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Review article

Green extractivism in Colombia: A scoping review on indigenous rights and livelihood impacts, and policy and social movement responses

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ABSTRACT

We examine the impacts arising from net-zero related extraction of metals, mineral and clean energy on indigenous rights and livelihoods in Colombia, and identify policy and social movement responses. A scoping review method combined database searches in SCOPUS, Policy Commons and Overton with a grey literature search. In total, we screened abstracts and titles of 1050 documents, assessed 95 full-text records for eligibility, and included 34 documents for final review. We identified two core themes: green dispossession and renewable energy extraction impacts in *La Guajira*, sub divided into cultural, socio-political and environmental impacts; and resistance strategies to green extractivism, sub-divided into self-provision as part of a popular energy transition and holistic critiques to transition narratives and plans. National social movement responses were directed towards the left-wing government of Gustavo Petro, elected in 2022. International responses focussed on the coloniality of critical raw material extraction. Two main policy responses by the Petro government aimed to expand community access to energy services and create a Just Energy Transition roadmap. We conclude that Global South calls for the Global North to reduce resource consumption are becoming more prominent. Furthermore, we found some conceptual inconsistencies in this literature based on a routinisation of case studies and an epistemic poverty of dualistic social science concepts which tend not to consider non human actors in extractivist dispossession/degradation, especially in indigenous territories. We recommend future research employ relational theoretical frameworks to develop cultural analyses of extractivist dispossession/degradation, and diversify the Colombian geographical focus beyond *La Guajira.*

1. Introduction

Low-carbon energy transitions are driving a global race for clean energy. Technologies like wind turbines, solar PV panels, battery storage or electric vehicles rely on a wider range of critical raw materials (CRM) than fossil fuels (IEA, 2021, pp. 45–49). CRMs such as lithium, copper, manganese and graphite are of strategic economic importance given their low substitutability and high geopolitical supply-chain vulnerabilities (Breton, 2022). In Colombia, the development strategy of Gustavo Petro's progressive government reflects this broader geopolitical turn towards net-zero related resource securitisation (Le Billon et al., 2025). To overcome the country's dependency on fossil fuel exports, the administration is committed to clean energy production (e.g. wind, solar, green hydrogen) and sustainable resource diversification based on mining and processing CRMs required for the energy transition (DNP, 2023, pp. 54–60; 184–182). Petro furthermore halted new oil and gas exploration licenses and joined international initiatives such as the Beyond Gas Alliance and the Fossil Fuel Non-Proliferation Treaty Initiative.

These efforts have positioned Colombia as a regional and international leader in climate change mitigation. However, in the absence of international concessionary climate finance flows, a development strategy geared towards CRM-driven sustainable resource diversification and industrialisation is challenging not only from a capital investment perspective, but also risks entrenching an extractivist development pathway that conflicts with indigenous rights, community cohesion, livelihoods, and biodiversity outcomes. Energy transition-related CRM extraction, and production and export of green hydrogen and other forms of renewable energy from the Global South to the Global North have been argued to perpetuate colonial, extractive North-South and centre-periphery relations, and engender socioecological conflicts, violence and displacement (Andreucci et al., 2023; Canelas and

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Carvalho, 2023; Cuenca, 2021; Mejia-Muñoz and Babidge, 2023). Social scientists use extractivism as an organising concept to understand these processes, characterised by high volumes of resource extraction for international export with minimal processing and high environmental impact (Chagnon et al., 2022; Gudynas, 2015, pp. 11–14). Extractivism also re-orders (non-Anthropocentric, relational) worldviews and renders Indigenous and other peripheral territories and bodies expandable for the sake of economic growth (Dunlap et al., 2024) – including in Colombia.

Though the indigenous population of Colombia is very small (<5%) (Julio Cesar et al., 2020, p. 3), indigenous territories are disproportionately impacted by clean energy projects, especially in Colombia's northeastern department of *La Guajira* (Jaramillo, 2013; Ulloa, 2023). We therefore set out to investigate the impacts of CRM extraction and clean energy production (wind, solar, green hydrogen) on indigenous rights and livelihoods in Colombia, as well as attendant social movement and policy responses through a green extractivism lens. Green extractivism is an emerging field of research that broadly analyses the industrial-scale production and export of clean energy such as green hydrogen (Kalt et al., 2023), wind power (Dunlap and Arce, 2022) and/or net zero related CRM extraction (Voskoboynik and Andreucci, 2022) from the vantage points of neocolonialism, dependency theory, (ecologically) unequal exchange, post-development, and political ecology approaches to ecological distribution conflicts and dispossession (Dorn, 2022; Dunlap et al., 2024).

Green extractivism offers fruitful avenues through which to critically explore how global energy transitions are perpetuating colonial centre-periphery dynamics. The term is variously used to delineate broader climate change mitigation instruments such as nature-based financial mechanisms, carbon offsets or emission rights (Bruna, 2022a, 2022b), explain resource extraction for the green economy (Verweijen and Dunlap, 2021), or forge links with the bourgeoning agrarian extractivism literature on bio-fuels (Dorn et al., 2022). Despite disparate conceptual approaches, green extractivism scholarship attunes us to the ways in which energy transitions are leveraged as investment opportunities to overcome climate-induced obstacles to capital accumulation (Andreucci et al., 2023; Dunlap et al., 2024). Such projects are sustained by a nascent climate change consensus and green legitimisation strategies that frame these extractive processes as compatible with and necessary for climate change mitigation (Dorn et al., 2022; Dunlap et al., 2024). This rationale turns the physical production of CRM, clean energy or biofuels into an ideology that justifies both extraction and its consequences (Szeman and Wenzel, 2021). Thus legitimised, CRM mining projects are creating sacrifice zones of near-permanent environmental damage, often in indigenous territories (Sanz and Rodríguez-Labajos, 2023). Latin America has become a focal point of these interventions, epitomised in the large-scale socio-environmental damage sustained to territories and communities in the Atacama Plateau's salt flats in Chile, Argentina and Bolivia. Given the Petro government's decarbonisation strategy outlined above, Colombia in particular is at a key political and economic inflection point that is highly significant for regional and global studies of clean energy production.

For the purpose of our research, we conceptualised green extractivism as the extraction of CRMs for low-carbon transitions and the production of clean energy such as green hydrogen, wind or solar for export and/or domestic consumption. Compared to others (e.g. Dunlap et al., 2024), this is a relatively narrow focus, though justified in relation to research scale (Colombia) and scope (indigenous territories), as these are the most prevalent issues in this context. Rather than offering a universal definition of green extractivism, we sought the most appropriate focus for achieving our research aims. Theoretically, we frame our enquiry around post-development principles that recognise marginalised communities as knowledge producers and actors in the energy transition (Escobar, 2000) and justice-oriented postgrowth approaches to global environmental politics (Steinberger et al., 2024).

We employed a scoping review methodology to understand the impact of green extractivism on indigenous rights and livelihoods in Colombia, and identify and analyse concomitant social movement responses and policy interventions. Although focussed on a specific national context, we present the first scoping review on green extractivism. Scoping and/or systematic reviews have previously been employed to interrogate the socio-political implications of mining and extractivism, for instance focussing on sand (Bisht, 2021), health (Brisbois et al., 2019, 2021) or conflicts (Camacho-Garza et al., 2022). In contrast to Camacho-Garza et al. (2022) and Brisbois et al. (2019, 2021), our review covered both peer-reviewed and grey literature databases. We perceive the latter crucial to understanding how social movements mobilise and give meaning to 'green extractivism', often either excluded or included belatedly into peer-reviewed literature. A scoping review is a useful approach given our aim was to address the value of an emerging concept that analyses extractive processes and social-environmental conflicts with novel, 'green' characteristics.

Our main findings coalesce around two themes regarding the impact of green extractivism on indigenous rights and livelihoods in Colombia: 1) green dispossession and renewable energy extraction in *La Guajira*; 2) resistance strategies to and critiques of green extractivism. National social movement responses were directed at the Petro government, mainly in relation to dispossession in *La Guajira*, while international ones focused on the coloniality of CRM extraction. Crucially, we identified calls for the Global North to reduce resource consumption. The policy responses fell under the Petro administration, which seeks to increase energy access and lay the groundwork for a just energy transition. In addition to social reproduction and labour relations (as done by the literature on agrarian extractivism, cf. Ojeda, 2021), our review highlights the importance of integrating cultural politics/more-than-human actors and relational ontologies into green extractivism studies, especially in indigenous territories. Similar to others (Dunlap, 2021), we note the blurred lines between new/green and 'old' fossil or mineral extractivism in Colombia.

2. Methods

Scoping reviews are useful "to identify and synthesize an existing or emerging body of literature on a given topic" (Mak and Thomas, 2022). Green extractivism still is an emerging concept. Therefore, a scoping review allowed us to rapidly map the term's prevalence and conceptual and analytical use in the Colombian context, and identify and analyse common threads, diverging definitions, geographical focal points and key impacts. Following Arksey and O'Malley (2005), we identified research questions, selected relevant studies, charted the data, and collated, summarised and reported results. A scoping review method also matched our intention of including grey literature and was selected over a systematic review because of the latter's relatively narrow focus on quality assessment (Arksey and O'Malley, 2005).

The academic and grey literature document selection process was done in two steps, following the PRISMA methodology (Moher et al., 2009; Tricco et al., 2018). Despite the methodological rigour this confers, our scoping review is nevertheless limited in some ways (Arksey and O'Malley, 2005). For example, it is less suitable for evaluating the quality and methodological rigour of selected documents, while large quantities of results generated by the search can force hard choices on how to restrict results to a number of documents that can feasibly be analysed (see Table 1). The literature search was conducted between October and December 2023. Based on a general reading and our knowledge of the green extractivism and energy transition literature, we generated three key concept groups consisting of relevant search terms (Appendix A). These concept groups addressed our research questions comprehensively: What are the impacts arising from net-zero related extraction of metals, mineral and energy, specifically focusing on indigenous rights and livelihoods in Colombia? What are the policy and social movement responses to environmental conflicts arising from green extractivism in Colombia? We combined three database searches

Table 1
Screening criteria of peer-reviewed and grey literature.

Abstract and Title Screening Criteria for peer-reviewed articles		
Category	Include	Exclude
Context	Impacts of green extractivism in Colombia on indigenous rights and livelihoods, which includes the search terms of key concept 1 (i.e. possible alternative terminology, e.g. renewable extractivism). Policy and social movement responses to green extractivism impacts on indigenous rights and livelihoods in Colombia, including search terms of key concepts 2 and 3.	Other impacts of green extractivism across Colombian society, ecosystems and/or urban areas that do not relate to indigenous rights or livelihoods; policy and social movement responses that do not specifically address green extractivism and indigenous rights and livelihoods.
Key actors	Literature written and published by Colombian state actors, including local government, region, municipalities and cities; literature by NGOs and social movement organisations operating in Colombia.	Responses by non-Colombian social movements and other governments; NGOs and social movements that don't work in Colombia.
Literature type	Journal articles, reviews, opinion pieces, book chapters, dissertations, policy briefs, technical reports, internal organisational reports, declarations, statements and blog posts.	Other forms of media (podcasts, lectures, videos).
Date	Any.	None.
Language	English and Spanish.	Not available in either English or Spanish.
Additional Grey Literature Screening Criteria		
Content	Letters, declarations, manifestos that mention or are supported by Colombian people or organisations that work in Colombia.	News written by journalists, even if they use "green extractivism".

in SCOPUS, Policy Commons and Overton with a grey literature search using Google Scholar and government websites of the Colombian state Department of Mines and Energy. Appendix B contains all search strings.

The SCOPUS search allowed us to carry out a comprehensive search of interdisciplinary, peer-reviewed literature on green extractivism, which returned 662 documents. Overton and Policy Commons are multilingual databases for policy documents and grey literature with useful search restriction tools. We identified relevant documents written or published by Colombian state actors (policy briefs, legislation) and social movements (declarations, statements, reports). Overton and Policy Commons searches respectively returned 146 Spanish-language policy documents and 186 social movement documents (153 in Spanish, 33 in English).

Though striving for comprehensiveness in our research design, our analysis revealed limitations of using SCOPUS in Global South research contexts. SCOPUS predominantly indexes Global North-based journals. This may have introduced a Eurocentric bias in our academic literature results, which, we contend, is balanced by the Colombian policy and social movement documents we explicitly sought to answer our research questions. However, even though a scoping review allows for iterative research design, due to limited resources we were not able to conduct a retrospective search in a Latin American database. The academic results therefore may exclude relevant green extractivism literature published by Latin American authors (cf. Section 4 for an analysis of implications for future research).

To complement our database policy search, we manually searched the official web pages of the Colombian government, using the Spanish translation of the following terms: energy transition, clean energy, renewable energy, critical raw materials, metal mining, mineral mining, copper mining, wind/solar power, green hydrogen, indigenous rights, land rights, environmental protection, environmental standards, ILO 169, climate change adaptation, climate change mitigation. This search returned another 48 documents. The research team provided an additional 11 items that fit our screening criteria (Table 1): two peer-reviewed articles (Alarcón, 2023; Ulloa, 2023), one book (Jaramillo, 2013), and eight grey literature documents (Barón-Cárdenas, 2020; Jaramillo, 2012; Pacto Ecosocial e Intercultural del Sur, 2023a, 2023b; Ramírez-Tovar and Schneider, 2023; Soler Villamizar and Moncaleano, 2022; Transnational Institute, 2023; Global Witness, 2023). In total, we identified 391 grey literature items (Fig. 1).

We subsequently completed the PRISMA screening process, first importing the initial data sets into Zotero and manually deleting duplicates (Fig. 1). Next, title and abstract screening of the remaining 678 documents excluded 580 documents. Table 1 lays out purposefully narrow inclusion and exclusion criteria given the geographical and thematic scope of this research, and the conceptual aim of assessing the (novel or other) ways in which extractive processes and social-environmental conflicts are characterised specifically as 'green' in the context of global energy transitions. Full-text review on the remaining 98 items removed 70 items which did not fit our research objectives, and two policy documents that were not written or published by the Colombian government. The combined screening process identified 26 documents for inclusion in our analysis. We subsequently repeated the 'identification' step of the PRISMA model (Fig. 1) because we identified missing key documents, which had either shown up in other search engines or were cited in the original set of 26 documents.

A Google Scholar search for "'Colombia" AND "green extractivism"' delivered two highly relevant documents (Andreucci et al., 2023; Thema and Roa Garcia, 2023), while searching for "Colombia" on the homepage of the *Journal of Political Ecology* and repeating the above screening process delivered two more documents (Banks and Schwartz, 2023; Feeney, 2023). Even though the journal is indexed on SCOPUS, the two articles did not appear in the search conducted there, likely due to time of publication. Searching key journals manually is furthermore a recommended step in a scoping review given database searches can miss relevant articles (Arksey and O'Malley, 2005). Finally, we included four documents written by and with the Wayuú indigenous people in *La Guajira* (Barney, 2022; Indepaz, 2022; Gobierno Nacional et al., 2023; Pueblo, 2022). We could not find a letter mentioned in Ulloa (2023) to President Iván Duque by Denys Velásquez Uriana, a Wayuú leader in 2022, which may have fitted our selection criteria. The final number of included documents was 34, listed in Appendix C.

Manual inclusion of relevant documents and iteratively adjusting research design are common features of scoping reviews (see, for example, Clarke et al., 2024). This partly relates to database search results depending on keyword selection and search strategy design (Arksey and O'Malley, 2005). However, it could also relate to the emerging and fast-evolving nature of green extractivism as a concept and field of study. Iterative adjustments complicate the research process, making the study of emerging concepts like green extractivism both methodologically challenging and resource-intensive.

After identifying and selecting relevant studies (Table 1), the data was charted (Step 4, in Arksey and O'Malley, 2005) in a table with different descriptive categories for peer-reviewed and grey literature (e.g. content summary, green extractivism definition, resource or extractive process, geographical focus, impacts, policy and social movement responses). In designing the table, we separated socio-political, economic and cultural impacts, in line with Ulloa (2021). Section 4 discusses the limitations of this approach. The table formed the basis for our thematic analysis (Step 5: Collating, summarising and reporting the results, in Arksey and O'Malley, 2005), results of which are presented next.

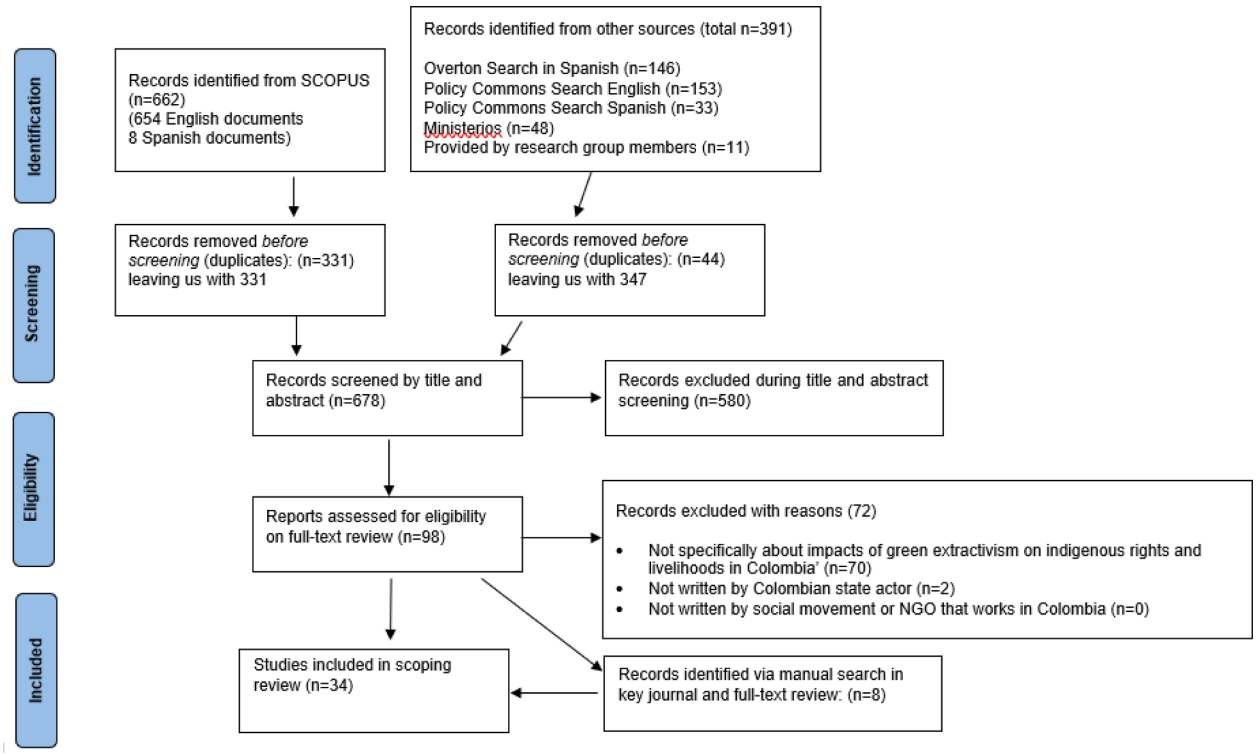

Fig. 1. PRISMA Flow Diagram based on Moher et al. (2009).

3. Results

3.1. Characteristics of included documents

We identified 34 final documents for full-text review, published between 2012 and 2023: eleven peer-reviewed journal articles, one book, and 22 grey literature documents. The latter include short articles in popular journals, as well as reports, declarations and letters. Social movement responses to green extractivism were mostly identified within the grey literature (Barney, 2022; Censat Agua Viva, 2023; Indepaz, 2021, 2022; Gobierno Nacional et al., 2023; Pacto Ecosocial e Intercultural del Sur, 2023b; Transnational Institute, 2023; Pueblo, 2022), although some were cited in academic articles referring to environmental conflicts (Acosta and Martínez, 2019; Acosta García, 2022; McNeish, 2017; Pérez-Rincón et al., 2019; Ulloa, 2023). Some civil society organisations appeared repeatedly: Censat Agua Viva (Carmona Castillo, 2022; Caro Galvis and Portela, 2022; Gómez, 2022), Corporación Grupo Semillas (Asoquimbo and Tierra Digna, 2019; Gimena Roa et al., 2021), Instituto de Estudios para el Desarrollo y la Paz (Barney, 2022; González Pozo and Barney, 2019), Pacto Ecosocial e Intercultural del Sur (2023b), and Heinrich-Böll-Stiftung Colombia (Barón-Cárdenas, 2020; Ramírez-Tovar and Schneider, 2023; Soler Villamizar and Moncaleano, 2022). We identified two Petro government policy responses: the Energy Communities initiative and a Just Energy Transition Roadmap (Vélez Torres, 2023a, 2023b). The following sections detail results of the thematic analysis for each of the three topics we sought to understand.

3.2. Impacts of green extractivism on indigenous rights and livelihoods in Colombia

Our thematic analysis sought to understand the impacts of green extractivism on indigenous rights and livelihoods in Colombia, here understood as renewable energy production and export, as well as related activities such as CRM extraction for clean energy technologies. We identified two major themes, detailed below.

3.2.1. Green dispossession and renewable energy extraction in La Guajira

The first major theme relates to the arrival of wind parks and associated conflicts into *La Guajira* and to some extents the neighbouring *Cesar* department in the country's northeast. This comprises a large subset of recently published papers, commentaries and declarations (Banks and Schwartz, 2023; Barney, 2022; Caro Galvis and Portela, 2022; González Pozo and Barney, 2019; Indepaz, 2022; Gobierno Nacional et al., 2023; Thema and Roa Garcia, 2023; Ulloa, 2021, 2023; Pueblo, 2022). These documents identified a range of rights and livelihood impacts for the indigenous Wayúu peoples whose territory stretches across the *La Guajira* peninsula and into Venezuela. We narrowed those down into three sub-themes: cultural, sociopolitical and environmental impacts. This categorisation is to some extent arbitrary, as the impacts on everyday experiences generated by the (expected) arrival of onshore and offshore wind parks are inherently interconnected and overlapping.

Jaramillo's (2012, 2013) work on the 15-turbine Jepírachi wind farm precedes most documents by nearly a decade. Owned by *Empresas Públicas de Medellín* and inaugurated in 2004, the park has become a symbol for the aesthetics of green dispossession in *La Guajira* (Ulloa, 2023). The first renewable energy project of this scale and scope in Colombia, it has subsequently become an important locus of intervention for social movements, policy responses and indigenous resistance.

3.2.1.1. Cultural impacts. A key dimension of the cultural impacts of green extractivism stems from conflicting and irreconcilable political ontologies and accompanying meaning given to wind and territory. Wind parks assume and conceptualise wind as an economic resource, whereas the Wayúu people consider the wind as sacred home of their ancestors (Jaramillo, 2012). The documented social and political conflicts arose when wind as an element which had never been defined as property by those living within the areas penetrated by clean energy production goes through processes of appropriation. In this case, efforts to quantify and monetarily compensate wind use in Wayúu territory are part of the negotiations by *Empresas Públicas de Medellín* with the World Bank under the Clean Development Mechanism. The conflict generated

by this project, the Jepírachi wind park, profoundly disputes the Wayúu's conceptualisation of "an element of the environment as capital, heritage or, more profoundly, as an inalienable form, constitutive of what it means to be human for the indigenous Wayúu" (Jaramillo, 2013, p. 70). As such, green extractivism is generating ontological conflicts with potential to impact Wayúu culture and identity.

The Wayúu themselves point out cultural losses as energy-mining projects are affecting their ability to carry out traditional activities (Vélez Torres, 2023b, p. 44). The cultural impacts of wind park developments in *La Guajira* are also illustrated by the role which *Empresas Públicas de Medellín* played in maintaining and fencing Wayúu cemeteries as part of their compensation package. These cemeteries are important markers of territory, and as such their maintenance may have served the interests of the Wayúu but also prolonged relationships with the company as social service provider (Jaramillo, 2013, p. 96). Appropriating sacred spaces of ancestral memory, territorial governance and political organisation into forms of (non-monetary) compensation for the Jepírachi wind park illustrate the profound cultural impacts of clean energy production in *La Guajira*.

3.2.1.2. Sociopolitical impacts. A more recent wave of reports and articles concern the planned expansion of wind infrastructure in the region (González Pozo and Barney, 2019; Thema and Roa Garcia, 2023; Ulloa, 2021, 2023). González Pozo and Barney (2019) are concerned about replicating Jepírachi's impacts on indigenous rights and political autonomy, opaque money transfer structures and carbon credit management, and patronising in-kind community expenditure. Exploratory work for future parks includes installing wind power measurement instruments, negotiations with the communities, environmental impact studies and other, investment-related scoping activities which significantly impact Wayúu social life (González Pozo and Barney, 2019, p. 53). Investors tend to negotiate with each community separately, forcing communities to start acting as private land owners which engenders conflicts and disintegration of socio-political ties. Effective participation of the Wayúu peoples is considered fundamental to redress these issues and enable monetary valuation and compensation for use of their land and any cultural and environmental impacts (González Pozo and Barney, 2019). One of the companies operating in the region, Begonia Power, expects multiple positive and negative impacts of wind farms such as economic activities, employment generation resulting in temporary income rises, setting of expectations and conflict generation, as well as effects on archaeological, historical and cultural heritage (González Pozo and Barney, 2019, p. 149).

From 2021 onwards, the concepts of extractivism and green extractivism feature more prominently in the literature, with documents explicitly using these terms. Ulloa (2021, 2023), for example, uses this framework to analyse dispossession and rights violations exerted by companies constructing wind parks in *La Guajira*. The arrival of photovoltaic and wind energy to the region is argued to extend the lifespan of previous extractive processes related to the mining-energy nexus, generating similar territorial, environmental and socio-cultural impacts (Ulloa, 2021). Referring to the impact of the Jepírachi wind park, these documents align with Jaramillo's (2013) earlier concerns over how the new relations created by the project transformed the political structures of the Wayúu. Negotiations over compensations, for example, "broke down social relations, family ties anchored in the redistribution, solidarity and complementarity of the *Sukuipa Wayúu* [it is the way of acting by means of law, words and living and therefore determines the territoriality of the Wayúu]" (Rojas, 2012, cited in Ulloa, 2021 emphasis in original). These social impacts of green extractivism are intimately connected to Wayúu political structures (Indepaz, 2022; Gobierno Nacional et al., 2023; Pueblo Pueblo, 2022), leading us to characterise these impacts as 'socio-political'.

3.2.1.3. Environmental impacts. Key impacts on farmland and local fauna arise from the wind turbines themselves, but also related infrastructure such as high-voltage power lines and energy transformers (Ulloa, 2023). While Wayúu authorities have warned about specific environmental impacts such as pink flamingo migratory routes, their concerns were not included in environmental impact assessments. Ulloa (2023) therefore focuses on how the aesthetic dimension of "wind landscapes" sanitises their potential impact on Wayúu territory. The majority of the documents focussed on fears around future projects, and a lack of models for concretely assessing the impacts of additional wind farms. With the exception of flamingo migratory routes, we were not able to identify many concrete environmental impacts of green extractivism in *La Guajira*. Rather, renewable energy development impacts are subsumed within wider energy transition and fossil fuel extraction narratives and projects.

To illustrate, an additional set of articles (Carmona Castillo, 2022; Caro Galvis and Portela, 2022; Gómez, 2022) analyses energy transition processes ranging from coal extraction to new wind farms and so-called transition fuels such as natural gas. Caro Galvis and Portela (2022) argue that promoting renewable energy production in *La Guajira* does not contain expanding coal extraction, which has had profound environmental impacts in the region, including drastically decreasing the availability and quality of potable water. Gómez (2022) in turn critically examines the continued exploitation of natural gas as a transition fuel in *La Guajira* and *Cesar*. Gas extraction produces methane emissions which add to Colombia's emissions budget and water pollution. A significant portion of the extracted gas is furthermore used to facilitate coal extraction, negatively affecting water basins in *La Guajira* (Gómez, 2022).

Carmona Castillo (2022) voice similar concerns over how the energy transition plays out in *La Guajira*, explaining the risks and limitations of Corporate Social Responsibility (CSR) as implemented by the coal-mining company Cerrejón in *La Guajira*. CSR justifies the presence of extractivist projects in terms of 'responsible mining' and sustainable development, thereby legitimising and extending the lifespan of extractivism in the region. CSR thereby acts as entry mechanism for implementing renewable energy projects in indigenous territories (Carmona Castillo, 2022). While some CSR projects can have a positive environmental impact, for instance, around reforestation or environmental monitoring, CSR's narrow, technical solutions to complex social and environmental problems currently impede the development of post-extractivist futures in *La Guajira*.

3.2.2. Impact as change: resistance strategies to green extractivism

The second major theme details two sub-themes of resistance strategies and critiques of energy transition narratives that we identified as direct responses to green extractivism projects.

3.2.2.1. Self-provision as part of a popular energy transition. One set of grey literature documents details local energy initiatives (Barón-Cárdenas, 2020; Gimena Roa et al., 2021; Ramírez-Tovar and Schneider, 2023; Soler Villamizar and Moncaleano, 2022). These initiatives represent collaborations between indigenous and non-indigenous actors and collectives, and respond to harmful extractive activities within indigenous territories that impact livelihoods and/or autonomous forms of socio-political organisation. These efforts primarily consist of small-scale and communitarian solutions such as solar panels, eco-efficient stoves and biodigesters. Clean energy technologies are combined with social innovations such as *mingas* that organise agricultural work collectively (Gimena Roa et al., 2021), connecting energy issues to wider struggles for *Buen Vivir* (Good Living) and *una vida sabrosa* (joyful living). Strengthening community resilience vis-à-vis energy provision can build capacity in other areas considered to be essential for leading meaningful lives centred on collective wellbeing and joyful living, such as environmental patrimony protection and community forest management (Gimena Roa et al., 2021, p. 84).

Sovereignty is a central component of autonomous socio-economic organisation and energy self-provision. Though these notions are not extensively developed in these papers, Gimena Roa et al. (2021, p. 84), for example, link energy to food sovereignty, while Barón Cárdenas subsumes sovereignty within a multiplicity of objectives, denouncing the current energy model's abandonment of "our own progress, sovereignty, self-determination, industrialisation and development" (2020, p. 34). In contrast, the initiatives shown in a 'Virtual Exhibition of Popular Proposals for a Just Transition by the People for the People' (*Exhibición Virtual*) coalesce around themes of autonomy, decentralisation and inclusion (Soler Villamizar and Moncaleano, 2022). Since 2020, this online platform has been sharing alternative energy initiatives and practices in Latin America (Censat Agua Viva, 2023). In January 2024, the map showed 119 initiatives, including communal micro hydroelectric grids, urban gardens with communitarian biodigesters, and solar PV panels for water pumping and other socio-ecological reproduction activities.

In addition to the practical experiences of communities engaging in energy self-provision, some documents focussed on their intersection with policy and regulatory standards. For instance, Ramírez Tovar and Schneider (2023) set out the practical, political and regulatory dimensions of *Comunidades Energéticas* (Energy Communities). As a key policy proposal put forward by the Petro government, *Comunidades Energéticas* seeks to expand community access to energy services and support decarbonisation processes (see 3.4). In contrast, the current energy model only allows for energy generation at household or individual level. Ramírez Tovar and Schneider (2023) emphasise the need for this flagship policy to transcend micro-grid-based subsidy models to avoid reproducing paternalist relations with the state and marginalising autonomous self-management of communities.

Though the set of documents discussed in this sub-section address (neo)extractivism, their main interest lies in expanding the role communities can and ought to have in supporting a popular energy transition. Documents explicitly contrast the latter with the current, corporate-led energy transition (Ramírez-Tovar and Schneider, 2023), in which "the majority of the elements (artifacts, projects, norms, legislation, research and development, etc.) are controlled by, or work in favour of, transnational corporations or world powers" (Bertinat et al., 2020, p. 3). In contrast, their understanding of a popular energy transition is based on a vision of strong sustainability and characterised by social-environmental, procedural and redistributive justice (Bertinat et al., 2020, p. 158). This idea goes beyond technological change to envision "change in the very structure of the system and interactions, with the inclusion of new actors and, especially, the active participation of citizens" (Ramírez-Tovar and Schneider, 2023, p. 14). The community energy initiatives hosted on the *Exhibición Virtual* mentioned above are examples of a community-led, popular energy transition, while cooperative practices like *minga* are examples of active citizen participation and social innovation. Clean energy production, therefore, transcends issues of electricity access and provision to encompass wider practices and concerns such as food sovereignty, decentralisation, and the overall strengthening of local, autonomous economies.

3.2.2.2. Holistic critiques to transition narratives and plans. A group of academic and grey literature documents describe how different actors construct energy transition narratives, and attempt to assess the future impacts of a projected increase in renewable energy infrastructure and extraction (Alarcón, 2023; Andreucci et al., 2023; Thema and Roa Garcia, 2023). These articles are more future-oriented in their analysis and include transition scenarios to visualise and warn about the impacts of this infrastructure in indigenous territories and the larger supply chains and extractive processes required for their construction (Alarcón, 2023). Thema and Roa Garcia (2023) offer different trajectories of technological change to achieve decarbonisation in Colombia and Germany, considering the individual constraints of each of them – for instance, Colombia's fossil fuel dependency in meeting its own energy demand. The report contends that the energy needs associated with decarbonisation in Colombia preclude exporting significant amounts of renewable energy to support decarbonisation processes in Germany (see also Alarcón, 2023). Especially considering the existing conflicts around renewable energy infrastructure in places like *La Guajira*, Thema and Roa Garcia (2023, p. 58) argue that extractivism in Colombia only serves to sustain excess consumption in the Global North. This capital-led energy transition is argued to produce 'decarbonisation by dispossession' (Andreucci et al., 2023), justifying the expansion of extractive activity under the banner of mainstream energy transition narratives.

Andreucci et al.'s (2023) conceptualisation of green extractivism via 'the green energy-extractivism nexus' closely builds on the work of Zografos and Robbins (2020), who have expanded the understanding of 'sacrifice zones' to legitimise ecological destruction – territories that become "sacrificed" – under the banner of urgent climate action and "greening" the economy. An energy transition in the context of unequal international trade relations reproduces previous injustices. This wider critique of the international order – and the role of international financial institutions in particular – is also present in the social movement declarations described in point 3.3. The literature on green extractivism in Colombia has therefore produced holistic critiques to corporate-led transition narratives, problematising Colombia's peripheral position in the international system, and critiquing the colonial resource drain from Global South to North. These discussion points are also picked up in social movement responses.

3.3. Social movement responses at national and international level

We identified a series of declarations, meeting minutes, protocols and agreements (Barney, 2022; Indepaz, 2022; Gobierno Nacional et al., 2023; Pueblo, 2022) that document and reflect on socio-political processes led by and/or involving the Wayúu people in *La Guajira*. In these documents, Wayúu communities contest and disagree with ongoing energy infrastructure expansion in their territory, for example, via communications and appeals to the newly elected Petro government (Indepaz, 2022). The Pueblo, 2022 set out their terms for new wind projects arriving in their territory and denounce as illegitimate previous consultations and approved renewable energy projects scheduled for construction. Beyond indicting specific projects, these documents also address wider central government policies and decrees, for instance, those promoting offshore wind parks as part of the Colombian energy transition (Barney, 2022; Indepaz, 2022). The documents explain, amongst others, a lack of formal recognition for ancestral Wayúu authority structures. While these are defined by matrilineal descent, they do not map onto the formal traditional authority bodies recognised by the state as legitimate participants in formal consultations and negotiations. Similarly, a Just Transition agreement for *La Guajira* signed in 2023 by the national government, indigenous authorities, corporations and development agencies sets out collaborative guidelines for an energy transition approach that is acceptable for all involved parties (see 3.4.) (Gobierno Nacional et al., 2023). The overall trend in these documents is to broadly reject the way in which renewable energy production is currently taking place across indigenous territories in *La Guajira*.

Among the national and international social movement's responses to green extractivism are a series of letters, petitions and declaration (CCJ, 2020; Indepaz, 2021; Pacto Ecosocial e Intercultural del Sur, 2023a, 2023b; Transnational Institute, 2023; Global Witness, 2023). These documents share similar concerns, directly or indirectly focussing on raw material and other extractive processes related to the energy transition. Two open letters (CCJ, 2020; Indepaz, 2021) aim to influence legislative processes in the European Union parliament, summarising conflicts and rights violations in extractivist zones in Colombia. They demand a series of guarantees, including respect for human and cultural rights, rights of indigenous peoples, and the need for significant

participation of affected communities in governing clean energy projects. Other declarations (Transnational Institute, 2023) argue for political tools and principles that safeguard indigenous rights and livelihoods for a more just energy transition.

These documents again make a distinction between "corporate" and "popular" energy transitions. For example, the Bogotá Declaration (Pacto Ecosocial e Intercultural del Sur, 2023b) states that "the [Colombian civil] war contributed to the exacerbation of both traditional […] and new forms of extractivism associated with the corporate 'green transition'". They use variations of the term green extractivism, such as "colonial extractivism", "energy colonialism" or "green colonial extractivism" (Pacto Ecosocial e Intercultural del Sur, 2023a, 2023b; Transnational Institute, 2023). The latter illustrates the coloniality of current global energy arrangements, in which "green colonial extractivism […] dispossesses communities of their land" (Transnational Institute, 2023, p. 15). This document denounces corporate-led energy transitions for sacrificing people and nations, which has wider implications for community-led, participatory just energy transitions.

3.4. National policy responses

We identified two national government policies responding to the sociopolitical, environmental and cultural challenges of green extractivism. Both were put forward by the Petro administration, in office since 2022. The first, *Comunidades Energéticas (*Energy Communities; see 3.2.1), is a strategy to expand energy services and collectively support Colombian decarbonisation efforts in a just manner (Vélez Torres, 2023a, p. 79). The scheme allows communities to generate renewable energy for themselves, or sell surplus electricity via a feed-in tariff to local distribution systems. The programme began with an open call for communities to register their interest in becoming an officially supported energy community. By the time the initial application stage closed in April 2024, the project had received 18,462 registrations of interests from communities across Colombia (Ministerio de minas y energía, 2024). The government was subsequently preparing for a testing phase prior to national roll-out.

The second relevant policy package is the government's Just Energy Transition (JET) Roadmap, created following a national consultation (Vélez Torres, 2023a, 2023b). Amongst others, the consultation resulted in the 2023 Just Transition agreement for *La Guajira* (Gobierno Nacional et al., 2023), described in 3.3. The JET roadmap consists of two documents: a baseline assessment of current knowledge on JET incorporating academic, private sector and civil society perspectives (Vélez Torres, 2023a); and results of 27 government dialogues (*Diálogos Nacionales*) carried out with ethnic and indigenous authorities, trade unions, young people, civil society, the business sector and others to design a JET (Vélez Torres, 2023b). While national in scope, the consultation held three specific territorial dialogues in *Cesar, La Guajira* and the Pacific Coast.

The participatory process sought to understand current impacts of mostly fossil and hydroelectric energy provision systems and related extractive activities across these three territories. Given the disproportionate impact of renewable and conventional energy extraction in *La Guajira*, the only indigenous dialogue was held with the Wayúu authorities. The Wayúu described a loss of identity and culture as a result of renewable energy projects and accompanying dispossession, intercommunal conflict, violence and division (Vélez Torres, 2023b, pp. 40–46) (see 3.2). The opposition was not to energy projects *per se*, but the way in which they are implemented. In response, the government guaranteed water provision and community participation in designing and approving corporate energy and Energy Community projects in ancestral territories. In other territories, like the Pacific Coast (*Litoral Pacífico*), participants described environmental impacts of mining such as mercury poisoning, while socio-political issues pertain to drug trafficking and the gendered impacts of fossil fuel-based energy provision such as charcoal (Vélez Torres, 2023b, p. 121).

Across these dialogues, there is no clear distinction between impacts related to new forms of renewable energy extraction, and preceding hydrocarbon extraction impacts. The Wayúu dialogue in *La Guajira*, for instance, criticises the "mining-energy sector" more broadly, argued to have led to the losses of aquifers, flora and fauna (Vélez Torres, 2023b, p. 22). However, the roadmap includes a range of environmental, economic, political-institutional and social proposals related to needs and opportunities associated with the energy transition, as well as government commitments in response to the Wayúu and trade union dialogues (Vélez Torres, 2023b, pp. 122–125; 46, 141). Following this national consultation process, the government proposes a JET consisting of four pillars: equitable resource access and democratisation of energy systems; gradual diversification of the country's energy matrix focussing on self-sufficient and reliable energy provision; binding social participation of affected communities via prior consultations and rollout of the Energy Communities programme; knowledge-intensive energy management with cooperation between private and public sectors (Vélez Torres, 2023a, pp. 344–345).

While the dialogues do not distinguish between old and new forms of extractivism, the roadmap explicitly recognises extractivism and green extractivism as relevant terms, developed by academics and civil society organisations to describe resource exploitation and appropriation patterns in Latin America and Colombia (Vélez Torres, 2023a, p. 65). In elaborating their understanding of a JET, the government argues for (re-)industrialisation as a way of overcoming extractivism, focussing on regional cooperation and energy diplomacy (Vélez Torres, 2023a, p. 87). The government cites Bolivia's lithium industrialisation strategy as an example of challenging hierarchical dependencies associated with an extractivist development model reliant on unprocessed raw material exports (Vélez Torres, 2023a, p. 94). Furthermore citing expected technological advances in areas such as electrification and carbon capture and storage, the government expects local industrialisation processes to drive sustainable development in a range of sectors, including tourism, agriculture, transport, and the service industry (Vélez Torres, 2023a, p. 323). These proposed changes fall within the overarching framework of a JET geared towards developing 'territories of life'.

4. Discussion

This is the first review to synthesise evidence on impacts and responses to green extractivism in a specific Latin American context from both grey and academic literature. It capitalises on a key moment in the modern political history of Colombia, and a broader global geopolitical turn towards net-zero related resource securitisation. The progressive government of Gustavo Petro has positioned Colombia as a regional leader in climate change mitigation and adaptation by attempting to phase out fossil fuel production via renewable energy production and CRM-driven sustainable resource diversification and industrialisation. We sought to understand the already occurring impacts of these efforts on indigenous rights and livelihoods in Colombia plus social movement and policy responses through the lens of green extractivism.

Our principal findings are theoretical and practical. Theoretically, we identified conceptual inconsistencies within the literature on green extractivism on Colombia. Practically, we found a clear distinction made in the literature between what is currently perceived to be a corporate-led energy transition, and demands for a popular energy transition led by (affected) communities. Their respective impacts and outcomes are argued to represent stark differences in facilitating energy access and (self-)provisioning for communities, respecting indigenous communities' right to free, prior and informed consent around renewable energy and/or CRM extraction projects, and community cohesion. Demands for a popular energy transition correlate with decolonial, feminist and eco-centric critiques of transition narratives and plans that contest the current eco-modernist and corporate-led trajectories of global energy transitions. Crucially, we identified calls by social movements in Colombia for the Global North to reduce resource consumption.

This call for degrowth has sufficiency-oriented policy implications for Northern energy transitions.

Our main theoretical finding relates to conceptual inconsistencies within the green extractivism literature on Colombia, particularly around using different terms to describe similar phenomena. In centring their work on (socio-)ecological distribution conflicts (Feeney, 2023; Pérez-Rincón et al., 2019), some papers' conceptual lenses overlap with and contribute to our understanding of green extractivism. Future research therefore needs to carefully unpack key terms and concepts, especially around green extractivism-adjacent terminology. A heightened conceptual clarity is therefore needed to facilitate a shared understanding of, and comparisons between, the disparate impacts and responses to green extractivism. This is crucial given that the bourgeoning climate change consensus legitimises and encourages CRM and clean energy extraction in the Global South as necessary for decarbonisation in the North (Dorn et al., 2022; Svobodova et al., 2022). Understanding these processes is a crucial prerequisite for researching, advocating for, and ultimately implementing just global sustainability transformations.

Our analysis builds on Maillet et al.'s (2021) work on routinisation of extractivism in knowledge production in Chile. Although 'green extractivism' is still an emergent concept, 'extractivism' in other national settings has been criticised for repeating the case study formula, reaching a routinised reproduction of conclusions. Those researching green extractivism should therefore aim to avoid this routinisation; in the Colombian case, we have already seen the proliferation of case studies focussing on *La Guajira*, all reaching very similar conclusions. We elaborate on the near-exclusive focus on *La Guajira* and its implication for understanding regional and global energy transitions further below.

Our review thereby hints at a certain epistemic exhaustion with using extractivism to understand energy transition related conflicts in Colombia. That is, the literature has reached a saturation point with using extractivism to communicate injustices or mining impacts across disciplines and disparate contexts. Competing theoretical emphases meant that even authors who could have an affinity around centring their work on (green) extractivism sometimes publish on diverging theoretical wavelengths, as it were. This makes it harder to sustain a clearly delineated field of green extractivism that can make incisive interventions in the ways in which the global energy transition undermines sustainable development in Colombia.

The finding on epistemic exhaustion may well stem from our narrow search context and need not apply to the wider/global green extractivism literature. We nevertheless suggest ways to overcome this limitation when investigating green extractivism in Colombia and beyond: one, by integrating social aspects of degradation and dispossession into the conceptualisation of extractivism, as done by the burgeoning agrarian extractivism literature; and two, by integrating cultural aspects via relational theoretical frameworks that recognise more-than-human agency in green extractivism studies. The literature on agrarian extractivism expands our understanding of extractivism as an export-oriented, environmentally degrading process of raw material extraction to encompass the deterioration of labour conditions and their constitutive regimes of gendered social reproduction work (Berman-Arévalo and Ojeda, 2020; McKay, 2017; Ojeda, 2021). We discuss our central finding around relational frameworks and cultural politics approaches to green extractivism studies in the following paragraphs.

We divided our data extraction table into environmental, socio-political and cultural impacts of clean energy extraction, which was useful for depicting the damages already inflicted on the ecosystems inhabited by the Wayúu, as well as the mechanisms that so far have reproduced environmental injustices. However, when charting and analysing the data, this division appeared arbitrary, making us question the reviewed literature's narrow understandings of clean energy impacts. This is particularly the case in a highly intervened territory like *La Guajira*, where synergetic impacts create new emergent technological regimes. For example, the provision of desalinated water via trucks alleviates water scarcity, but also changes the spiritual relationship of the Wayúu people to water and the sacred rituals associated with the relationality represented by water territories: spirits, animals and plants (Ulloa, 2020). We therefore argue that clarity around how green extractivism is conceptualised, framed and analysed ought to come out of empirical work with affected communities. Second, as demonstrated by Ulloa (2020), incorporating anthropological and relational theoretical frameworks can help understand the multiplicity of impacts and conflicts and recognise more-than-human actors, in particular in indigenous territories. This would complement the epistemic shortcomings of dualist social science concepts, which make a division between cultural and economic extractivism-related losses when from indigenous perspectives (and to varying extents) they often can be one and the same.

Our findings point to a major gap in the literature on green extractivism impacts in Colombia: a near-exclusive research and policy focus on the indigenous territory of *La Guajira*, site of fossil and clean energy extraction since the middle of the 20th century, and focal point for anti-mining resistance in Colombia. As such, we anticipated a bulk of the documents addressing green extractivism-related impacts on indigenous rights and livelihoods to focus on this region. However, changing government priorities in Colombia are pushing green mining frontiers into other territories (Arellano-Yanguas et al., 2023). Accompanying these developments with affected communities beyond *La Guajira* will facilitate an understanding of the impacts of global energy transitions on indigenous political, cultural and territorial rights and livelihoods, biodiversity protection and equitable, rights-based development outcomes.

The focus on *La Guajira* is also illustrative of the multi-issue conflicts produced by green forms of extraction mapping onto preceding fossil fuel projects such as the *El Cerrejón* coal mine. As such, the line between old and new or green extractivisms is blurred and difficult to distinguish, again leading to conceptual challenges around delineating exactly what it is that makes extractivism 'green'. This is not just in relation to how supposedly clean energy supply chains, energy transport and storage, and prerequisite metal or mineral extraction processes themselves rely on fossil fuel infrastructure (Dunlap, 2021), but the ways in which green energy development projects are primarily geared towards capitalist accumulation and value extraction (Ulloa, 2024). Wind parks as so-called green energy projects thereby reproduce, prolong, and yield territorial, environmental, and socio-cultural impacts comparable to conventional extractive processes of accumulation and dispossession (Ulloa, 2023). These nascent shifts have been considered under the term 'grey extractivism' (Wiegink and Calvao, 2024). Other relevant strands of research posit these issues as 'infrastructural harm' in an attempt to systematically analyse the territorial, material, ideological, socio-politically and economically entangled multi-scalar and multi-sectoral dimensions of renewable and non-renewable extractivism (Dunlap, 2023; Kallianos et al., 2023; Nygren et al., 2022). We suggest that these are fruitful conceptual avenues for studying the expansion of clean energy production and concomitant CRM extraction (cf. Dunlap et al., 2024).

A key practical finding relates to social movements' calls for the Global North to reduce resource consumption and thereby limit socio-ecologically harmful extractivist activities in the South, or in this case, Colombia. These demands would set Northern energy transitions onto a sufficiency-oriented trajectory that would ensure decent living standards and wellbeing within planetary boundaries – a core concern of the wider de- and postgrowth literature (Millward-Hopkins et al., 2020; Vogel et al., 2021). These findings contradict a commonly levelled critique; namely, that degrowth's European origins and framing limit its exposure and relevance for global transition discourses (Muradian, 2019). While there are strands in degrowth thought that either tacitly or effectively support a postgrowth agenda for the Global South (Gerber and Raina, 2018; see also Gräbner-Radkowitsch and Strunk, 2023; Kothari et al., 2014; Lang, 2017), our search did not find explicit

postgrowth critiques of Colombia's current development model. However, our findings around alternative energy and self-provisioning as responses to corporate-led green extractivism projects have highlighted the importance of autonomy, decentralisation and democratising decision-making processes, defined as pre-requisites for living well within planetary limits (Steinberger et al., 2024). Our findings are therefore highly relevant for understanding ways in which communities build alternatives to (green) growth and corporate-led energy transitions, and resist the encroachment of ecomodernist visions of development in their territories.

Our review has focussed on a narrow national context to gain an understanding of green extractivism impacts in Colombia specifically because of the country's regional climate and energy transition leadership. This was counterbalanced by the breadth of the search within that national context, that is, by focussing on not just academic papers but policy and social movement responses. Green extractivism appeared in both academic and non-academic texts, meaning that we found nearly no contextual differences in the theorisation of green extractivism. Our search criteria (Table 1) represent some limitations because we excluded papers that are relevant to the discussion at hand, but didn't specifically fit the criteria. For example, one group of academic and grey literature documents discussed the use of popular consultations in confronting extractive projects in Colombia (Acosta and Martínez, 2019; Acosta García, 2022; McNeish, 2017). Between 2013 and 2018, ten successful consultations have blocked metal and hydrocarbon mining projects, as well as a hydroelectricity dam (Acosta García, 2022). These studies have relatively technical, legal connotations, expanding on the characteristics of Colombia's judicial system which have enabled such initiatives.

While we did not find evidence of popular consultations and resource sovereignty-based strategies challenging green extractivism projects in Colombia, these initiatives can be relevant for studying the phenomenon's impact and responses to it. Communities consider that corporate consultations to obtain free, prior and informed consent under ILO 169 have been conducted inadequately (Vélez Torres, 2023a, p. 261). Moreover, popular consultations (as opposed to ILO 169) illustrate the intimate relations communities create with their territories, linking, for instance, territorial and economic development claims to "cultural and epistemological expressions of identity and relationships to landscape and resources" (McNeish, 2017). As laid out in our results section, similar claims and assertions of relations and values have supported struggles against emergent forms of green extractivism in *La Guajira*. Popular consultations therefore "provide a language for radical and speculative alternatives applicable beyond Colombia, especially since many of the issues are shared across Latin-America" (Acosta García, 2022). Given judicial challenges to participatory political processes in Colombia, future research ought to investigate popular consultations' potential role in contesting the corporate or otherwise character of the energy transition in Colombia. Could they, for example, be used strategically to advocate for energy and/or resource sovereignty to demand compliance with key recommendations of the government's JET Roadmap?

While refining our search criteria, we furthermore identified academic and grey literature documents focussing on hydroelectricity conflicts (Asoquimbo and Tierra Digna, 2019; Feeney, 2023; Hougaard and Vélez-Torres, 2020; Pérez-Rincón et al., 2019). While they touch upon extractivism-adjacent concepts such as dispossession, they do not focus on the wider topic of the energy transition and concomitant North-South centre-periphery dynamics which guided our research interest. Nevertheless, these case studies illustrate emergent conflicts related to the energy transition, especially with regards to livelihoods, uneven resource access and pollution burden, offsetting projects and land restitution (Asoquimbo and Tierra Digna, 2019; Feeney, 2023; Hougaard and Vélez-Torres, 2020; Pérez-Rincón et al., 2019). The latter two could become interesting focal points for future studies on green extractivism as clean energy production and mining projects expand into biodiversity hotspots and/or indigenous territories. Future research could consider our excluded documents as part of a wider investigation into (energy-focussed) extractivist logics and dynamics in Colombia.

Though the review searched for and included both English and Spanish-language documents, a final limitation relates to the coloniality of database indexing. SCOPUS indexing is delineated by academic publishing norms around impact factors and therefore excludes journals that Latin American authors might publish in. Such bibliometric coloniality measures and reproduces epistemic validity, credibility and research robustness based on quantitative metrics and academic norms shaped by Global North journals (Mills et al., 2023). This ultimately marginalises knowledge about the Global South produced by the Global South in some of the most prominent scientific databases, such as SCOPUS (Heleta and Mzileni, 2024). The coloniality of knowledge production has limited our search results, in that we had to supply 11 documents ourselves and potentially excluded diverse voices, theoretical perspectives and knowledge produced within and from the specific context we were researching. Future reviews on green extractivism in Latin America should, amongst others, include database searches in SCIELO, a Brazil-based online scientific library that indexes Latin American journals in Portuguese and English.

5. Conclusion

The key strength of this review is that it brings together academic literature, policy documents, and social movement responses on the impact of green extractivism on indigenous rights and livelihoods in Colombia. We conducted a comprehensive, three-pronged database search, focussing respectively on a scientific database to identify peer-reviewed papers (SCOPUS) and two databases that index reports, working documents, policy briefs and documents from think tanks, governments, agencies, NGOs and INGOs (Policy Commons; Overton). Our unique contribution therefore consists of providing an extensive summary on the politics and study of green extractivism in Colombia. The identification of trends and gaps in this body of work is valuable to the research community because it maps out areas and approaches for future research (set out below) that could enrich our understanding of the interaction between green extractivism-driven decarbonisation and sustainable development, particularly for indigenous peoples. Our review is furthermore timely and relevant as we provide a snapshot in time of the first half of Gustavo Petro's administration, which proposed significant policy responses to issues related to green extractivism and the energy transition, for example, with regards to energy provision and access, dispossession, community participation and informed consent. We also identified ways in which social movements responded to these initiatives which included calls for the Global North to reduce resource consumption, implying a sufficiency-based policy trajectory for energy transitions in affluent economies.

We suggest further research strengthen conceptual clarity around 'green extractivism' by engaging in empirical work with affected communities using relational theoretical frameworks to understand synergetic impacts, particularly in indigenous territories. Integrating cultural aspects of extractivist degradation and dispossession would recognise non-human agency in green extractivism studies and complement the emphasis on social relations around labour, nature and gender developed by the agrarian extractivism literature. While our findings are limited to the green extractivism literature in the Colombian context, these suggestions may also benefit other research contexts, as well as enrich the global literature on green extractivism. A systematic review on green extractivism could help contextualise these findings globally.

In Colombia, future work should diversify the geographical focus of policy and research interventions beyond *La Guajira*, taking into account the changing policy, legal and regulatory framework surrounding the energy transition, including around green hydrogen. Colombia's 2022–2026 Development Plan supports phasing out fossil fuel extraction and a reindustrialisation strategy based on CRM-driven sustainable resource diversification. A key question, however, is how plans to

expand the green mining frontier fit the principles and pillars of the government's JET Roadmap, particularly around sovereignty, reliability, equity and democratisation. Moreover, as of the second half of 2024, the two identified policy responses have not yet been borne out, and the 2026 elections may well see a government change. Colombia is at the forefront of competing visions for just energy transitions. These merit further, sustained study that engages with the principal actors articulating these visions.

CRediT authorship contribution statement

Gabriela Cabaña: Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Data curation. **Katharina Richter:** Writing – review & editing, Writing – original draft, Supervision, Project administration, Methodology, Funding acquisition, Conceptualization.

Declaration of competing interest

The authors declare no conflict of interest

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Supplementary materials

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