

Social Impacts of the Green Transition: Prospective Environmental (In)Justice in Europe's Peripheries

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Abstract

The green transition is increasingly perceived as unjust by various stakeholders. Academic debates revolve around decarbonisation and coal phase-out legislation, the rush for critical minerals, new forms of renewable energy, regional strategies and the lack of effective coordination mechanisms, and policy gaps between economic and workforce development strategies and socio-ecological protections. Based on six case studies carried out between 2023 and 2025, this article identifies future vulnerabilities arising from the reproduction of intersectional socio-environmental inequalities in the EU's just transition, thereby expanding the frame of socio-environmental justice (SEJ) through the lens of prospective environmental justice (PEJ). By centring analysis on the prospective production of SEJ and creation of green sacrifice zones, PEJ encourages scholarship and policy to confront the cross-sectoral and structural inequalities that green transition policies, as expressions of green capitalism, often inherit and amplify. We address a gap in comparative studies that empirically and qualitatively engage with the grassroots effects of the transition in Southern and Eastern Europe, discussing its structural conditions and evidencing place-based lived experiences. This article contributes to mapping prospective (re)vulnerabilisation in Europe's green/just transition and the making of green sacrifice zones, wherein certain groups, identities, lands, and livelihoods are precast as dispensable in the pursuit of climate goals. Our contribution builds understanding of what it means to be made vulnerable in the technocratic shadow of the green transition in Europe's periphery.

Keywords

green sacrifice zones; just transition; prospective environmental justice; socioeconomic inequalities; socio-environmental justice; vulnerability

1. Introduction

The twin transition (digital and green), unfolding amid the triple planetary crisis (climate change, nature loss, and pollution), is a “complex policy-led process with time goals” (Garcia-Garcia et al., 2020, p. 1) that aims to: reduce greenhouse gas emissions by 55% by 2030, reach 40% renewables by 2040, and attain climate neutrality by 2050 under the European Green Deal’s Fit for 55 package (2020). Under the framework of a just transition that “leaves no one behind,” major policy changes and innovations have occurred in strategic sectors, including energy and renewables, industrial decarbonisation, transportation and housing, finance, agriculture, food systems, and biodiversity. The cumulative effects of these policies are stimulating a growing academic debate around how best to evaluate the fairness and effectiveness of their driving mechanisms, as well as their socioeconomic and environmental impacts (Krawchenko & Gordon, 2021; Lager et al., 2023; Millward-Hopkins & Johnson, 2023; Sovacool et al., 2020). Drawing on environmental justice and political ecology literature, this article contributes to the debate by examining how patterns of socio-environmental injustice are reproduced through the planning and implementation of just transition policies in peripheral European regions. It addresses the green transition through the multidimensional lens of prospective environmental justice (PEJ; Velicu, 2020).

The socio-environmental justice (SEJ) framework has been adopted by movements, politicians, and scholars to identify and critically analyse the multiple forms of violence, power dynamics, vulnerabilisation, and (re)production of inequalities involved in the planning and implementation of green transition policies, with a specific focus on the lived experiences of affected communities (Cambou, 2020; Middlemiss, 2022; Sanz-Hernández et al., 2020; Svartdal & Kristoffersen, 2023; Upham et al., 2022). Five dimensions of SEJ operate at the core of policy planning and implementation (distributional, procedural, recognitional, restorative, and cosmopolitan), exposing negative effects and procedural shortcomings. This, in turn, requires a just transition capable of compensating for the material and immaterial harms caused by including and recognising marginalised groups in decision-making processes that concern their territories, livelihoods, and futures (Lager et al., 2023). And yet, Velicu and Barca (2020, p. 265) emphasise the need to go beyond an understanding of SEJ as (only) “the unfair distribution of toxins or benefits,” arguing instead for more analysis “to examine everyday social relations of injustices as they indicate preliminary problems.” What is needed is an analysis that addresses SEJ in its targeted, deliberative, and ongoing processes of (re)vulnerabilisation and sacrificial gerrymandering in the name of global green citizenship.

Contributing to fill this gap, this article addresses one broad question: *How are socio-environmental injustices prospectively produced across green transition policy domains?* This question is answered through the critical perspective of PEJ (Triefus & Velicu, 2025; Velicu, 2020; Velicu et al., 2026). PEJ is an understudied concept within the just transition framework that offers an analytical tool to push our thinking about socio-environmental justice beyond procedural dimensions of distribution, recognition, or participation (Velicu & Kaika, 2017) by addressing the preliminary “slow, discursive, symbolic, agentic, psychological, spatial, temporal, material layers of violence associated with economic growth” (Velicu, 2020, p. 8). PEJ examines how vulnerabilisation is reproduced and projected into the future. It builds on existing efforts to map vulnerability across the EU, as a transversal analytical lens that cuts across the five dimensions of SEJ to identify the pre-emptive nature and ongoing production of sacrificable zones and groups on the altar of the green transition (Zografos & Robbins, 2020). We apply the PEJ lens to understand inequalities not as outcomes, but as ex-ante instances that can be either amplified or diminished by decarbonisation policies

(Dwarkasing, 2023). In this context, vulnerability is continuously produced within “relationships of domination and oppression that are shaped by the social, economic, and political cultures, structures, and processes that constitute political life,” whose uneven distribution should be considered as systemic (Schiff, 2024, p. 126).

Several indexes, indicators, datasets, and studies attempt to measure widespread societal vulnerability related to climate change and the green transition, in largely quantitative terms, such as the European Environment Agency’s Climate Change Vulnerability Impact Assessment, the European Committee of the Regions Territorial Impact Assessment, the EU Energy Poverty Advisory Hub, the EU Multidimensional Inequality Monitoring Framework, and the Regional Green Transition Vulnerability Index (Antje et al., 2023; Juhola et al., 2022; Lager et al., 2023; Rodríguez-Pose & Bartalucci, 2024; Sánchez-Guevara et al., 2019; Sibilia et al., 2024). In broad terms, Zarowsky et al. (2013) outline “shadow zones of vulnerability” and processes of vulnerabilisation in a public health context, identifying three core elements: (a) the initial or underlying condition of the affected individuals or groups; (a) exposure to individual or collective risks or shocks; and (c) their capacity to cope with these risks and their consequences. For regions highly dependent on carbon-intensive industries and sites of potential and existing EU Strategic Project designation, or related to Important Projects of Common European Interest, different dimensions of SEJ in the literature contain precursive temporalities, where energy poverty, housing inequality, and job precarity exist and can be exacerbated. A PEJ lens helps understand pre-emptive processes of (re)vulnerabilisation in a just transition, in order to scrutinise and ultimately better prepare to mitigate socio-environmental injustices, by identifying five processes of PEJ that crosscut the five dimensions of SEJ, which we unpack in Section 2.

Using data from six methodologically diverse case studies aligned through a common analytical framework (see Section 3), this article conducts a cross-sectoral analysis of their preliminary results through the lens of PEJ. These cases investigate the socio-environmental and economic impacts of the green transition in different policy areas and multiple countries across Southern and Eastern Europe. In particular, they focus on lithium mining in Portugal (Barroso) and Serbia (Avramović et al., 2025; Piccardi et al., 2025), forest conservation in the Carpathians, Romania (Puiulet et al., 2025), coal mine closures in the region of Bierzo-Laciana, Spain (Zavala Pérez, 2025), agricultural land use in Croatia, Serbia, and Slovenia (Pistotnik & Kušej, 2025), and energy renewal of residential buildings in Croatia, Serbia, and Slovenia (Komazlić et al., 2025). Together, these studies encompass (at least) five major EU decarbonisation and green transition policy domains, and their diverse contexts enable us to avoid sectoral reductionism. This article contributes to understanding the prospective (re)production of vulnerability in Europe’s green transition and the making of new green sacrifice zones, where certain groups, lands, and livelihoods are pre-emptively cast as dispensable in the pursuit of both new extractivism and climate goals (Juskus, 2023; Marin et al., 2023; Saleth & Varov, 2023; Zografos & Robbins, 2020).

This article is structured as follows: the next section provides a general overview of current efforts to map vulnerability and SEJ studies on green and just transition impacts, with a focus on PEJ and consequent visions of mitigating, not exploiting, vulnerability and (in)equality. Section 3 outlines the GreenPaths analytical framework adopted by the six case studies and the methodology mobilised by the present article to analyse them. Section 4 presents the main results deriving from PEJ cross-case analysis, and, before concluding our findings, Section 5 offers a brief discussion on policy implications of PEJ and future directions.

2. Prospective Environmental Injustice and the (Re)Production of Vulnerabilities in the Green Transition

Environmental justice literature offers five established dimensions for analysing the uneven impacts of green transition policies: procedural, distributional, recognitional, cosmopolitan, and restorative. Distributional justice, the most referenced, relates to how different groups benefit or experience impacts from the changes associated with the green transition (Köhler et al., 2019; Krawchenko & Gordon, 2021; Millward-Hopkins & Johnson, 2023; Piggot et al., 2019; Sovacool et al., 2020). The authors highlight that this should entail a renegotiation and assessment of distributional patterns of costs and benefits. Procedural justice focuses on governance elements—who is included in decision-making and how decisions are made (see Cambou, 2020; Heffron & De Fontenelle, 2023; Krawchenko & Gordon, 2021; Lager et al., 2023)—and requires policy tools that facilitate genuine discourse and contestation, wherein the just transition is not seen as a one-off event, “a passage to a predefined future, but a set of continuously evolving processes that must be responsive to diverse forms of vulnerabilities and the relational practices that condition them” (Abram et al., 2022, p. 1038). Recognitional justice sheds light on which groups are vulnerable, marginalised, misrepresented, or silenced within transition processes (Juhola et al., 2022; Krawchenko & Gordon, 2021; Lager et al., 2023; Lempinen & Vainio, 2022). The dimensions least encountered in the literature are restorative justice—compensation for and the mitigation of the loss and damage brought on by the transition (Lempinen & Vainio, 2022; McCauley et al., 2023)—and cosmopolitan justice, rooted in the notion that the citizens of each nation have an obligation to themselves and to citizens of other nations (Heffron & De Fontenelle, 2023; Sovacool et al., 2020).

Some national studies offer diverse insights into just transition policy’s adverse impacts on SEJ. For example, Lempinen and Vainio’s (2022) study of Finnish peat workers’ experiences of transition policies unpacks cosmopolitan, distributive, procedural, restorative, and recognition injustices, citing concerns for the future “saturated with profound personal and economic worry” (Lempinen & Vainio, 2022, p. 6). Upham et al. (2022) explored energy and transport poverty in Iceland, focusing on disability and vulnerability as access barriers to social benefits, identifying sociodemographic characteristics of those likely to experience deprivation—people in isolated rural locations, single parents, those without access to a car, etc. In Norway, Svartdal and Kristoffersen’s (2023) introduce the Why in My Backyard (WIMBY) framework to capture local perceptions of energy projects and the “technological, social, and cultural factors that shape public attitudes and engagement” (Svartdal & Kristoffersen, 2023, p. 7). Cambou (2020) focuses on Indigenous Sami rights to reindeer husbandry, guaranteed in Sweden’s green transition policy, yet impacted by wind turbine construction, detailing examples of distributional, procedural, and recognitional injustice under domestic and international human rights and environmental law.

While these SEJ categories capture prominent ongoing harms, they often remain within a framework that addresses injustices as they manifest—on impact—necessitating interrogation of the deeper structural conditions that produce them (Cedergren et al., 2022; Lager et al., 2023). To address this, we adopt PEJ as an analytical lens to help understand the “deep-seated and ongoing dimensions of socio-environmental injustice” that are often overlooked—forms of harm that can be understood as “constitutive moments of systemic violence” (Velicu, 2020, p. 414). The concept draws attention to the pre-emptive structural aspects of SEJ that are exploited and normalised by global capitalism, and to the racialised, patriarchal, and militarised patterns of control over resources (Pichler et al., 2017; Pulido, 2017). At its core, PEJ asks what

makes “extractivist projects possible in the first place” (Velicu, 2020, p. 414)—the pre-existing forms of violence that pave the way for, and are subsequently reinforced by, green development projects that aim to promote what Dunlap and Riquito (2023, p. 18) call “a hyper-modernist worldview based on climate reductionism and techno-fixes.” Velicu (2020) identifies five interrelated processes of PEJ evident in affected communities’ testimonies: (a) slow dispossession and forced marginalisation of communities; (b) the production of disposable lives and livelihoods; (c) daily psychological and emotional damage; (d) the systematic disavowal of alternatives to development; and (e) the disqualification of communities as political subjects. Across these processes, disproportionate harm is not merely a failure of distribution or recognition, but “the exact production of some people and spaces as dispensable or ‘surplus’” (Triefus & Velicu, 2025; Velicu, 2020, p. 11) that precedes any formal decision.

This critical perspective directly informs a more radical interrogation of the just transition framework. As Velicu and Barca (2020) argue, where just transition vocabularies have expanded to include representation and participation, vulnerable people are essentially invited to accept compensation from a system that thrives on producing such groups, trapping justice in a limiting, techno-managerial politics. By centring analysis on the prospective production of injustice—the making of disposable people before a project even begins—PEJ challenges just transition scholarship and policy to confront the structural inequalities and vulnerabilities that green transition policies, as expressions of green capitalism, risk reinforcing when they fail to interrogate the pre-existing conditions that make certain communities more exposed, vulnerable, and at risk.

This framing responds to important gaps in the existing literature. Scholars have documented that climate policies often generate new social risks for the most vulnerable, including poor and Indigenous communities displaced through green land grabs for lithium, biofuel production, and renewable energy infrastructure (Carley & Konisky, 2020; Sovacool, 2021). As Piggot et al. (2019) highlight, fossil fuel divestment planning tends to focus more narrowly on compensation rather than on wider social equality concerns, which raises critical questions regarding how transition planning can account for non-financial losses, such as loss of culture or identity. Intersectional analyses further reveal how low-income households, people with disabilities, single mothers, and ethnic minorities face the transition at a systematic disadvantage (Middlemiss, 2022). We develop this research on PEJ in the context of the UN Warsaw International Mechanism on Loss and Damage (2013), which calls for non-economic loss to be factored into mitigation and adaptation policy in line with Article 8 of the Paris Agreement (decision 2/CP.19).

Crucially, the limited evidence on new forms of SEJ in Europe remains concentrated on Western Europe, omitting populations in Southern and Eastern Europe already made vulnerable by post-socialist transitions (Golubchikov & O’Sullivan, 2020). As Rodríguez-Pose and Bartalucci (2024) demonstrate, less developed, peri-urban, and rural regions in both Southern and Eastern Europe are significantly more exposed to green transition socio-economic reconfigurations, with vulnerability correlated to lower regional GDP per capita. In Central and Eastern Europe, structural determinants—cold climates, inefficient dwellings, decaying infrastructure, and high income inequality—intersect with heavy reliance on coal-fired power stations and rising energy poverty to create distinct vulnerabilities (Middlemiss, 2022; Voicu-Dorobanțu et al., 2021). Southern European regions face compounded challenges, including reliance on tourism and agriculture—sectors set for major disruption—alongside pre-existing economic stagnation (Avramović et al., 2025; Rodríguez-Pose & Bartalucci, 2024). As Schuster et al. (2023) show, wide disparities exist even among EU

member states. For example, while Germany implements programmes for local diversification and support for ethnic minorities, Romania has largely lacked interest in managing a just transition, leaving already marginalised communities further exposed.

Our contribution grounds PEJ as a way to understand what it means to be (re)vulnerabilised in the techno-solutionist shadow of the green transition. As Tansel and Tilley (2024, p. 523) remark: “the race to make Europe ‘the first climate-neutral continent’ by means of the European Green Deal hinges on making (or re-making) colonial territories into sacrifice zones for the extraction of transition minerals.” This thinking highlights a key dichotomy of cosmopolitan injustice that, on one hand, depicts the transition as a planetary good with common global-community goals, whilst on the other hand, creates green divides in the attribution of benefits and displacement of socioeconomic and ecological costs onto vulnerable populations. By applying a PEJ lens to under-researched geographies, this article contributes to mapping the prospective production of vulnerability in Europe’s green transition and the making of new green sacrifice zones (Marin et al., 2023; Zografos & Robbins, 2020). Through this lens, we build on SEJ literature in relation to Tansel and Tilley’s (2024, p. 523) call to “critically reframe such large-scale transition projects and their concrete impact on the conditions of existence for many marginalised and vulnerable communities.”

3. Methodology

The literature reviewed in Section 2 builds on a scoping review conducted between November 2023 and February 2024 regarding policy impacts and discussions on green transition in Europe, through an initial scan in Google Scholar, a systematic search in Mendeley, and a systematic search in the EU publications database (Chavez et al., 2024). Additional literature was reviewed between October 2025 and February 2026, searched through Google Scholar, and expanded on gaps relating to keywords of vulnerability, SEJ, and green sacrifice zones in the EU context.

The empirical and secondary data presented in this article were generated through research of the GreenPaths project, whose case studies investigated the same overarching question (How are green transition policies impacting environmental sustainability and social wellbeing?). This article focuses on further data analysis and discussion in response to two specific research questions: How are socio-environmental injustices prospectively produced across green transition policy domains? What can a PEJ framework contribute to understanding (re)vulnerabilisation beyond standard SEJ dimensions? The purpose of the case studies was to provide a comprehensive, in-depth, and empirically grounded assessment of the linkages between green transition policy interventions, environmental sustainability, and social wellbeing. GreenPaths’ 15 case studies were selected based on three main criteria: (a) relevance to European Green Deal-related policy interventions; (b) geographical focus on regions often underrepresented in transition debates; and (c) availability of in-depth empirical material generated within the project. More specifically, in this article we selected six focus case studies based on overlapping themes of the project’s analytical framework (see Figure 1), geographic focus on Southern and Eastern Europe, transnational policy connections, and the authors’ varying degrees of involvement as co-authors (Piccardi et al., 2025; Puiulet et al., 2025) or as advisors and peer-reviewers (Avramović et al., 2025; Komazlić et al., 2025; Pistotnik & Kušej, 2025; Zavala Pérez, 2025).

The methods used across the case studies are diverse, consisting of: literature reviews; media, legal, and policy content and critical discourse analysis; quantitative data analysis; primary qualitative data analysis from interviews, focus groups, ethnography, participant observation, public and online events, seminars, webinars, conferences, consultations, and debates with policy and legal experts, researchers, government officials, trade unionists, activists, and local residents. To ensure analytical coherence, all case studies were guided by a common analytical framework and a conceptual and methodological matrix that established cross-sectoral and transversal processes of social impact and common scientific concepts that set parameters, provided a common lexicon and a toolbox of indicators and methodological tools (Erridge et al., 2024). As shown in Figure 1, the framework proposes three connected conceptual tiers: overarching concepts that align the case studies across multiple contexts; specific, industry or discipline-focused fields of inquiry; and localised, case-specific concepts. While this diversity strengthens the empirical base, it also limits strict comparability across cases. Accordingly, our approach does not aim at direct comparison nor monitoring and evaluation-style policy appraisal, but at identifying recurring patterns and mechanisms across heterogeneous contexts.

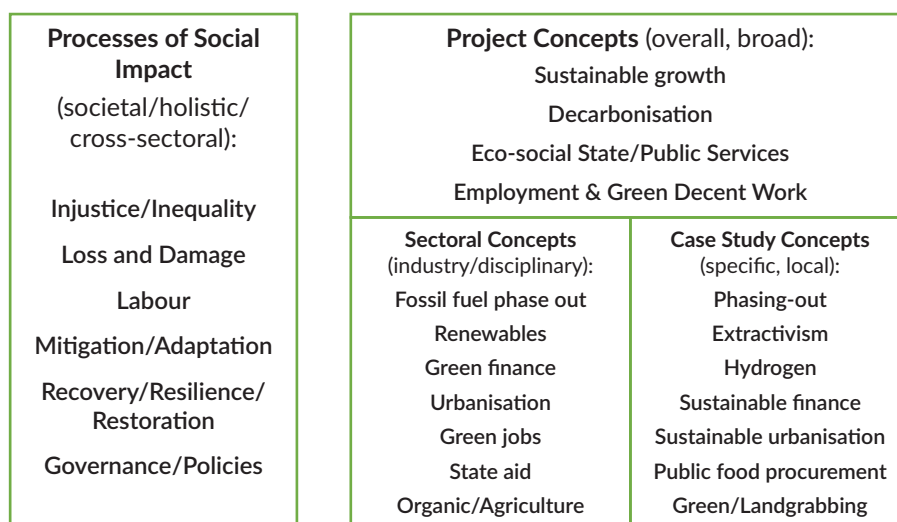


Figure 1. GreenPaths analytical framework: Key concepts and social impacts (Erridge et al., 2024).

The study followed a thematic analysis approach (Braun & Clarke, 2021), adapted to a multi-case comparative design. It focused first on the summary socioeconomic and environmental costs and benefits of green transition policy as identified by partners in their cases, analysing secondary data produced as part of a synthesis of case study findings (Clifton et al., 2025) and enriched by additional analysis of empirical data through our PEJ lens. First, deploying MAXQDA software, we developed a hybrid coding scheme, combining deductive codes derived from the GreenPaths analytical framework with inductive codes emerging from the empirical material. Second, consistent with Braun and Clarke's (2021) phases of thematic analysis, codes were grouped into themes through a process of pattern identification across cases, which were then reviewed and refined in relation to our additional research question and PEJ focus. The analysis focused on recurring "meta-narratives" around the winners and losers of green transition policy and structural mechanisms through which SEJ/PEJ is produced, and patterns of inequality and vulnerability are (re)generated across policy domains and geographical contexts (Clifton et al., 2025).

Finally, several methodological limitations must be acknowledged. These include potential selection bias due to case availability within the project, authorship of cases, and the limited generalisability of findings beyond the studied contexts. These limitations are mitigated through the use of a shared analytical framework, systematic coding procedures, and a transparent cross-case analytical strategy. Table 1 shows an overview of the case studies, identifying the key policy areas, conflicts, and locations.

Table 1. Overview of case studies' focus areas.

Case study authors	Policy area	Key policies analysed	Location (country, place, project)
Piccardi et al. (2025)	Critical raw materials/lithium mining	EU Critical Raw Materials Act (CRMA); National Energy and Climate Plans (NECPs)	Portugal, Barroso, proposed lithium mine
Puiulet et al. (2025)	Biodiversity/forest conservation	EU Biodiversity Strategy (European Green Deal); National Forest policies	Romania, Făgăraș Mountains, eco-park
Zavala Pérez (2025)	Coal phase-out	EU Just Transition Mechanism; Spanish Just Transition Agreements (JTAs)	Spain, Bierzo-Laciana, JTA phase-out region
Pistotnik and Kušej (2025)	Agriculture/land use	EU Common Agricultural Policy (CAP 2023–2027)	Croatia, Serbia, Slovenia, CAP land use
Avramović et al. (2025)	Critical raw materials/lithium Mining	CRMA; NECP	Serbia, Jadar, proposed lithium project
Komazlić et al. (2025)	Energy poverty/building renovation	EU Directive on Energy Performance of Buildings (EPBD); National renovation programs	Croatia, Slovenia and Serbia, urban renewal

4. Mapping Processes of PEJ in Six Case Studies

In this section we provide an overview of the six case studies, analysing them through the PEJ lens to show how socio-environmental injustice is being produced and reproduced. The six case studies are situated in Southern and Eastern Europe, and cover multiple policy areas. We focus on the EU's CRMA and associated NECPs in the case of the proposed lithium mines in Barroso, Northern Portugal, and Jadar, Serbia. Born out of the "lithium rush," the Mina do Barroso project has seen consistent opposition from local communities and reflects "sacrificial logics" at the EU and national policy level, as well as in the mining company's public relations discourse, in which a UN Globally Important Agricultural Heritage System and its communities are rendered expendable for critical mineral extraction (Piccardi et al., 2025). The Jadar case, currently on hold due to grassroots resistance and a lack of necessary permits, acts as a cautionary tale: global demand for critical raw materials can exacerbate local injustices, creating and justifying green sacrifice zones as an acceptable price to pay for EU accession and green technology supply chain optimisation (Avramović et al., 2025).

The EU's biodiversity strategy is present in the case of a controversial forest conservation project led by the Foundation Conservation Carpathia (FCC) in the Făgăraș Mountains, Romania, which has also faced significant opposition from local populations. The Romanian forest conservation case applies the green

sacrifice zone lens to biodiversity conservation, revealing how a neoprotectionist model of conservation facilitates green grabbing that sacrifices local livelihoods (Puiulet et al., 2025). We also discuss the EU Common Agricultural Policy (CAP; 2023–2027) and its impacts in Croatia, Serbia, and Slovenia, which point to the rise of green grabbing as well as the costs of ecological “solutions” for rural communities. The CAP case demonstrates how land is reduced to a technical variable for carbon sequestration and biodiversity offsets, facilitating the reproduction of inequalities through land concentration and the marginalisation of small-scale farmers (Pistotnik & Kušej, 2025).

Sacrificial logics also operate, albeit less explicitly, across the remaining two cases. Looking at socioeconomic initiatives under JTAs, coal phase-out in El Bierzo and Laciana in León (Northern Spain) is visibly affecting local communities through the abrupt closures of mining activities and inadequate compensation mechanisms—“neither *transition* nor *just*” (Zavala Pérez, 2025). The Spanish coal phase-out case suggests that mining communities are treated as expendable in the transition to renewables (Zavala Pérez, 2025). The EU Directive on EPBD is explored in the case of Croatia, Slovenia, and Serbia, which questions the effectiveness of associated national policies to reduce energy poverty. The systematic exclusion of vulnerable households from funding schemes, combined with the gentrification pressures that follow renovation, suggests that low-income tenants and rural communities are being sacrificed for urban, property-owning beneficiaries of the green transition (Komazlić et al., 2025).

Narratives of manufactured urgency are deployed to justify fast-tracking extractive projects, as seen in the case of Barroso, whilst the procedural mechanisms that exclude vulnerable groups from funding are identified in the case of CAP and in the renewal of residential buildings. Recognition failures render traditional conservation practices invisible in the formation of the FCC’s eco-park, whilst discourses that frame local resistance to mining as an obstruction of national development are evident in both the lithium cases, which all function as “constitutive moments of systemic violence” (Velicu, 2020, p. 1). In this sense, our PEJ analysis reveals deeper structural patterns that cannot be captured by the ex-ante characteristics of SEJ dimensions alone. All six case studies reveal recurring patterns through which green transition policies produce and reproduce socio-environmental injustices. Drawing on Velicu’s (2020) original formulation of the five processes of PEJ, in the following subsections we uncover the deeper processes of (re)vulnerabilisation underpinning SEJ in the green transition.

4.1. Slow Dispossession and Forced Marginalisation of Communities

Across these cases, we observe the systematic production of vulnerability through slow dispossession and forced marginalisation: tactics that pressure communities into accepting extraction or conservation whilst acclimatising them to insecure futures (Velicu, 2020). In Romania, Puiulet et al.’s (2025) examination of forest conservation in the Făgăraş Mountains reveals how the creation of a large privately-owned conservation area has restricted access to forests, traditionally used for husbandry, timber collection, and foraging, with impacts disproportionately felt by the most vulnerable, such as the Roma community, who have seen dramatic declines in income from mushroom picking. New financial ventures like the Carpathia Carbon Finance Project risk further alienating locals from potential benefits (Puiulet et al., 2025). In the Portuguese lithium case, the combination of manufactured urgency, tick-box consultation, and government-facilitated processes of (private and commons) land expropriation serves to pressure communities to accept mining whilst denying their “right to say no” (Piccardi et al., 2025). The energy renovation case reveals how the

exclusion of vulnerable households from funding schemes facilitates “renoviction” (Komazlić et al., 2025). This active production of displacement as energy efficiency upgrades drive “green gentrification” and rising rents. Funding processes fail to identify and subsidise vulnerable tenants in multi-apartment buildings. At the heart of this is the “split incentive” or “landlord–tenant dilemma,” since property owners lack motivation to invest in energy upgrades, whilst tenants cannot make such investments themselves (Komazlić et al., 2025). Slow dispossession of rural communities also appears as a consequence of CAP, whose implementation across Slovenia, Croatia, and Serbia reveals how direct payments reinforce land concentration and consolidate power among large actors, while smallholder farmers, women, and youth face systematic exclusion from benefits (Pistotnik & Kušej, 2025).

4.2. The Production of Disposable Lives and Livelihoods

What we observe across all six cases is the preordained (re)production of certain groups, lands, and livelihoods as sacrificial as a process of (re)vulnerabilisation that precedes and enables specific injustices. The pre-emptive production of certain populations as “dispensable,” which manifests as subsistence economies are threatened, people are acclimatised to precarity and constituted as surplus to the requirements of green modernisation (Velicu, 2020, p. 11). In the energy renovation case across Croatia, Serbia, and Slovenia, Komazlić et al. (2025) found that the most vulnerable households—elderly residents, single parents, tenants of post-socialist housing, or rural communities reliant on solid fuels—remain largely excluded from funding schemes, whereas more affluent urban households benefit from state and municipal programmes, creating a “twofold territorial bias” favouring urban over rural areas and affluent neighbourhoods over disadvantaged ones (Komazlić et al., 2025). In Serbia, Rio Tinto’s Jadar project, studied by Avramović et al. (2025), threatens irreversible ecological damage to fertile agricultural regions and endangered biodiversity habitats, whilst Piccardi et al. (2025) show that Savannah Resources’ Mina do Barroso project in Northern Portugal threatens contamination of air and water resources vital for local subsistence that could also impact a Natura 2000 biodiversity site. The transition has also engendered labour precarity, evidenced by job losses, regional emigration and insufficient reskilling in “new green” industries (Zavala Pérez, 2025). The Spanish coal phase-out case reveals how distributional injustices manifest inequitable benefits and burdens across groups—adult men most affected by job losses, women entering precarious employment, youth facing bleak prospects (Zavala Pérez, 2025). A recurring tension exists between decarbonisation imperatives and livelihood dependencies. New projects often prioritise temporary, high-skilled employment while displacing pastoral and rural communities, failing to generate sustainable economic alternatives for affected populations. This is compounded by widespread scepticism about the number and quality of jobs that green projects will actually create (Piccardi et al., 2025; Puiulet et al., 2025; Zavala Pérez, 2025).

4.3. Daily Psychological and Emotional Damage

A third key process of PEJ is the daily psychological and emotional damage felt by marginalised local communities. This falls under intangible loss and damage (Tschakert et al., 2019), both in relation to threats to historical livelihoods and in the toll taken by fighting against green capitalist takeover, in protest and in the courts. In the Spanish coal phase-out case, the protracted uncertainty surrounding JTA implementation, constant shifts in policy objectives and bureaucratic obstacles to accessing promised benefits inflict daily psychological and emotional damage: communities are not simply experiencing a transition, but rather a

slow dispossession of secure futures through tactics that erode resistance and shut down meaningful alternatives (Zavala Pérez, 2025). In the case of the Barroso mine, widespread public opposition has generated multiple forms of injustice; these effects are particularly pronounced for women, who are frequently at the forefront of resistance and, due to their historically rooted roles in social reproduction, tend to shoulder a substantial share of the emotional labour involved (Piccardi et al., 2025; see also Dunlap & Riquito, 2023). In Romania, community resistance has been met with public humiliation and threats of legal action, fostering a pervasive climate of fear (Puiulet et al., 2025). A similar pattern is evident in the Jadar lithium mine case, where those who refused to sell their land have reportedly faced intense pressure.

4.4. *The Systematic Disavowal of Alternatives to Development*

This process of PEJ is strongly reflected in the sidelining and erasure of traditional agricultural and nature stewardship practices, even those recognised for their global importance by the UN. In the Romanian forest case, the eco-park project erases local stewardship, invoking “virgin wilderness” narratives that invisibilise centuries of sustainable environmental care work by local communities, framing their ancestral lands as pristine nature to be saved and denying their existence as legitimate political subjects (Puiulet et al., 2025). These colonial tropes of pristine wilderness have long justified dispossession and, today, are recycled to justify green grabbing (Iordăchescu, 2021). The CAP case reveals how gendered injustices persist as women hold significantly less land and access fewer benefits from area-based subsidies, while commons-based alternatives lack serious policy recognition (Pistotnik & Kušej, 2025). When CAP payments reinforce land concentration, they (re)activate structural inequalities that make large-scale industrial farming the only viable model. In both the Romanian and Portuguese cases, traditional systems of communal land governance—the *obște* or *composesorate* in Romania, the *baldios* common lands in Portugal—are minimised and circumnavigated despite their historical and cultural significance (Piccardi et al., 2025; Puiulet et al., 2025).

4.5. *The Disqualification of Communities as Political Subjects*

The last process of PEJ that we discuss is the disqualification of communities as political subjects. In our cases, it manifests in the truncation, acceleration, and exclusion from substantive public consultation on environmental impact assessments around green energy and extraction projects and reliance on non-binding principles over international law (e.g., EU principles for sustainable raw materials; European Commission, 2021). For instance, in the Romanian case, the profound recognitional injustice of erasing local stewardship is not merely an oversight but a pre-emptive disqualification that enables conservation without community consent—communities are rendered invisible before any formal decision about a privately-owned Eco-park is made. In the Portuguese lithium case, Savannah Resources’ acquisition of mining contracts has been marked by multiple violations of the Aarhus Convention (United Nations Economic Commission for Europe, Aarhus Convention Compliance Committee, 2025), including inadequate public consultation and restricted access to information, with decisions made through opaque top-down processes where public debates are perceived as formalities for external investors and policymakers (Piccardi et al., 2025). The Spanish coal phase-out case reveals how JTA implementation suffers from political cycles that disrupt revitalisation projects, while multiple administrative levels and frequent leadership changes undermine shared objectives (Zavala Pérez, 2025). When mining projects override community opposition, suspending democratic safeguards in the name of economic progress or national defence. The Serbian lithium case exemplifies how the promise of EU accession and good green citizenship serves to legitimise environmental sacrifice for cosmopolitan

justice ideals, positioning resistance as the parochial obstruction of a planetary necessity—a discourse that pre-emptively delegitimises opposition before any specific procedural failure occurs (Avramović et al., 2025).

5. Conclusions and Implications for Future Policy Directions

Overall, our case studies highlight a stark contradiction or paradox at the centre of the green (just) transition: policies designed to solve a global environmental crisis are, both in their planning and implementation, frequently generating green sacrifice zones, (re)vulnerabilising marginalised peoples, and reinforcing entrenched inequalities. The prevailing approach, characterised by top-down governance, a flawed system of impact measurement, and the erroneous assumption that “green” is inherently “just,” is disproportionately benefiting corporate actors and urban centres while marginalising and sacrificing already vulnerable subjects, including rural communities, Indigenous peoples, women, and low-income households. We emphasise how a systemic and intersectional approach to inclusive governance and stakeholder engagement is needed to bridge divides in the twin transition, whilst encouraging further research to understand and measure PEJ that would generate invaluable evidence on future vulnerability mapping in relation to the Warsaw International Mechanism on Loss and Damage.

In this article, we show that the prospective production of sacrificability operates through common patterns of structural injustice and pre-existing vulnerabilities that green transition policies encounter and amplify. In this sense, our analysis of our case studies through the five processes of PEJ indicates some persistent issues related to cross-sectoral and transnational coherence in the imagining, implementation, and governance of green/just/fair transition policy. Therefore, we consider PEJ as a lens of inquiry that can help shape and mitigate future policy impacts on vulnerable populations and future sacrifice zones. Our previous GreenPaths project deliverables provide a searchable database of indicators that assess the different social impacts of green transitions (Zavala-Pérez et al., 2024) and a sectoral mapping of approaches and methodologies currently used to identify, foresee, and assess green transition policy interventions in Europe (Chavez et al., 2024) that could be harnessed and built on.

For example, relating to critical mineral extraction and related green energy projects, the UN Economic Commission for Europe’s Aarhus Committee provides important oversight of the Aarhus Convention’s implementation. In a 2023 country report on Portugal, former UN Special Rapporteur for the environment David R. Boyd recommended the formation of specialised environmental courts that improve access to environmental information, strengthen public participation, and facilitate access to justice, including adherence to and penalties for breaching public consultation in environmental projects under the Aarhus Convention and complying with international law on environmental protection and restoration (e.g., European Parliament and Council of the European Union, 2024a, 2004b). Such courts can provide a forum for future consultation on and monitoring of socio-environmental impact assessments for potential critical mineral extraction, green infrastructure, or energy projects.

The Just Transition Mechanism and Fund’s aims to mobilise financial resources to cover the social costs of economic diversification of the territories most affected by the transition, including the reskilling of labour, and associated Territorial Just Transition Plans, as evident in coal phase-out case study, identifies some positive moves in the early implementation of two of Spain’s 15 JTAs and provides some suggestions on how future JTAs could be improved. As Zavala Pérez suggests: “policies must address socioeconomic patterns

rooted in decades or even centuries of history;” they should balance the needs and expectations of diverse socioeconomic groups, whilst embedding into policy design: “educational reform, local and regional diagnostics, transparent communication, ongoing monitoring, and fair responsibility sharing” (Zavala Pérez, 2025, p.25). These factors, coupled with the fact that fossil fuel phase-out has been anticipated for decades, point to the need for pre-emptive rather than reactive measures.

Our findings also indicate high socio-environmental costs that represent key future vulnerabilities in Southern and Eastern Europe’s just transition. Negative SEJ impacts reinforce pre-existing vulnerabilities based on gender, ethnicity, urban/rural location, and power imbalances between the EU’s core and its periphery. The different dimensions of SEJ are preceded by prospective environmental injustices that lay the groundwork for green-grabbing for mineral extraction, agricultural, or neo-conservation projects; tangible and intangible loss and damage to (supposedly protected) cultural heritage and ancestral practices; a lack of public inclusion and consultation in policy design, implementation, and effective policy monitoring mechanisms that ensure public concerns are addressed (restorative justice). The invisibilising of lower-income residents predicates a lack of public participation, due process, and transparency. Vulnerable groups are sidelined by influential geopolitical actors (i.e., large corporations, international investors, state elites, property, and landowners) with the capacity to access subsidies and finance that drive the transition.

The potential of PEJ mitigation and future vulnerability mapping is undermined by gaps in measurement that include a lack of intersectional and socio-geographic data about marginalised, vulnerable, and impacted populations (i.e., low-income households, rural communities, Indigenous peoples, precarious workers, and small-scale farmers), that could provide insights on, for example, economic (e)migration patterns, land use, subsidy beneficiaries, employment quality, environmental effects, and distributional outcomes. Furthermore, standard assessments often ignore non-material losses and psychosocial harms and fail to adequately evaluate SEJ: predominantly quantitative economic and CO₂-related metrics often sideline the social dimensions of the transition, leading to outcomes where environmental improvements coincide with societal deterioration.

Our analysis highlights cross-case instances of PEJ, which point to the complexity and contentious temporality of just transition initiatives that package policies in terms of before and after promises of bright green futures. The core “leave no one behind” principle of the European Green Deal faces the same challenge as its previous iteration under the sustainable development goals, in that there is no serious structural approach to protecting the most vulnerable to development. The anticipatory nature of many of the costs and benefits identified are, in some cases, predictive or promissory; they represent fears and aspirations of the green transition. The PEJ issues identified in our research are interconnected, intersectional, and interdisciplinary. To align the green transition with the principles of justice and social wellbeing, a fundamental shift is urgently needed from technical, top-down implementations to approaches that deliberately centre SEJ within legal frameworks, with policy tools that ensure robust democratic governance, genuine community engagement, and procedural justice, moving beyond tick-box consultation to empower local communities in decision-making about their environment’s protection, socio-economic futures, and resource use.

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Conflict of Interests

The authors declare no conflict of interests.

Data Availability

Data relating to GreenPaths research is accessible through the University of Cantabria's UCrea platform, which has a free and standardised access protocol. UCrea is an OpenAIRE and OAI-PMH compliant repository.

Supplementary Material

Supplementary material for this article is available online in the format provided by the authors (unedited).

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