacks functioning institutions; oracle data may be falsified; the consent mechanism requires actors with capacity and will to co-sign, neither guaranteed under bombardment or state collapse. Under these conditions the architecture does not produce governance by consent. It produces control, convertible at will into coercion.

Beneath the technical argument lies the deeper one. This is a human problem, and no algorithm can cure a pathology that thousands of years of human civilisation have so far failed to cure. The problem of power and control is darker, deeper, and more dangerous than any technology can change. The change must come from a desire to change, and a political willingness to preserve all human life and all human rights as a first principle. The architecture returns nothing where deployment would risk certifying the



atrocities it is nominally designed to prevent. The refusal is the architecture deferring, honestly, to a question only humans and their political institutions can answer.

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Rituals and land in community-based social enterprises: Organising pathways towards just eco-social transitions

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Keywords: community-based social enterprise; indigenous entrepreneurship; ritual infrastructures; just ecosocial transitions; collective flourishing

Social entrepreneurship is increasingly understood as a collective endeavour, often developing through community-based processes rather than individual heroic agency (Montgomery et al., 2012). Although heterogeneous, the notion broadly converges around social value creation through commercial activity, positioning social enterprises as inherently hybrid organisations (Battilana & Lee, 2014). Community-based social enterprises occupy a particularly paradoxical position in the field. They depend on markets to generate income and sustain material livelihoods yet may simultaneously be rooted in Indigenous cosmologies that prioritise reciprocity, collective responsibility, territorial stewardship, and relational connections between human and more-than-human beings. Research has highlighted the importance of collective identity, embeddedness, and territory in community-based entrepreneurship (Peredo & Chrisman, 2006; Hertel et al., 2019), but we know less about the mechanisms through which these organisations engage with markets without allowing market rationalities to erode their social, cultural, and ecological commitments. This study examines ritual infrastructures as one such mechanism, asking how rituals translate Indigenous spiritual and moral relationships with land into organisational practices that enable community-based social enterprises to navigate tensions between market participation and collective flourishing. Ritual theory suggests that rituals do not merely represent shared beliefs but enact moral orders, generate collective commitments, and reproduce organizational arrangements (Turner, 1969; Dacin et al., 2010). In socio-ecological contexts, ritual practices may further embody relational ontologies and cultivate ecological commitments and reciprocity with the more-than-human world (Davy & Quilley, 2018).

Empirically, the paper develops an interpretive qualitative case study of ANEI, an Indigenous community-based coffee enterprise in Colombia. The case was theoretically selected because it combines participation in international coffee markets with strong cultural, territorial, and spiritual commitments, while ritual practices remain visible in community life. Data comprise semi-structured interviews with producers, community members, organisational leaders, and other stakeholders; field observations; documentary materials; and historical and narrative accounts. Drawing on an inductive and interpretive analytical approach, the study triangulates these sources to reconstruct how cosmological meanings, ritual practices, and economic organising become interconnected over time.

Preliminary findings suggest four interrelated functions of ritual infrastructures through which the community navigates tensions between economic viability and the protection of social and ecological systems. First, *translation* converts cosmological principles and spiritual relationships with the land into concrete organizational practices and commitments. Second, *protection* establishes moral boundaries that protect communities and ecosystems from over-commodification and ecological degradation. Third, *regulation* helps mediate tensions that arise when market demands conflict with community commitments and understandings of appropriate economic activity. Finally, *linkage* creates spaces in which indigenous and market rationalities can interact and coexist without the former necessarily being subsumed by the latter.

The study contributes to the social and community-based entrepreneurship literature by conceptualising rituals as organisational infrastructures that help preserve alternative economic rationalities under market pressures. It also contributes to debates on just ecosocial transitions by illuminating how community-based enterprises negotiate economic viability in relation to collective flourishing, ecological stewardship, and cultural continuity.



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Relational anthropology and the 'priesthood of creation': A Christian alternative to socioenvironmental conflict

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This proposal explores an alternative vision of the human role in the face of the climate crisis, moving beyond both despotic anthropocentrism and anti-humanist biocentrism. Drawing on a rereading of the theology of creation, it proposes a relational anthropology based on the co-belonging of human beings and nature. Insufficient models such as "dominion" or mere "stewardship" are discarded in favor of the figure of the "priest of creation": a mediator who integrates the material and the spiritual within a "community of living beings". This perspective redefines human dignity through the categories of vulnerability, care, and encounter, offering a robust ethical framework for conflict transformation and the de-securitization of migration. By understanding the ecological crisis as an anthropological issue, Christianity provides a foundation for integral peace and social justice, translating faith into an ethics of care indispensable for socio-political stability in Europe.



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PANEL 14a - Sustainability Literacy, Environmental Values and Social Engagement

Research Hub Climate Science and Just Transition

Communicating the Just Transition: Capacity-Building for Sustainability Communication and Science–Society Engagement — The SkillsCamp Western Macedonia (Greece) Case Study

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Keywords: Just Transition and Sustainability Communication; Climate Literacy; Science-Society Engagement; Translational Public Communication; Mediterranean climate-hotspot: Western Macedonia (Greece)

Just transition regions face a dual challenge: managing accelerated socio-economic transformation while sustaining public understanding of, and democratic legitimacy for, climate policies (UN IPCC, 2022). The Mediterranean is a recognised climate-change hotspot, and Western Macedonia (Greece), a formerly lignite-dependent region supported by the EU Just Transition Fund (EC, 2021), exemplifies this complexity. Effective climate action requires not only scientific evidence but also societal capacity to communicate and translate knowledge into inclusive transition pathways. Transition governance is well resourced technically and financially, yet chronically under-resourced communicatively: evidence circulates without a corresponding societal capacity to translate, contest and localise it, leaving room for misinformation, distrust and the exclusion of affected communities.

This contribution presents and evaluates SkillsCamp: an annual, university-led, transdisciplinary, place-based capacity-building programme held in Kozani, Western Macedonia (Greece), and delivered by the School of Journalism and Mass Communications, Aristotle University of Thessaloniki, Greece. Its objectives are: to build climate and energy literacy among future and practising communicators; to develop the translational competences that convert scientific and policy knowledge into publicly usable, situated narratives (Moser, 2010; Touri et al., 2021); and to foster sustained deliberative exchange among students, journalists, professionals, regional and local authorities and civil society actors.

The programme draws on environmental journalism and communication, sustainability and climate literacy, resilience, and public communication. Methodologically, it combines expert-led workshops, experiential place-based peer learning, stakeholder engagement, role-play simulations built on profiles of local stakeholders, collaborative reporting, and field visits to transition sites (e.g., the lignite mines and thermal power plants of the Kozani-Ptolemaida basin, photovoltaic parks and circular-economy facilities). Evaluation triangulates pre- and post-programme self-assessment, participant testimonies and real-time audience analytics from the associated public event.

Findings from the two consecutive cycles converge. In 2025, among 25 participants from six European countries, self-assessed knowledge of the green and just transition shifted from a distribution concentrated at the low and moderate levels to one at high and very high levels, with no



low ratings post-programme. In 2026, the public event attracted 92 attendees, 56 of whom engaged through an interactive platform, submitting 40 questions and casting 67 votes on themes spanning local climate impacts, decarbonisation and the social dimensions of energy change; they rated the experience 4,5 out of 5, and all would participate again. Qualitative accounts across both cycles identify field immersion and first-hand contact with regional actors as the decisive learning mechanisms.

SkillsCamp demonstrates the value of science-society engagement and locally embedded capacity-building in green and just communication. It shows that structured, place-based experiential communication training measurably narrows the distance between climate science and public discourse, and that it does so in alignment with European Green Deal imperatives and Just Transition Mechanism goals (EC, 2019), in the very territory where transition costs are generated. It further highlights the role of universities as durable regional infrastructure for participatory just transition governance, rather than episodic outreach providers. SkillsCamp is therefore offered as a replicable model for translating climate science into actionable public communication, transferable to other carbon-intensive European regions and the wider agenda of inclusive, climate-resilient societies.

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Does Academic Excellence Drive Sustainability? The Predictive Role of Doctoral-Level Education on Teachers' Sustainability Literacy and Climate Awareness in Türkiye

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Keywords: climate change awareness; educational attainment; academic engagement; teachers; Turkey

Climate change is not only an acute environmental challenge but also a profound social and educational imperative that demands informed, capable, and empowered citizens. Education plays a transformative role in fostering the critical knowledge, skills, values, and sense of agency needed for effective climate action. Within this ecosystem, school teachers serve as pivotal agents, directly translating climate science and environmental ethics into everyday pedagogical practice (UNESCO, 2024). However, an essential question remains insufficiently explored in educational research: whether higher levels of formal educational attainment and active academic engagement are systematically associated with elevated levels of climate change awareness among practicing teachers. Addressing this empirical gap is particularly vital within the broader frameworks of peace, social justice, and inclusive governance, where climate change increasingly intersects with social vulnerability, structural inequality, and collective civic action.

This study investigates whether teachers' global climate change awareness varies significantly by educational attainment and to what extent academic and professional engagement indicators predict their awareness levels. Employing a quantitative, cross-sectional survey design, the research focuses on practicing teachers across diverse educational settings in Türkiye. Educational attainment is analyzed across three distinct levels: bachelor's degree, master's degree, and doctoral degree. Academic engagement is operationalized through actionable professional indicators, including authoring published academic works, participating in scientific or educational research projects, presenting at academic conferences or symposia, and attending specialized professional development programs focused on climate change, environment, or sustainability. Relevant background variables—including age, professional teaching seniority, school level, and academic teaching field—are integrated into the analysis as contextual controls.

Data are gathered using the Global Climate Change Awareness Scale developed and validated by Yılmaz, Topçu, and Günbayı (2025). This 34-item unidimensional scale demonstrated robust psychometric validity and internal consistency in its foundational study. To ensure scientific rigor, the scale's internal reliability will be re-evaluated within the teacher sample before conducting primary statistical analyses.

Data collection is actively ongoing across multiple regions and school levels nationwide. The comprehensive dataset will be finalized and fully processed prior to the conference. Consequently, the session presentation will deliver complete empirical outcomes, encompassing descriptive statistical profiles, psychometric reliability assessments, one-way analysis of variance (ANOVA) comparing awareness levels across educational attainment brackets, and multiple linear regression models evaluating the independent predictive weight of specific academic engagement activities.

By rigorously evaluating the intersection of educational background and scholarly activity, this study aims to advance scholarly understanding of how advanced teacher qualifications shape environmental responsiveness. Furthermore, the expected results will yield strategic, evidence-based recommendations for policy makers, teacher education institutions, and professional development coordinators seeking to build climate-resilient, future-oriented educational communities.



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Promoting Climate Change Literacy in the Foreign Language Classroom – Exploring High-school Students' Attitudes and Language Awareness

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Keywords: Climate change literacy, English as a lingua franca, IPCC calibrated language, Content and Language Integrated Learning (CLIL), peace education

Climate change represents not only an ecological crisis but also a profound societal challenge with significant implications for education. In alignment with the interdisciplinary mandate of the EU Peace Conference 2026, this paper investigates how shifting mindsets within the foreign language classroom can contribute to a more peaceful, just, and climate-resilient future. The study focuses on the role of English as a lingua franca of science, policy, and international dialogue (Cates, 2017), connecting climate change literacy (Hoydis et al., 2023) to the broader agendas of education for sustainable development, global citizenship, and peace education. The central research question explores how an integrated teaching unit – combining the Intergovernmental Panel on Climate Change (IPCC) calibrated language of science with activities that critically analyze media representations of climate politics – can foster high school students' scientific literacy, language awareness, and constructive attitudes toward global cooperation.

Drawing on the framework of Content and Language Integrated Learning (CLIL), the research positions English proficiency as a tool for active participation in transnational policy debates rather than mere language proficiency. The empirical component consists of a qualitative case study involving twenty-eight high school students (ages 16–17) in Germany. The methodology involved a teaching unit centered on the IPCC's calibrated terminology, followed by semi-structured group interviews designed to assess students' experiences and attitudes. Data were analyzed using thematic analysis (Terry/Hayfield, 2021).

The findings reveal three significant trends: first, students demonstrated enhanced linguistic awareness, gaining a nuanced grasp of scientific certainty and uncertainty through the use of calibrated terms. Second, the participants developed a critical stance toward political and media narratives, showing an ability to deconstruct sensationalist rhetoric and scrutinize how language shapes public perception. Third, students perceived English as an indispensable medium for cooperative global action, viewing the language as a participatory tool for accessing international science and policy. Collectively, these results suggest that integrating climate change literacy into foreign language education equips students with the cognitive and social skills necessary to navigate complex climate discourses. By bridging climatology, linguistics, and peace studies, this paper demonstrates that fostering linguistic and media criticality can amplify the peace-building potential of climate education, ultimately supporting the development of an informed and resilient global citizenry.

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Lifelong Learning for Sustainable Development: Challenges, Opportunities, and Limitations

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Keywords: Lifelong Learning, Sustainable Development, Sustainable Development Goals, Social Sciences, Systematic Review.

In addition to the introduction and concluding remarks, the paper consists of three interrelated parts. The introduction provides a brief elaboration of the paper's ideas and structure by situating LLL within the context of SDG4 (Quality Education). SDG4 conceptualizes education as a continuous, inclusive, and transformative process rather than one limited to formal schooling. The conceptual and methodological framework is presented in the following part of the paper, where the authors explain the structure of the qualitative literature review and the analysis of selected case studies. The qualitative literature review of recent academic publications that address SDGs, lifelong learning, education for sustainable development, digital competences and learning (Braßler, 2024), sustainability LLL competencies (Han, 2025), and the United Nations' Transforming Our World: the 2030 Agenda for Sustainable Development is the second part of the paper. In the third part, this conceptual and methodological framework is used to analyze several case studies of lifelong learning programs at universities in Albania, Bosnia and Herzegovina, and Montenegro, with a special focus on sustainable development in the Western Balkans. The literature review, as well as case studies, show that digital technologies and e-learning platforms expand access to education and support flexible learning pathways. Furthermore, research indicates that "institutions should prioritize platform adaptability and student engagement strategies when implementing e-learning solutions for sustainable development" (Găvruş et al., 2025). Building on these findings, research indicates that integrating sustainable development in education requires creation of new educational models toward socially engaged approaches by developing Urban Living Labs (ULLs) (Morales et al., 2024) and including Education for Sustainable Development (ESD) in Higher education quality assurance (Ryan & Tilbury, 2013). The literature review and analysis of the selected case studies show that LLL, both globally and in the Western Balkans, is increasingly used to integrate sustainable development into adult education, professional development, higher education, along with sector-specific training. Furthermore, universities and other educational institutions need to develop meaningful partnerships with communities, policymakers, and civil society organizations to integrate sustainability into teaching, research, and outreach. In the concluding remarks, the authors reflect on the research limitations and suggest future research directions related to LLL for sustainable development.

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Determinants of Sustainable Behaviour Among University Students: A Cross-Cultural Comparative Analysis

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Keywords: sustainable behaviour; value-action gap; cross-cultural; institutional scepticism; higher education

This study investigates the factors shaping sustainable behaviour among university students in Italy, Brazil, and Vietnam, addressing the persistent gap between environmental awareness and actual pro-environmental conduct - a phenomenon widely described in the literature as the value-action gap. Drawing on the Theory of Planned Behavior (Ajzen, 1991) and the value-action gap framework (Blake, 1999; Kollmuss and Agyeman, 2002), the research employs a cross-sectional quantitative survey design using a structured multi-section questionnaire. The instrument captures social and ecological awareness, institutional trust, social influence, motivations, perceived barriers, and sustainable consumption criteria across three culturally and institutionally distinct national contexts.

The study produces four main findings. First, the effect of awareness on sustainable behaviour is fully mediated by motivations: awareness alone does not reduce reliance on self-interested consumption criteria unless it activates internalized pro-environmental motivation. Bootstrap mediation analysis (5,000 iterations) confirms full mediation, with the indirect path through motivations significant and the direct path non-significant once motivations are controlled. These finding replicates and extends prior evidence from Latin American and Chinese university populations, suggesting a universal psychological mechanism rather than a culturally contingent pattern.

Second, institutional scepticism - students' perception that corporate and governmental sustainability commitments lack credibility - is the dominant predictor of the knowledge-action gap, outweighing both motivations and structural barriers. This implies that raising environmental awareness without simultaneously addressing institutional credibility may be not only insufficient but counterproductive as an educational strategy.

Third, structural barriers act as the binding constraint on behavioural criteria: once barriers are accounted for, awareness and motivations lose independent predictive power, suggesting that



motivational readiness is insufficient without practical enablers such as accessible alternatives and reduced economic costs.

Fourth, social influence is the most upstream predictor, shaping awareness across all three country subsamples, while the core awareness-motivation-behaviour chain proved cross-culturally stable. What varied substantially across countries was the structural context: Vietnamese students reported the highest barriers alongside the widest knowledge-action gap, despite stronger awareness and social influence.

Implications for higher education institutions are outlined across three complementary intervention strategies: nudging and sustainable defaults to reduce structural friction; rebuilding institutional credibility through transparent and consistent sustainability commitments; and fostering collective efficacy through peer-based programmes and direct student participation in sustainability governance. The study argues that sustainable behaviour change requires all three conditions simultaneously - motivated students, credible institutions, and reduced structural barriers - and that focusing on any single condition in isolation is unlikely to close the knowledge-action gap.

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Governing “Invasive” Lives: Urban Wildlife, Climate Narratives, and the Politics of Control in Europe

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Keywords: invasive species; critical discourse analysis; speciesism; multispecies justice; urban wildlife governance

Invasion biology, the young field that classifies and manages introduced species, has become a very contested areas of contemporary ecology (Cassini, 2020). One of the strongest critiques targets the field's core categories: "non-native," "alien", and "invasive" rest on the assumption that there is a correct place and time for a species to exist. This assumption not only contrasts with the Earth's dynamic history but runs in close parallel with the vilification of human migrants, evoking a similarly xenophobic register (Inglis, 2020). This framing is reinforced by a militaristic language, in which species are cast as "enemies" against whom humans must "wage war," attributing to them an intentionality and malice they cannot possess (Colautti & MacIsaac, 2004; Janovsky & Larson, 2019), while obscuring the human actions, including the global wildlife trade, responsible for their presence in a new territory (Inglis, 2020).

This paper examines how these dynamics operate in a specific European case: the governance of the monk parakeet (*Myiopsitta monachus*) in Spain, introduced through the global wildlife trade and now classified as invasive and subject to lethal control. Using Critical Discourse Analysis, we examine how the Spanish conservation organisation SEO BirdLife (re)produces the language of invasion biology in the case of this species. Preliminary findings show a diagnostic frame that labels the species an "exotic invasive bird" and a "coloniser" of biodiversity, causing damage to the country's "natural heritage," conveyed in alarmist terms such as "continuous expansion." This rests on an anthropocentric assumption that territory belongs to human interests, with humans alone positioned to decide which forms of life may legitimately occupy it. Bird trade and pet-keeping are named as the origin of the "problem," yet never situated within a broader account of human responsibility. On the other hand, the prognostic frame invokes a legal "obligation to act," accusing administrations of a "dereliction of responsibility" for having "looked the other way", presenting the situation in near-emergency terms. According to SEO, "culling" must target adult birds while animal welfare considerations are acknowledged only tangentially and remain subordinate to the legal duty to manage the population. Citizens, moreover, are drawn into unwitting complicity through public censuses that precede and inform these policies without disclosing that purpose.



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The ethical cost of this discourse-driven management is severe: portraying these birds as illegitimate intruders normalises killing them, a practice that would otherwise require public debate and explicit justification (Inglis, 2020). In doing so, SEO BirdLife's narrative rests on three interlocking logics: and anthropocentrism, which positions humans as the ultimate arbiters of which forms of life may remain; speciesism, which favours some species over others; and de-individuation, privileging "the species" over the sentient individuals it comprises. Furthermore, we argue that such discourse (re)produces colonial, militaristic, and androcentric logics that normalise violence as society's default response to complexity, treating lethal removal as an obvious, almost unquestionable answer to entanglements between species and territory, while the suffering inflicted and the cost borne by those killed remain unexamined. This pattern resonates broader logics of domination that structure how societies govern lives deemed out of place, whether framed through narratives of invasion, migration, or contested coexistence. Ultimately, it highlights the need for approaches grounded in peace, justice, and inclusiveness across different forms of life for a more just and compassionate future.

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PANEL 14b - Climate Vulnerability, Health Risks and Unequal Adaptation

Research Hub Climate Science and Just Transition

Digital Heat-health Platforms and the Politics of a Just Transition: Reconfiguring Vulnerability and Responsibility in Climate Adaptation Governance

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Keywords: Digital Platforms; Heat-health; Just Transition; Vulnerability; Responsibility

Digital platforms are widely used in climate and health governance to map heat risk, identify vulnerable populations and support adaptation decisions. However, their contribution to a just transition in climate adaptation remains underexplored, especially how platforms define vulnerability and redistribute responsibility through indicators, spatial scales and visualization. We approach these platforms as socio-technical arrangements through which data, classifications and interfaces shape how vulnerability becomes visible, spatialized and actionable (van Dijck et al., 2018; Leszczynski, 2016). We examine these processes through a comparison of four platforms: the California Healthy Places Index: Extreme Heat Edition (HPI) and the CDC Heat & Health Tracker/Heat & Health Index (HHI) in the United States, and the Climate Impact Atlas and Climate Adaptation Knowledge Portal in the Netherlands. We combine a quantitative survey with semi-structured interviews and document analysis. Our findings show four ways in which vulnerability is made actionable. HPI combines projected heat exposure with place- and population-based vulnerability to identify communities requiring adaptation resources (UCLA Luskin Center for Innovation, 2022). Interviewees described community consultation, removal of potentially stigmatizing indicators, avoidance of red colour schemes associated with redlining, and asset-oriented framing linked to policy guides and funding decisions. The CDC HHI standardizes vulnerability nationally through historical heat-health burden, health sensitivity, sociodemographic and built-environment modules (Flinn et al., 2024), while HeatRisk uses location- and season-specific thresholds linked to observed health impacts. Interviews show that the platform was designed to make complex data accessible and support jurisdictions with limited heat-health capacity. In the Netherlands, the Climate Impact Atlas translates national climate data into spatial information for professional users and climate stress tests (Goosen et al., 2014); social vulnerability to heat was described as an expanding component. The Climate Adaptation Knowledge Portal acts as a knowledge intermediary between national policy, research institutions and adaptation practitioners. Here, “just adaptation” and vulnerable groups were described as increasingly important but still relatively new and partly contested, alongside a shift from communicating risks toward supporting adaptation measures within the national spatial-adaptation framework (Delta Commissioner, 2025). We argue that these platforms do more than represent pre-existing vulnerability: they produce actionable geographies of heat risk by selecting indicators, fixing vulnerability to spatial units and directing attention toward populations, places and interventions. The comparison reveals two logics. In the US cases, vulnerability is translated directly into prioritization, rendering socio-spatial and health inequalities comparable for targeting public-health action and resources. In the Dutch cases, vulnerability is more closely tied to coordination, with climate-



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risk information mediated through knowledge infrastructures to support planning, risk dialogue and multi-level adaptation. We conclude that these platforms are not neutral links between data and decision-making. They make some risks and populations more legible, through indicators, spatial categories and visualizations. This comparison shows how platformization recasts heat vulnerability as a governable spatial problem. In the US cases, vulnerability is oriented more toward prioritization and resource targeting; however, in the Dutch cases, it is oriented more toward coordination and institutional adaptation.

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Water accessibility in core and peripheral areas in Czechia

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Keywords: Core-periphery; Spatial inequality; Water accessibility; Czechia

Spatial socio-economic inequalities persist and continue to evolve across Europe. In particular, disparities between metropolitan and non-metropolitan areas have been increasing. In other words, socio-economic cores are becoming increasingly differentiated from other areas, while peripheral regions remain disadvantaged in terms of employment opportunities and structure, wage levels, and accessibility to higher-order services, among other factors (Kebza & do Carmo Perotto, 2020). At the same time, core areas generate continuously growing demand for resources. Hypothetically, such concentrated demand may contribute to increasing resource prices, similarly to the processes observed in housing markets. On the other hand, despite the ongoing housing crisis in major cities, housing prices have recently increased relatively faster in some peripheral areas (Palarczyková, 2026), indicating that rising costs of basic needs are not necessarily confined to economically prosperous regions. Against this background, an important question concerns the extent to which existing spatial inequalities may be reinforced by unequal access to natural resources in the context of the climate crisis, particularly during episodes such as summer heatwaves and cumulative drought. Water was selected as a resource that is indispensable for human existence, biodiversity, and life in general. Due to several methodological limitations, including the use of private wells and extensive collection of rainwater for non-potable purposes, this contribution focuses specifically on the prices of water supplied through public water networks. The study asks whether water prices exhibit a systematic spatial pattern related to socio-economic differentiation. Do prices in core areas reflect higher demand and greater pressure on resources, or are peripheral areas cumulatively burdened by an additional source of economic stress? To address these questions, a socio-economic typology of Czechia was developed using statistical indicators provided by the Czech Statistical Office (ČSÚ, 2026). Water price data obtained from Pravda o vodě (2026) were subsequently compared with this socio-economic classification to examine whether systematic differences occur between core and peripheral areas. The analysed water prices combine charges for drinking water supply (vodné) and wastewater collection and treatment (stočné) and are adjusted for inflation to enable comparison over time.

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Climate-Risk Management and Social Vulnerability: Case Study of Internally Displaced People Settlements in BiH

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Keywords: internally displaced persons; vulnerability; climate change; floods; adaptation

Climate-risk areas in Bosnia and Herzegovina have, in some cases, become locations for post-war settlement of internally displaced persons (IDPs), placing an already socially and economically vulnerable population in areas exposed to environmental hazards. Building on the understanding of vulnerability as a multidimensional and socially and spatially differentiated phenomenon (Adger, 2006; Cutter, Boruff, & Shirley, 2003), this paper examines the relationship between social and spatial vulnerability in the context of post-war settlement in Bosnia and Herzegovina. The aim of the paper is to analyze how spatial planning decisions made under conditions of post-war crisis management have contributed to the long-term exposure of vulnerable and displaced populations to climate-related risks. The research focuses on the settlement of Dobor in the Municipality of Modriča, located on the floodplain of the Bosna River. The case study combines analysis of the spatial context and historical development of the settlement, the chronology of major hydrological events, the spatial evolution of the settlement, and the response and remediation measures undertaken following major flood events, particularly the catastrophic flooding of 2014. The analysis shows that the post-war establishment and expansion of the settlement on previously agricultural floodplain areas contributed to the accumulation of social and spatial vulnerability. The 2014 flood demonstrated the consequences of this exposure, while subsequent investment in structural flood protection substantially improved the physical protection of the settlement. However, the remaining lack of adequate internal drainage infrastructure, together with changing hydrological conditions under climate change, continues to expose the population to residual risk. The case therefore demonstrates that vulnerability cannot be addressed solely through physical protection measures after a disaster has occurred. The Dobor case further illustrates how fragmented spatial planning and governance can contribute to the persistence of vulnerability, particularly when urgent housing needs are addressed without sufficient consideration of spatial and environmental constraints. The findings highlight the need to integrate climate-risk assessment into spatial planning and housing decisions, particularly for socially vulnerable populations, and to strengthen coordinated and multisectoral approaches to climate risk management. The paper argues that addressing vulnerability requires moving from reactive post-disaster interventions towards proactive, integrated and climate-responsive spatial planning.

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Living on the Mauritian Coastline: Global Risks and Uneven Vulnerabilities. The Case of Bel Ombre

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Island territories are particularly vulnerable to the impacts of climate change. The village of Bel Ombre, on the southern coast of Mauritius in the southwestern Indian Ocean, provides a telling example of the profound transformations currently underway: coastal erosion, sea-level rise, temporary or permanent flooding, and the increasing frequency of extreme climatic events in tropical environments. At the same time, it highlights differentiated patterns of vulnerability among local populations (Doorga, 2022). The study area is a former sugar estate that has undergone extremely rapid and profound changes in terms of urbanization and economic activities since the early 2000s. It now encompasses a traditional fishing village, a row of beachfront hotels, and a luxury villa development for foreign residents further inland. Given its limited spatial extent, the Bel Ombre area can be regarded as a laboratory for analyzing the capacity of island societies to adapt to the risks associated with climate change. Our presentation draws on the findings of two research programs. The first, the “Mauriscot” program, focused on coastal risks in Mauritius and was conducted between 2021 and 2024 by the French Geological Survey (BRGM) and the Geolab research laboratory at the University of Limoges, France. The second, the “Migrafisc” program, launched in 2023, brings together researchers from several French and Swiss universities to investigate investment migration across different territories. My doctoral research, which focuses on Mauritius, is part of this latter program. Cross-analysis of the results highlights the gap between, on the one hand, the vulnerability of resident Mauritian populations—among the poorest on the island, with some households already experiencing recurrent flooding—and, on the other hand, that of luxury hotel and residential developments, for which climate-related risks appear to be largely mitigated or obscured. In response to these unequal vulnerabilities to the consequences of climate change, different types of stakeholders are seeking solutions over varying time horizons. The interests and strategies of economic actors and the resident Mauritian population are sometimes contradictory and conflictual. In the face of the state's difficulties in addressing these issues, civil society actors, including members of environmental NGOs, are proposing approaches towards “equitable environmental governance,” particularly through adaptation planning. By combining an essentially qualitative methodology with extensive mapping, this case study therefore examines land and environmental inequalities, the prospects for a just transition, and the conditions for building a “climate-resilient society.”

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Socio-ecological stress and health inequalities: disability, gender and the limits of welfare protection in Europe

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Climate risk does not act on undifferentiated individuals, but on populations positioned within unequal social structures that shape exposure, vulnerability and adaptive capacity. Feminist political ecology challenges technocratic readings of climate change as a socially neutral physical shock (MacGregor, 2010) and cautions against treating women as an inherently vulnerable category, a framing that can obscure both agency and the structural production of risk (Arora-Jonsson, 2011). An intersectional perspective instead emphasises that gendered inequalities interact with class, age, disability and place in shaping the capacity to avoid, absorb and recover from environmental stress (Kaijser and Kronsell, 2014; Djoudi et al., 2016). Within this frame-work, repeated heat can be understood as an inequality multiplier that may amplify pre-existing asymmetries rather than create vulnerability de novo (Sultana, 2014). We examine whether repeated exposure to anomalously warm years is associated with a widening female-minus-male gap in chronic morbidity across levels of long-standing activity limitation, and whether national health-system and welfare resources moderate this relationship. The analysis uses an unbalanced country-year panel of 35 European countries from 2010 to 2024, combining harmonised EU-SILC health indicators with annual temperature anomalies and socioeconomic, environmental, health-system and social-protection indicators. Activity limitation is classified as none, moderate or severe using the Global Activity Limitation Indicator. The primary outcome is the female-minus-male difference in the prevalence of a long-standing illness or health problem among people with moderate limitation. Repeated heat is measured as the number of years, within the current year and previous two years, in which a country's annual temperature anomaly reaches or exceeds its own 75th percentile. Preferred OLS models include country and year fixed effects, country-specific linear trends and controls for GDP per capita, unemployment, income inequality, population ageing and PM2.5 exposure. In the preferred sample of 375 country-years, each additional unusually hot year is associated with a 0.858 percentage point increase in the female-minus-male chronic-morbidity gap among people with moderate limitation (SE 0.211; 95% CI 0.428-1.287; $p < 0.001$). The association is negative among people without activity limitation (-0.209 percentage points) and positive but imprecise among those with severe limitation; the direct moderate-minus-none contrast is 1.067 percentage points. Results remain robust across alternative climate measures, estimators, sample restrictions, leave-one-out analyses, randomisation inference and spatial specifications. Dynamic models locate the largest association one year after an unusually hot year, while the future-exposure placebo is null. No contemporaneous or lagged health-system or welfare interaction survives multiple testing correction. The findings are consistent with an interpretation of climate stress as a socially structured amplifier of health inequality, without implying biologically determined female vulnerability or identifying the individual mechanisms involved. They also suggest that broad national indicators of welfare and health-system capacity may be too coarse to capture the institutional dimensions of equitable, disability-inclusive climate adaptation.



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PANEL 15 - Education, Pedagogy and Transformative Practices

Research Hub Migration and Human Rights

Who Deserves Protection? Climate Mobility, Human Rights, and the Educational Politics of Recognition

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Keywords: climate mobility; human rights; recognition; deservingness; critical pedagogy; higher education; Mediterranean.

Climate-induced mobility is commonly approached through the languages of displacement, migration governance, legal protection, and border management. These perspectives are indispensable, but they leave a prior question insufficiently explored: how does a society learn to recognise some displaced persons as subjects entitled to protection while perceiving others as distant, suspicious, undeserving, or threatening? Climate change does not simply intensify human mobility. It also exposes the selective mechanisms through which vulnerability becomes publicly visible, politically credible, and legally actionable. This paper therefore argues that climate mobility must be understood not only as a legal and political challenge, but also as a pedagogical one. The contribution introduces the concept of an educational politics of recognition as an interpretative framework for the relationship between climate mobility and human rights. The expression refers to the educational, cultural, discursive, and institutional processes through which individuals and communities learn to perceive, classify, and evaluate the vulnerability of others. Recognition is not merely an individual moral disposition. It is shaped by narratives, categories, images, institutional practices, digital infrastructures, and educational experiences that influence who appears in the public sphere as a credible subject of suffering and as a bearer of rights. In this sense, protection is never only a response to vulnerability; it also depends on the conditions through which vulnerability becomes recognisable. This issue is particularly significant in the context of environmental mobility. Climate change rarely acts as a single and isolated cause of migration. Environmental degradation intersects with poverty, political instability, unequal access to resources, labour insecurity, gendered inequality, health risks, and pre-existing forms of social marginalisation. Slow-onset processes such as desertification, water scarcity, coastal erosion, or the progressive loss of livelihoods can remain less visible than sudden disasters while profoundly altering the possibility of remaining in place. These entanglements complicate conventional distinctions between voluntary and forced migration and expose important gaps in existing regimes of international protection (McAdam, 2012). The Mediterranean offers a particularly revealing context for analysing these dynamics. It is simultaneously a climate-sensitive region, a space of intense human mobility, and a politically charged border zone in which unequal regimes of movement and protection meet. Environmental vulnerability intersects here with socioeconomic inequality, humanitarian discourse, migration control, and border securitisation. The central question is therefore not only whether protection exists, but whose vulnerability becomes intelligible as a legitimate claim to protection. This shift from protection as a legal category to protectability as a socially mediated condition opens a specifically pedagogical field of inquiry. The theoretical framework combines the philosophy of recognition with critical approaches to vulnerability and pedagogy. Honneth's account of recognition highlights its role in the formation of individual and social agency, while Butler's analysis of differential frames of grievability makes visible the political conditions through which some lives count more readily than others (Honneth, 1996; Butler, 2009). These perspectives become especially productive when placed alongside research on migrant deservingness, which shows that access to legitimacy is often structured through moralised distinctions between those considered worthy and unworthy of inclusion (Chauvin & Garcés-Mascreñas, 2014). The paper extends these insights by asking how such distinctions are learned, reproduced, and



potentially challenged through education. The concept of educational politics of recognition is therefore not used as a synonym for human-rights education. It names the formative processes that precede and accompany legal-political decisions about protection. Societies learn which borders appear natural, which forms of mobility are described as dangerous, whose testimony is credible, and whose claims to rights are represented as excessive. The production of deservingness is also a pedagogical production. It occurs in formal education, but also through media discourse, institutional language, political communication, digital platforms, and everyday public narratives. Education is thus implicated both in the reproduction of exclusionary frames and in the possibility of making those frames visible and contestable. From this perspective, the pedagogical challenge is not simply to transmit established knowledge about migrants' rights. It is to educate the capacity to interrogate the categories through which a person becomes visible as a rights-bearing subject in the first place. This argument resonates with Freire's understanding of education as a practice of critical reading of the world rather than passive reception of given meanings (Freire, 2005). Applied to climate mobility, such an approach requires learners to examine how categories such as migrant, refugee, victim, risk, emergency, illegality, and deservingness are produced, circulated, and institutionalised. Human-rights education becomes, therefore, an education of judgment: a practice that asks not only what rights exist, but how social and epistemic frames condition whose rights are recognised as urgent and credible. This problem is becoming more complex as migration governance increasingly incorporates digital infrastructures and AI-based anticipatory tools. Predictive models, biometric systems, risk assessment, and data-driven border management promise greater capacity to anticipate or manage mobility. Yet classification is never merely technical. The categories through which people are rendered visible as risks, vulnerable populations, potential migrants, or recipients of protection can reproduce assumptions already embedded in political and social discourse. The educational task is consequently to develop critical literacy capable of examining how data-driven representations shape public understanding of climate mobility without reducing technological innovation either to a neutral solution or to a predetermined threat. Methodologically, the paper adopts a theoretical-conceptual and interdisciplinary approach rooted in philosophy of education and social pedagogy while engaging with migration studies, human-rights scholarship, climate-mobility research, and critical studies of digital governance. Its aim is not to establish a linear causal relationship between climate change and migration, nor to propose a new legal status for environmentally displaced persons. Rather, it reconstructs the conceptual relations among vulnerability, recognition, deservingness, protection, and education in order to identify the pedagogical assumptions that underpin contemporary responses to climate mobility. Within this framework, higher education assumes a distinctive responsibility. Universities should not function merely as sites for communicating established knowledge about climate migration. They can become spaces in which the categories through which mobility is interpreted are themselves subjected to critical examination. Research-based teaching can place students in contact with competing evidence legal ambiguities, migration narratives, institutional classifications, and data-driven representations. In doing so, it can transform interdisciplinary research into a pedagogical practice of public reasoning, enabling students to understand how knowledge about migration is produced and how this knowledge shapes judgments about dignity, belonging, and protection. A pedagogy of recognition must therefore move beyond compassion alone. Empathy may be educationally significant, but human rights cannot depend on emotional proximity or benevolence. The more demanding task is to cultivate the capacity to identify the social, institutional, and epistemic conditions that make some claims to dignity audible and others inaudible. This requires connecting climate vulnerability to structural inequality, border practices, legal categorisation, and the unequal distribution of visibility. It also requires resisting simplified narratives in which climate migrants are represented either only as passive victims or primarily as future threats. The expected contribution is twofold. At the theoretical level, the paper proposes educational politics of recognition as a pedagogical category capable of connecting recognition theory, human-rights education, climate mobility, and migration governance. At the educational level, it outlines a conception of research-based higher education in which climate mobility becomes an opportunity to cultivate critical judgment, epistemic vigilance, and rights-based public reasoning. The central claim is that protection is never merely a legal



response to an already visible vulnerability; it also depends on educational, symbolic, and institutional processes that shape whose vulnerability can be seen, believed, and recognised. The question 'Who deserves protection?' is therefore deliberately paradoxical. Its purpose is not to construct a more refined hierarchy of deservingness, but to expose and challenge the mechanisms through which such hierarchies are produced. A pedagogy of climate mobility grounded in human rights must ultimately question the assumption that dignity requires prior proof of deservingness. In a warming world, educating for rights means educating people to recognise how categories of protection are constructed, whose lives they leave at the margins, and how democratic education can make those margins critically visible.

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Teaching the Invisible: Slow Climate Displacement, Human Rights, and Pedagogies of Vulnerability

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Keywords: climate mobility; slow displacement; vulnerability; human rights education; higher education; slow violence; Mediterranean.

Climate mobility is often made visible only when movement becomes spectacular: when borders are crossed, emergencies are declared, or displaced populations become the object of humanitarian, political, or media attention. Yet many climate-related forms of displacement begin much earlier. They emerge through gradual processes in which environmental degradation, declining livelihoods, water scarcity, coastal erosion, health insecurity, and socioeconomic fragility progressively undermine the conditions that make it possible for people to remain, belong, and live with dignity. In this sense, climate displacement is not only a question of mobility. It is also a question of educational visibility.

This paper proposes a pedagogical reading of slow climate displacement by asking a different question from the one usually posed by migration governance: how can education make visible forms of vulnerability before they become publicly recognisable as displacement?

The contribution develops the notion of pedagogies of vulnerability as a framework for understanding the educational task generated by climate-induced mobility. Vulnerability is not considered here as a fixed characteristic of particular groups, nor as a synonym for weakness. Rather, it is understood as a relational and historically situated condition produced by the interaction among environmental pressures, social inequality, access to resources, political structures, and unequal possibilities of adaptation or mobility. Such an approach prevents climate migration from being reduced to a deterministic relationship between environmental change and human movement.

Research on environmental migration has shown that climate change rarely acts as an isolated driver of mobility. Migration decisions emerge from the interaction among environmental, economic, political, demographic, and social factors, and are shaped by both opportunities and constraints on movement (Black et al., 2011). Climate-related mobility must therefore be approached not as a mechanically predictable response to environmental change, but as a complex social process in which human agency, inequality, and structural conditions remain decisive. This complexity becomes particularly visible in processes of slow-onset environmental change. Unlike sudden disasters, phenomena such as desertification, declining agricultural productivity, salinisation, heat stress, and progressive resource scarcity often escape the temporal rhythms of public attention. Their consequences accumulate gradually, affecting housing, employment, health, education, family stability, and community life long before migration itself takes place. Rob Nixon's concept of slow violence provides a particularly productive lens for interpreting this phenomenon. Slow violence describes forms of harm that unfold incrementally and often invisibly, making them difficult to represent and therefore easy to neglect (Nixon, 2011). Applied to climate mobility, this perspective allows displacement to be understood not only as the moment of departure but also as a prolonged erosion of the material and social conditions that sustain inhabitable lives.

The pedagogical problem begins precisely here. What remains invisible is not merely an environmental process; it is also the gradual weakening of rights and possibilities. A community may still be physically present in a territory while its capacity to remain there safely and with dignity has already been profoundly compromised. Housing, health, work, access to education, social protection, and cultural continuity may all deteriorate before any movement takes place.



For this reason, the paper argues that human-rights education on climate mobility should begin before the border. This shift has important educational implications. Traditional representations of migration frequently organise understanding around visible events: departure, arrival, border crossing, asylum claims, or emergency reception. Such representations risk reinforcing the assumption that vulnerability becomes politically relevant only once movement has occurred. A pedagogy of vulnerability instead asks students to reconstruct the conditions that precede mobility and to recognise the cumulative erosion through which the possibility of staying may progressively disappear.

The Mediterranean offers a particularly meaningful context for this analysis. It is simultaneously a climate sensitive region, a space of intense socioeconomic inequality, and a major area of human mobility. Environmental degradation here intersects with demographic pressure, unequal access to resources, fragile labour markets, political instability, and differentiated capacities for adaptation. The Mediterranean therefore makes visible the limitations of narratives that describe climate migration exclusively as movement from one geographical space to another.

The paper argues that higher education has a distinctive responsibility in addressing this complexity. Universities should not merely provide information about climate change or migration. Their educational task should include the development of interpretative capacities through which students learn to identify connections among environmental change, inequality, mobility, and rights. This is where the concept of world-centred education becomes particularly useful. Biesta (2022) argues for an education oriented neither exclusively toward the learner nor toward curriculum content, but toward the reality of the world in which human beings exist together. From this perspective, education requires an encounter with realities that resist individual preferences and simplified explanations. Climate mobility constitutes precisely such a reality: complex, uncomfortable, transnational, and resistant to single-cause narratives.

A pedagogy of vulnerability should therefore not aim merely to increase students' emotional sensitivity. Nor should it reduce climate migration to an exercise in empathy. Its purpose is to develop the capacity to identify structural relations: between environmental degradation and social inequality, between immobility and constrained mobility, between human dignity and access to resources, and between apparently distant ecological processes and their consequences for everyday life. This pedagogical task is also closely connected with sustainability education. UNESCO's framework for Education for Sustainable Development emphasises the transformative role of education in enabling individuals to understand interconnected global challenges and participate in building more just and sustainable societies (UNESCO, 2020). Within climate mobility, however, such transformation requires moving beyond abstract environmental awareness. Students must be able to understand how ecological change is experienced differently according to socioeconomic position, geography, gender, age, access to political representation, and the capacity either to move or to remain.

The question of immobility is particularly important. Climate-related vulnerability does not always produce migration. Some individuals and communities may be unable to move because they lack economic resources, social networks, institutional support, or viable destinations. Others may actively wish to remain because of attachment to place, community, culture, or livelihood. The right to mobility must therefore be considered together with the conditions that make remaining a genuine possibility rather than an imposed condition.

This distinction is reflected in contemporary migration policy. The International Organization for Migration explicitly recognises the need not only to develop solutions for people who move and for people on the move, but also to create conditions that enable people to stay safely and with dignity when this is their choice (IOM, 2021). This rights-based approach provides an important institutional foundation for a pedagogical perspective that refuses to treat migration as either inevitable or inherently problematic. Methodologically, the paper adopts a theoretical-conceptual approach, situated within social pedagogy and philosophy of education while engaging with climate-mobility research, human-rights



frameworks, environmental humanities, and sustainability education. Rather than attempting to quantify future migration flows, the contribution examines the educational consequences of how climate mobility is framed, taught, and made visible. The central analytical move consists in shifting attention from the visible event of displacement to the premigratory erosion of rights. This expression refers to the gradual deterioration of the social, material, environmental, and institutional conditions necessary for a dignified life before displacement is formally recognised. The concept makes it possible to identify an educational blind spot: individuals may learn about migration only once movement occurs while remaining unable to recognise the processes that have made such movement increasingly unavoidable.

Research-based teaching can play a crucial role in addressing this blind spot. Climate mobility offers an opportunity to develop interdisciplinary educational practices that combine scientific evidence, migration studies, human rights, environmental narratives, and social analysis. Students can be asked not simply to identify causes of migration but to examine trajectories of vulnerability: What conditions have progressively become unsustainable? Which rights have been weakened? Who has the capacity to adapt, who can move, and who cannot? At what point does remaining cease to be a genuine choice?

Such questions can foster a form of critical literacy capable of resisting both alarmist narratives about future "waves" of climate migrants and overly simplified humanitarian representations. The educational objective is not to predict who will migrate but to understand how vulnerability is produced and unevenly distributed. This also differentiates the present contribution from approaches centred primarily on legal recognition after displacement. The pedagogies of vulnerability proposed here focus instead on the temporal dimension of climate injustice. They ask education to recognise harm before it becomes spectacular, rights erosion before it becomes legal exclusion, and constrained lives before they appear at a border. The expected contribution of the paper is therefore twofold. At the conceptual level, it develops pedagogies of vulnerability as a framework for interpreting the educational dimensions of slow climate displacement. At the didactic level, it proposes higher education as a space where interdisciplinary research can be translated into learning experiences that help students recognise the hidden temporalities and inequalities of climate mobility.

The central argument is that education for human rights in a warming world cannot begin only when displaced people become visible. If climate injustice operates through slow, cumulative, and unequal processes, educational responsibility must also learn to work within this slower temporality. Teaching the invisible means learning to perceive the erosion of dignity before displacement becomes an event.

From this perspective, higher education can contribute to a more inclusive understanding of climate mobility by making visible not only those who cross borders, but also those whose possibilities of remaining, moving, and living with dignity are progressively being narrowed by environmental and social change.

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Transforming Protestant Theology – Fostering Peace, Justice and Inclusive Societies

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Fundamental changes since the enlightenment era caused various challenges. And many of the current so called “Wicked problems” can be understood as a result of epochal transformations over the last 200 years. This had various effects on religion and causes multiple challenges for theology. In the tradition of a Liberal Theology of the 19th century these challenges have been addressed in two fundamental approaches: First, the role of religion in modern societies is understood as a specific contribution to culture. This role can be recognized as “school” of individuality (F. Schleiermacher) and freedom (G. W. F. Hegel). Secondly, theology is the academic discipline which provides necessary skills for those who will be in a responsible position in the (Protestant) churches – in other words: Theology’s current curriculum at German Universities is still shaped by this almost 200 year old understanding.

Today, we are facing a dramatic loss of members of the churches. They constantly reduce clergy, culturally (Christian) religion has already lost its function as an commonly shared ethos. Consequently theology cannot longer justify its own status as a discipline/faculty at universities only by focusing on those who will later join the churches professionally.

By holding on to the idea that religion is one (not the only, but maybe primary) source for individuality and freedom the question arises, how this fundamental potential of religion can be revisited in an appropriate manner for our times – and what that means for the curriculum of theology. This is what we call: Transforming Protestant Theology – Fostering Peace, Justice and Inclusive Societies. In this project we follow a twofold approach: We keep remaining in the liberal tradition of Protestant Theology which uniquely picked up the insights of “Enlightenment” to foster the “Co-Existence” of Christianity and Modernity (Troeltsch). Then, we use Ethics as a hermeneutical perspective. In addition to this we still hold true that Religion and “Bildung” (=Education and Formation) are equivalent phenomena and that the art of distinction is the crucial pedagogical perspective on today’s Wicked problems. We focus on these two discourses (Ethics and Bildung) that are crucial for universities and culture of our time. Our framework is deriving from a rich idealistic and classical tradition of ethics and educational sciences. As a consequence, we started re-thinking Theology’s Curriculum: Religion and theology in our understanding are not separated from culture and sciences but part of the cultural practices and knowledge that aims at personal development and constitutive rationality (J. Baumert).

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PANEL 16a - Nutrition, Food Systems & Biological Resilience
Research Hub Inclusive Health and Well-being

Fresh fruits, longer life: Climate-resilient solutions for ready-to-eat produce

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The extension of fruit shelf life represents a significant challenge in the context of climate change, which, through rising temperatures and the increased frequency of extreme events, accelerates deterioration processes, thereby compromising the quality and storability of fresh products. Conventional preservation technologies exhibit limitations related to cost and the increasing demand for more natural and sustainable solutions. In this context, edible coatings, including Aloe vera gel, represent a promising approach. Recent studies have highlighted the potential of functionalizing this gel with by-products from the food industry to enhance its effectiveness. The present study evaluates the efficacy of Aloe vera gel enriched with extracts derived from Citrus limon by-products in preserving the quality of ready-to-eat orange segments (*Citrus × sinensis*) during storage.



Buffalo milk microRNAs: A natural shield for vulnerable populations comparative insights and evolutionary conservation with human milk

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Keywords: miRNA, extracellular vesicles, buffalo milk, functional analysis, immune modulation, exposure

MicroRNAs (miRNAs) are small non-coding RNAs found in human milk content in extracellular vesicles (EVs), that may contribute to immune development and maternal infant communication (Perri et al., 2018; Tingö et al., 2021). Several of these molecular signals are evolutionarily conserved across mammalian species and were found in cow milk. Despite species-specific variations, a significant core remains highly conserved: miR-148a-3p is the most abundant transcript in both human and buffalo milk, followed by the let-7 and miR-30 families.

These "genetic messengers" survive digestion to regulate gene expression related to immune response and inflammation. For vulnerable populations in regions like Italy and Turkey, buffalo milk miRNAs offer a natural strategy for intestinal disease prevention. By bridging traditional agriculture with biomedical research, we can transform this local resource into a powerful tool for global health equity and resilience. This study explores the comparative miRNA profiles to identify evolutionarily conserved sequences and their potential biological impact. In particular, miR-148a-3p and miR-223-3p are highly represented in human and other species milk. This miRNA profile has been associated with potential immunoregulatory functions. Building on this evolutionary conservation, buffalo milk less studied as food matrix represents a compelling, regionally available source to assess these bioactive molecular components with potential nutritional relevance. Given the scale and cultural importance of buffalo milk production in Southern Italy and several other European countries, (Romania, Netherlands, Bulgaria, Hungary and Poland). Specifically, we examined the EVs content and the evolutionary



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conservation, gastrointestinal stability, and potential biological functions of miRNAs associated with buffalo milk as well as their possible relevance to sustainable nutritional strategies for vulnerable populations. Raw buffalo milk obtained from pooled routine milking at an Italian dairy farm was subjected to standardized in vitro gastrointestinal digestion using the INFOGEST protocol (Brodkorb et al., 2019). EVs were isolated from raw and digested milk by differential ultracentrifugation and characterized using, nanoparticle tracking analysis, and scanning electron microscopy. Total RNA was extracted from the isolated EVs, and miRNAs selected for their 100% sequence identity with human homologues were analysed by quantitative reverse-transcription PCR. Validated human gene targets of the miRNAs detected following digestion were subsequently examined through bioinformatic and functional enrichment analyses. Buffalo milk EVs revealed the presence of conserved miRNAs. In particular, miR-148a-3p and miR-223-3p, which remained detectable even after simulated gastrointestinal transit. Despite a significant reduction in total particle concentration post-digestion, EV size and morphological integrity were largely maintained. Interestingly, miR-148a-3p and miR-223-3p displayed contrasting trends during digestion, with the former being downregulated and the latter being upregulated.

These findings suggest that buffalo milk EVs protect miRNAs during gastrointestinal transit differentially and provide a foundation for investigating their potential effects on intestinal and systemic biological pathways. As novelty in this work, the in silico validated targets of singular and both microRNAs were associated with immune regulation, inflammatory signalling, protein turnover, intracellular communication, antigen processing and presentation, and nervous- system development. In conclusion, integrating traditional buffalo farming with molecular nutrition research may contribute to sustainable approaches to global health equity and resilience.

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Honey-derived microRNAs in immunonutrition and climate change resilience

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Keywords: Honey; dietary miRNAs; immune response; cross-species regulation; climate change

Honey has long been recognised for its nutritional and medicinal properties throughout human history. This is due to the abundance of bioactive compounds in its micronutrient fraction, including carotenoids, phenolic acids, and flavonoids, contributing to its antioxidant, anti-inflammatory, antiproliferative, and wound-healing properties (Afrin et al., 2020). In recent years, the presence of certain molecular components, particularly miRNAs, has been ascertained in honey, and such components are digestive-stable (Abrego-Guandique et al., 2024). This may be due to the protective function of extracellular vesicle-like (EVL) components, which can preserve the miRNAs' biological activity. However, the direct link between this fraction and the food product's immune activity is poorly established in the literature. Hence, we examined the presence of selected widely conserved miRNAs from the animal kingdom in EVL structures isolated from monofloral honey varieties. At least 44% of the screened miRNAs were present in all varieties in a manner that is not affected by mild heat treatment (pasteurisation). A computational view of the retained miRNAs suggests that signal transduction, transcriptional regulation, and protein stability contribute to immune system interactions. Particularly, predicted targets of such miRNAs are rich in immune and related cells, such as gastric isthmus progenitor cells, stromal cells, and immune subsets, indicating putative epithelial barrier functions (Abrego-Guandique et al., 2026). As endogenous miRNAs are established regulators of inflammatory signalling, immune-cell differentiation, epithelial homeostasis, oxidative-stress responses and cellular survival, exogenous miRNAs (or xenomiRs) have the potential to also offer such immune-nutritive capacities. While honey represents a low-cost, accessible, and biologically active resource in the global equity context, honey-derived extracellular nanoparticles may represent environmentally responsive molecular signalling systems of the producing species (bees), whose small RNA cargo may reflect adaptive immune and stress-regulatory processes associated with pollinator resilience under climate change conditions, as climate warming, drought and altered precipitation can modify flowering phenology, nectar availability, floral rewards, plant reproductive performance, bee physiology and plant–pollinator synchrony (Chen et al., 2023, Zapata-Hernández et al., 2024). What's more, miRNAs themselves participate in environmental stress adaptation. Plant miRNA networks regulate responses to drought, heat, salinity and other abiotic stresses



(Samynathan et al., 2023). Given the potential trans-species miRNA transfer through the diet (Ilori et al., 2026), these findings altogether support a testable axis between the environment, plant, bee, resulting honey, and the consumer, in which climate-associated stresses may reshape the small-RNA profiles of plants and pollinators, the miRNA repertoire entering honey, and, consequently, humans; particularly along the line of immunomodulation. Honey miRNAs could therefore be investigated both as candidate biomarkers of ecological stress and as components of climate-sensitive food functionality. However, direct causal studies linking climate stress to honey nanoparticle miRNA remodelling and consequent functional response in *in vitro* and *in vivo* models remain limited. Integrating small-RNA sequencing of geographically and botanically characterised honeys with climatic metadata, INFOGEST gastrointestinal digestion, intestinal transport models, target-prediction analyses and immune-cell validation could establish whether environmentally responsive honey miRNAs possess biologically relevant immuno-nutritional activities.

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Disease prevention and management: The role of Beta-Carotene

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Keywords: β -carotene; cognitive function; microRNAs; Exposome; Inclusive Health.

In the face of rising global health inequalities, malnutrition and micronutrient deficiencies remain critical challenges for the health and resilience of vulnerable populations (Nong, 2026). β -Carotene (BC), the principal dietary provitamin A carotenoid in Europe, contributes to vitamin A homeostasis and possesses antioxidant and potentially neuroprotective properties that may support cognitive health (Abrego-Guandique, 2023). However, its effects depend on dose, exposure duration, physiological context, and food matrix. (Bohn, 2017). Early-life exposure to a Western diet (WD), particularly during gestation and lactation, may disrupt metabolic and neurodevelopmental processes, thereby increasing vulnerability to later cognitive impairment (Tsan, 2021). MicroRNAs (miRNAs) are small non-coding RNAs that regulate gene expression and may influence neural and metabolic pathways (Abrego-Guandique, 2024). This study integrated evidence from human studies with experimental analyses in animal models to investigate the relationship between BC exposure and cognitive health, focusing on brain enrichment miRNAs and spatial working memory following early-life supplementation. A meta-analysis was conducted according to PRISMA guidelines. PubMed, Scopus and Web of Science were searched for human studies.

Random-effects models were used to examine associations between circulating BC and cognition and the effects of BC-containing interventions. For the experimental component, an animal model was used.



Offspring of WD-fed rodents received BC or vehicle during the suckling period with normal weaning and early weaning. Brain enrichment miRNAs were quantified using RT-PCR, and differentially expressed miRNAs and their predicted targets were investigated through enrichment analyses. Spatial working memory and cognitive flexibility were assessed using the T-maze spontaneous-alternation test. Ten eligible studies were identified for meta-analysis. The pooled association between circulating BC concentrations and cognitive outcomes was weak ($r = 0.14$; 95% CI: 0.06–0.21).

Conversely, intervention studies showed a significant moderate positive effect on cognitive performance (Cohen's $d = 0.37$; 95% CI: 0.03–0.71). Interpretation is limited by differences in intervention doses, duration and the frequent administration of BC in combination with other micronutrients. In animal model, early BC supplementation modulated brain enrichment miRNA expression. Their predicted targets were enriched in metabolic, synaptic and neuronal pathways. In male offspring exposed to maternal WD and early weaning, BC supplementation significantly increased spontaneous alternation and reduced decision latency in the T-maze. BC exposure may support cognitive health, although its effects depend on exposure type, timing and physiological context. Human interventions showed a moderate favourable effect on cognition, while circulating BC was only weakly associated with cognitive outcomes. In the experimental model, early-life BC supplementation modulated miRNAs and improved spatial working memory, particularly in male offspring exposed to maternal WD and early weaning. These findings warrant further investigation of food-based and biofortified BC strategies, considering sex, developmental timing and nutritional context.

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Valorization of olive oil by-products: Antioxidant activity and effects on HaCaT cell viability and migration of pomace fractions

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Keywords: olive oil by-products; olive pomace; lipophenols; HaCaT keratinocytes; cell migration

Olive oil production generates large amounts of solid and liquid by-products, including olive pomace (OP) and olive mill wastewater, whose management represents an important environmental challenge. At the same time, these residues contain bioactive compounds that can be recovered and valorized within a circular economy perspective. Olive pomace is particularly rich in (lipo)phenolic compounds and has attracted increasing interest as a source of functional ingredients for skin-related applications (Cacciola et al., 2025; Rodrigues et al., 2023). This study investigated olive pomace from the Coratina cultivar as a sustainable source of bioactive compounds with potential applications in dermatological and dermo-cosmetic formulations. Hydroxytyrosol (Hty), tyrosol (Ty), verbascoside, hydroxytyrosyl oleate (HtyOA), and hydroxytyrosyl linoleate (HtyLA) were isolated by preparative liquid chromatography and characterized and quantified by RP-HPLC-PDA-MS. Four enriched fractions were obtained: FR1, containing 35% Hty; FR2, containing 23% Ty; FR3, containing 13.42% verbascoside; and FR4, containing HtyOA (0.34%) and HtyLA (0.25%). Antioxidant activity was assessed by DPPH, ABTS, and FRAP assays. Overall, FR3 showed the highest antioxidant capacity, reaching 100.1 ± 6.8 mg Trolox equivalents (TE)/100 g OP in the DPPH assay, 304.6 ± 6.8 mg TE/100 g OP in the ABTS assay, and 1682.1 ± 24 μ mol Fe²⁺ equivalents/100 g OP in the FRAP assay. FR1 also displayed marked antioxidant activity, particularly in the ABTS and FRAP assays, whereas FR2 and FR4 showed lower activity in these chemical assays. The biological effects of the fractions were evaluated in HaCaT human keratinocytes at 5 mg/mL. MTT assays showed a significant increase in cell viability after 24 h for FR1 and FR3, while FR4 significantly increased cell viability after 48 h; none of the fractions caused a statistically significant reduction in cell viability relative to the control under the tested conditions. The biological relevance of HtyOA for skin-related applications has also been reported previously (Benincasa et al., 2019). Based on the MTT results, FR1, FR3, and FR4 were further investigated using a wound-healing assay. Preliminary observations showed a greater reduction in wound width for FR1 and FR3 after 24 h compared with the control, whereas FR4 showed a slower but sustained response, with greater wound closure than the control at 48 h. These observations are consistent with previous evidence describing pro-migratory effects of hydroxytyrosol in keratinocytes and wound-healing effects associated with verbascoside-rich extracts in cell-based models (Abate et al., 2021; Kanlayavattanakul et al., 2024). Overall, these findings support olive pomace as a promising source of functional (lipo)phenolic ingredients with antioxidant activity and potentially beneficial effects on keratinocyte viability and migration. Although further studies in more complex biological models are required, the results support the valorization of olive pomace for sustainable skin health and dermo-cosmetic applications.

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Regional craft wheat beers: Bioactive quality and their contribution to inclusive health and well-being in b&h and croatia

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Keywords: craft wheat beer; polyphenols; inclusive health; sensory evaluation; science communication.

This research evaluates regional craft wheat beers in Bosnia and Herzegovina (BiH) and Croatia as functional products capable of supporting inclusive health and community well-being. Unlike industrial breweries that predominantly focus on mass-market commercial lager beers, craft breweries utilize diverse yeast strains and specialized ingredients, resulting in significantly higher concentrations of health-promoting bioactive compounds.

To assess their quality, this study analyzed 12 regional craft samples—comprising 9 Weizenbier and 3 Witbier types—through physical-chemical parameters and formal sensory evaluation. Laboratory results demonstrated that these artisanal products contain remarkably high levels of total polyphenols, ranging from 113.23 mg/L to 170.23 mg/L. These plant-derived compounds, sourced directly from malt and hops, provide vital antioxidant benefits and potential cardiovascular protection. By identifying these benefits, the study positions craft brewing as a highly relevant, food-based determinant of community health.

The analytical methodology involved measuring bitterness, color, pH, and protein levels according to standard European Brewery Convention (EBC) methods. The chemical analysis revealed bitterness levels ranging between 10.26 and 28.07 IBU, while pH values remained within a stable and microbiologically secure range of 3.88 to 4.50. Concurrently, a professional sensory panel evaluated the samples, noting a strong and favorable alignment with the traditional German Weizenbier style. Notably, "Sample 7 CRO" emerged as the panel favorite, earning a near-perfect score of 97 out of 100 points. Despite a historical regional preference for pilsners, these findings suggest a growing consumer acceptance of nutrient-dense wheat beers as the regional craft movement expands.

A central argument of this contribution is the vital necessity of effective science communication to bridge the gap between complex food technology and public knowledge. By translating laboratory evidence—such as the role of specific protein fractionation in preventing chronic conditions like hypertension—into accessible public information, we empower consumers to make informed, health-conscious lifestyle choices. This consumer-empowerment approach directly aligns with the EUPeace mission to foster resilient, inclusive societies. By promoting local, artisanal agri-food products, this research contributes to the overall well-being of the Mediterranean area. Ultimately, recognizing craft beer as a legitimate source of bioactive nutrients, rather than merely an alcoholic beverage, supports a more inclusive understanding of public health and sustainable local production



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PANEL 16b - Sustainable chemistry, toxicology and green health innovations**Research Hub Inclusive Health and Well-being****Rare earth: emerging risks for human health****Maria PRINCIOTTO**

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Keywords:

Rare Earth Elements, Human Exposure, Human Health.

Global efforts to mitigate climate change and reduce dependence on fossil fuels require an increasing supply of critical raw materials, in particular Rare Earth Elements (REEs). REEs are a group of 17 metallic elements, including scandium (Sc), yttrium (Y), and the lanthanide series, crucial to modern technologies and the ecological transition thanks to their unique catalytic, magnetic, and optical properties. They hold strategic importance due to their essential role in decarbonization technologies, such as electric vehicles, wind turbines, energy-efficient electronics, and advanced battery systems (1). This growing diffusion of REE-dependent renewable energy and low-carbon technologies has resulted in the expansion of extraction, processing, and refining activities. The processing of REE-bearing minerals is associated with the generation of large volumes of mining and processing residues and the potential release of REEs into multiple environmental compartments. Moreover, the extensive use of REEs in electronic devices, together with the increasing generation of electronic waste (e-waste), may represent an additional source of their release and dispersion into the environment (2). The increasing occurrence of REEs in environmental matrices may result in multiple pathways of exposure, and consequently in growing human health concerns. Exposure to REEs may occur through the inhalation of airborne particles and dust, the ingestion of contaminated food and water, and, in specific contexts, exposure associated with medical applications. Following absorption in micro- and nanoscale forms, REEs may distribute to and accumulate in different tissues and organs, where they can interfere with biological processes. This impairment is caused by various mechanisms, including reactive oxygen species (ROS) generation, DNA damage, and the modulation of signalling pathways involved in inflammation, apoptosis, and cell proliferation. Potential adverse effects have been reported in several organs and systems, including the respiratory, cardiovascular, nervous, and reproductive, gastrointestinal systems (3). In the respiratory system, REEs cause severe damage (including impaired pulmonary clearance, chronic inflammation, phospholipids, and fibrosis) depending on dose, exposure duration, and particle size. Nanoscale REEs pose the greatest threat, traversing the blood–air barrier into systemic circulation. During transit, they cause localized endothelial inflammation and oxidative stress before reaching myocardial tissue to induce ROS-mediated cardiomyocyte damage. Additionally, inhaled nanoparticles travel to the central nervous system via olfactory and bloodstream pathways, altering communication between neurons, promoting oxidative stress, and causing cellular damage. Nanoscale REEs can also reach the reproductive system through the bloodstream, causing sperm DNA fragmentation and blood–testis barrier disruption. At the gastrointestinal level, it can be determined



dysphagia, nausea, emesis, and acid reflux and exerted pronounced toxic effects on liver. Conversely, REEs used in biomedical applications, such as cerium oxide, exhibit complex dose-dependent behaviours: showing antioxidant properties at specific concentrations, whereas higher exposure levels or longer durations induce cellular and metabolic alterations (4,5). In conclusion, despite their increasing use and environmental occurrence, significant knowledge gaps remain regarding REE exposure, dose-response relationships, toxicity, and threshold values, limiting effective monitoring and risk assessment. Addressing these gaps through an integrated One Health approach, combining environmental monitoring with toxicological and epidemiological research, is essential to support the safe and sustainable use of REEs.

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Deep eutectic solvents for enhancing phenolic acid solubility: Implications for sustainable health applications

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Keywords: Deep eutectic solvents; phenolic acids; betaine; solubility enhancement; antioxidant activity.

Phenolic compounds are widely distributed plant secondary metabolites with recognized antioxidant and other biologically relevant properties, yet the practical exploitation of many phenolic acids is limited by their poor aqueous solubility. This can reduce the concentration of the bioactive compound available in aqueous environments and may therefore hinder formulation performance and biological functionality. In this context, deep eutectic solvents (DESs) have emerged as tunable solvent systems capable of combining high solubilization potential, simple preparation and, when appropriately designed, improved sustainability profiles. Particular interest has been directed towards natural and biomimetic eutectic systems, inspired by the hypothesis that highly organized liquid microenvironments formed by naturally occurring metabolites may contribute to the solubilization and stabilization of poorly water-soluble compounds in biological matrices. Building on this bio-inspired concept, the present study investigates two betaine-based eutectic systems, betaine: lactic acid and betaine:urea:water, as alternative media for the solubilization of a selected panel of phenolic acids. The solubilization performance of the two systems was quantitatively evaluated using the shake-flask method, and the resulting values were compared with aqueous solubility data reported in the literature. Both eutectic systems demonstrated a pronounced capacity to increase the solubility of the investigated phenolic acids compared with water, although the magnitude of the enhancement depended on both the phenolic structure and the composition of the eutectic medium. Beyond solubilization, the study addresses the molecular interactions governing solute incorporation into the eutectic phase. Fourier-transform infrared spectroscopy (FT-IR) is employed to compare the spectra of the neat eutectic systems with those obtained after phenolic-acid incorporation, with particular attention to band shifts, broadening and intensity changes associated with modifications of hydrogen-bonding and other intermolecular interactions. The temporal stability of the resulting systems is further evaluated through FT-IR analyses performed at different time intervals to detect possible spectral changes indicative of degradation or structural transformation. Finally, antioxidant activity is assessed before and after incorporation of the phenolic acids into the eutectic media in order to determine whether enhanced solubilization is accompanied by preservation of biological functionality. By integrating solubility measurements, spectroscopic characterization, stability assessment and antioxidant evaluation, this work examines betaine-based DESs not merely as alternative solvents, but as structured molecular environments capable of simultaneously supporting solubilization, stabilization and maintenance of phenolic-acid activity. More broadly, the study contributes to the development of bio-inspired eutectic systems as



rational formulation platforms for poorly water-soluble bioactive compounds, linking green solvent design with the functional preservation of molecules of nutraceutical and pharmaceutical interest.

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Integration of biopolymers and mesoporous silica: An eco-compatible approach for the controlled release of acyclovir in the treatment of herpes virus

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Keywords: Herpes labialis; Acyclovir; Mesoporous silica nanoparticles (MSNs); pH-responsive drug delivery; Sublingual gelatine

Herpes labialis, caused primarily by Herpes Simplex Virus Type 1 (HSV-1), is one of the most widespread viral infections globally (Gopinath 2023). Conventional pharmacological treatment relies on Acyclovir as the gold standard; however, oral administration of this nucleoside analogue suffers from severe limitations, including low bioavailability (15–30%), a short plasma half-life, and the need for frequent dosing, alongside its inability to act on the virus during the latent phase (Hammer 2018). To overcome these critical issues and reduce the initial uncontrolled burst effect, this study addresses the scientific problem by proposing the development and characterization of a hybrid, stimulus-responsive therapeutic system intended for sublingual administration (Djayanti 2023, Álvarez 2020, Milano 2023). The primary objective is the design of an advanced pharmaceutical dosage form capable of integrating two distinct levels of kinetic control to ensure targeted, sustained, and pH-dependent release of Acyclovir within the acidic microenvironments typical of herpetic lesions. Methodologically, system preparation involved synthesizing mesoporous silica nanoparticles (MSNs) loaded with Acyclovir, which were subsequently coated with a pH-sensitive polysaccharide ester obtained by anchoring L-lysine onto β -(1,3)-D-glucan (extracted from *Euglena*). The resulting nanocarriers (Lys-O- β -Glucan MSNs) were incorporated into a three-dimensional hydrogel matrix composed of gelatin and glycerol. Physicochemical and morphological characterization was performed using FT-IR spectroscopy, scanning electron microscopy (SEM), X-ray diffraction (XRD), and optical microscopy, while functional performance was evaluated via swelling tests in artificial saliva and *in vitro* release studies in PBS at different pH values (7.4 and 5.5). The results demonstrate the successful covalent conjugation of the coating and a very high drug encapsulation efficiency within the MSNs (reaching 95%). SEM microscopy revealed well-defined spherical nanoparticles with average diameters of 200 ± 20 nm, while optical analyses confirmed that the polymeric coating provides effective steric and electrostatic stabilization, preventing macro-aggregation within the hydrogel. Swelling tests highlighted the matrix's high swelling capacity (close to 100%), with the coating acting as a temporary hydrophobic barrier during the initial stages. Finally, kinetic release profiles showed marked pH-responsive behavior: at physiological pH (7.4),



the cooperation between gelatin and the polymeric coating drastically limits Acyclovir diffusion (below 20% at 72 hours), suppressing the burst effect; conversely, in an acidic environment (pH 5.5), a progressive and programmed release is observed over the medium to long term. In conclusion, the developed hybrid platform proves to be a promising technological strategy for optimizing the bioavailability and site-specific efficacy of Acyclovir in the treatment of herpes labialis.

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Green drug delivery: Sustainable strategies for improving bioavailability and patient care

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Keywords

Deep Eutectic Solvents; Green Chemistry; Drug Delivery; Bioavailability; Sustainable Pharmaceuticals

The effective delivery of active pharmaceutical ingredients (APIs) characterized by poor solubility, low permeability, and limited bioavailability remains a major challenge in pharmaceutical sciences, often compromising therapeutic efficacy, dosing regimens, and patient adherence. Addressing these limitations while minimising environmental impact is a central objective of green chemistry applied to drug delivery. In this context, this contribution presents an integrated and sustainable strategy based on Deep Eutectic Solvents (DESs), a class of green solvents obtained by combining hydrogen bond acceptors and donors, which are non-toxic, biodegradable, and derived from natural or naturally inspired components. Owing to their tunable physicochemical properties, DESs can markedly enhance the solubility, stability, and permeability of APIs, thereby helping to overcome key biopharmaceutical barriers associated with the Biopharmaceutics Classification System. Recent studies from our research group illustrate the versatility of this approach across different therapeutic classes and administration routes. For atenolol, a BCS Class III β -blocker limited by low skin permeability, a DES based on choline chloride and propylene glycol was incorporated into polymeric eutectogels, achieving markedly higher transdermal release compared with conventional hydrogels and thus supporting a viable alternative to oral administration in cardiovascular therapy (Cassano et al., 2024). For mesalazine, a BCS Class IV anti-inflammatory drug used in inflammatory bowel disease, a natural DES composed of choline chloride and lactic acid increased aqueous solubility nearly forty-fold; when structured into an Eudragit-coated eutectogel, the system provided pH-dependent, colon-targeted release, minimising premature gastric drug release and enhancing site-specific efficacy (Sole et al., 2026). These findings build on recent work from our research group addressing the stability limitations of temozolomide, an anticancer drug used in the treatment of glioblastoma, whose stability over time can represent a critical challenge for formulation and drug delivery. A natural deep eutectic solvent composed of glycerol and lactic acid was investigated as a solubilizing medium for temozolomide and subsequently incorporated into a thermosensitive Pluronic F-127 based formulation designed for intranasal drug delivery. This approach supported the development of an innovative delivery platform aimed at improving drug solubilization and formulation stability, with potential implications for nose-to-brain delivery in glioblastoma. Collectively, these examples show how the integration of DESs into polymeric matrices enables the design of advanced, tunable drug delivery systems capable of controlled and targeted release through both transdermal and oral colon-targeted routes, while reducing the use of hazardous organic solvents. This



approach combines environmental sustainability with patient-centred care, in line with the core principles of green and sustainable chemistry (Di Gioia, Duarte and Gawande, 2023), and contributes to the development of safer, more effective, and more accessible therapies. By linking pharmaceutical innovation to environmental responsibility, this line of research also speaks to broader questions of equitable and sustainable access to healthcare.

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Effects of climate change on aquaculture: Environmental toxicity, food security, and human health

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Keywords: Ecosystem health; Environmental pollution; Food safety; Thermal stress; Water quality

Aquaculture plays an increasingly vital role in meeting global food demand, enhancing nutrition, and sustaining livelihoods. Aquaculture sector's contribution to global fish production is projected to rise from 46% to 53% by 2030, supporting livelihoods of nearly 600 million people worldwide (FAO, 2024). However, long term sustainability is threatened by a complex web of climate-induced stressors, anthropogenic pollution, disease outbreaks, and feed resource instability. In this context, the aim is to comprehensively evaluate the impacts of climate change on aquaculture within an integrated nexus of environmental toxicity, food security, and human health, proposing adaptation strategies grounded in "Climate Science and Just Transition".

First, climate change accelerates environmental toxicity through multiple pathways. Rising water temperatures, ocean acidification, and extreme climate events alter aquatic ecosystem dynamics. Thermal stress impairs growth, metabolic efficiency, and immune function in aquatic organisms, increasing susceptibility to pathogens and harmful algal blooms (Maulu et al., 2021). Crucially, climate variability shifts agricultural pest pressures, leading to increased pesticide application. Warmer waters modify the environmental fate, bioaccumulation, and toxicity of these contaminants, causing oxidative stress and metabolic disruption in cultured species (Koleva & Schneider, 2010; Burch et al., 2025). Second, these toxicological and environmental disruptions directly compromise food security. Deteriorating water quality and physiological stress reduce overall yields and product quality. Concurrently, climate change pressures the supply chains of essential aquafeed ingredients—such as fishmeal and fish oil—elevating production costs and compounding economic vulnerabilities across the sector. Third, the downstream consequences extend to human health and safety.

The bioaccumulation of pesticide residues and contaminants through the aquatic food chain poses severe public health risks, including potential endocrine, neurological, and chronic health disorders. Addressing this tripartite crisis requires integrated mitigation and adaptation frameworks. Sustainable practices must incorporate eco-friendly technologies, alternative feed ingredients, waste management, and the selection of climate-resilient species (Maulu et al., 2021). Furthermore, a "just transition" necessitates empowering small-scale producers, integrating local ecological knowledge into policy, and establishing climate-risk insurance schemes.

In conclusion, climate change impacts on aquaculture must not be viewed merely as production losses, but as an interconnected crisis encompassing environmental toxicity, food security, human health, and socioeconomic vulnerability. Achieving sustainable aquaculture requires holistic, equitable strategies that safeguard ecosystems while ensuring global food safety.



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