HARMONY LABS

COMMUNICATING THE ENERGY TRANSITION:

A LITERATURE REVIEW OF PUBLIC DISCOURSE AND NARRATIVES ABOUT ENERGY TRANSITION MATERIALS

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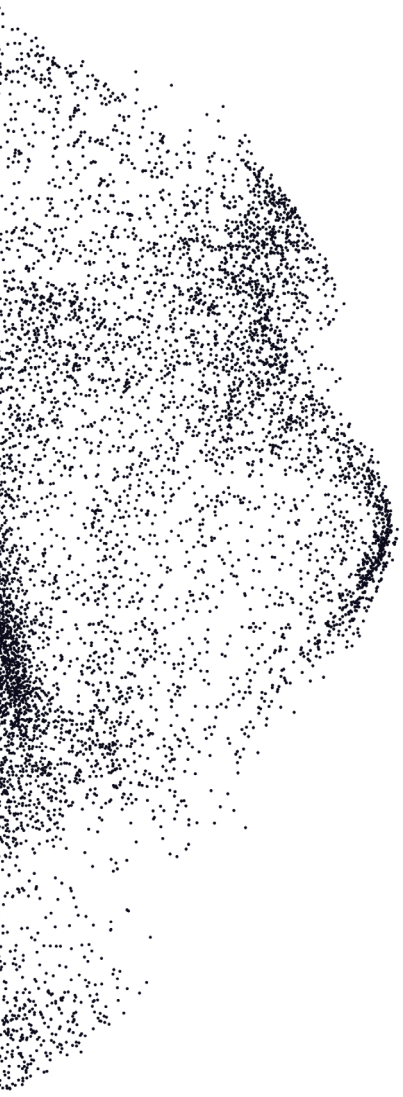
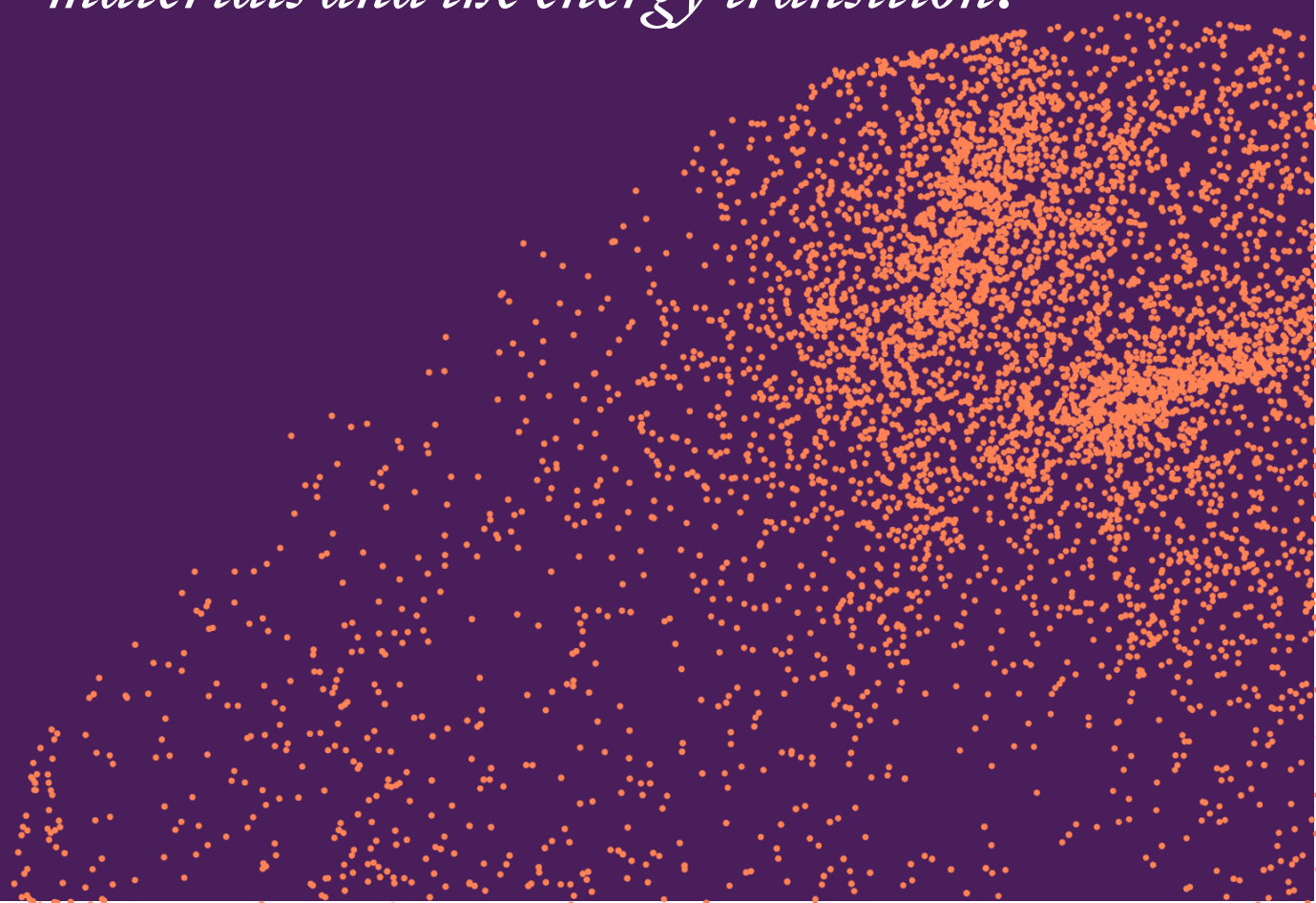


:SUMMARY

The guiding question for this literature review was:

What does the secondary literature tell us about the contents and impacts of existing communications strategies, public discourses, and narratives about transition materials and the energy transition?



THERE IS SUBSTANTIAL LITERATURE on the mineral demands of the energy transition, which we broadly define as the deployment of renewable energy sources, and the electrification of energy, industrial, transportation, and building systems. This literature review focuses on discourse analyses of energy transition materials (ETM) narratives, which tends to be critical of the origins and implications of the ways in which the mining industry expands production alongside climate policies.

Mining conflicts with the imperative to avoid environmental disasters, as mining can endanger critical habitats and the people and species who reside there.

Scholarly work on mining for materials related to renewable energy and electrification technologies, termed ETM discourse, increasingly mentions a tension central to this link. On the one hand, the ability to avoid worsening climate change and its impacts depends on the ability to transition energy sources away from fossil fuels. Zero-emission and renewable energy deployment entail large-scale production of energy technologies built from materials mined from the earth. On the other hand, this mining conflicts with the imperative to avoid environmental disasters, as mining can endanger critical habitats and the people and species who reside there. These are often presented as trade-offs: it appears as if society will need to choose one or other.

This literature review is also interested in conversations about justice, and as such, it challenges the binary choice between rising emissions and mining harms, and who is allowed to make it. To that end, the Alternatives section explores how ETM discourse may be differently framed.

Key Takeaways

THE LITERATURE IN THIS CORPUS largely reproduces the form of public debate about ETM. Specifically, it finds that the spheres of climate action and local lifeworlds are distinct (see the Scales section). A few exceptions demonstrate that the local scales where mining harms may be felt are just as significant, universal, and connected as the policies to reduce global emissions (see Challenges). ETM discourse, by framing mining in terms of climate policy, grants for its advocates the ability—and even responsibility—to make decisions about places within the same commodity and knowledge structures that have long caused mining conflicts (see Continuity).

RESEARCHERS OFTEN FIND that ETM discourses are circulated through the typical tools of images, marketing, interviews, policy documents, and news media, as well as the more academic term "imaginaries," which are variously defined as "imagined futures" (Larsen 2024, 318), "desired future societal order" (de Leeuw and Vogl 2024, 1845), and "projections of desirable futures" (Barandiarán 2019, 381).

ETM DISCOURSE OFTEN ADDRESSES the social embeddedness of science and technology along supply chains, often called sociotechnical systems. An aim of this approach is to call into question a static understanding of so-called "critical minerals" (Overland

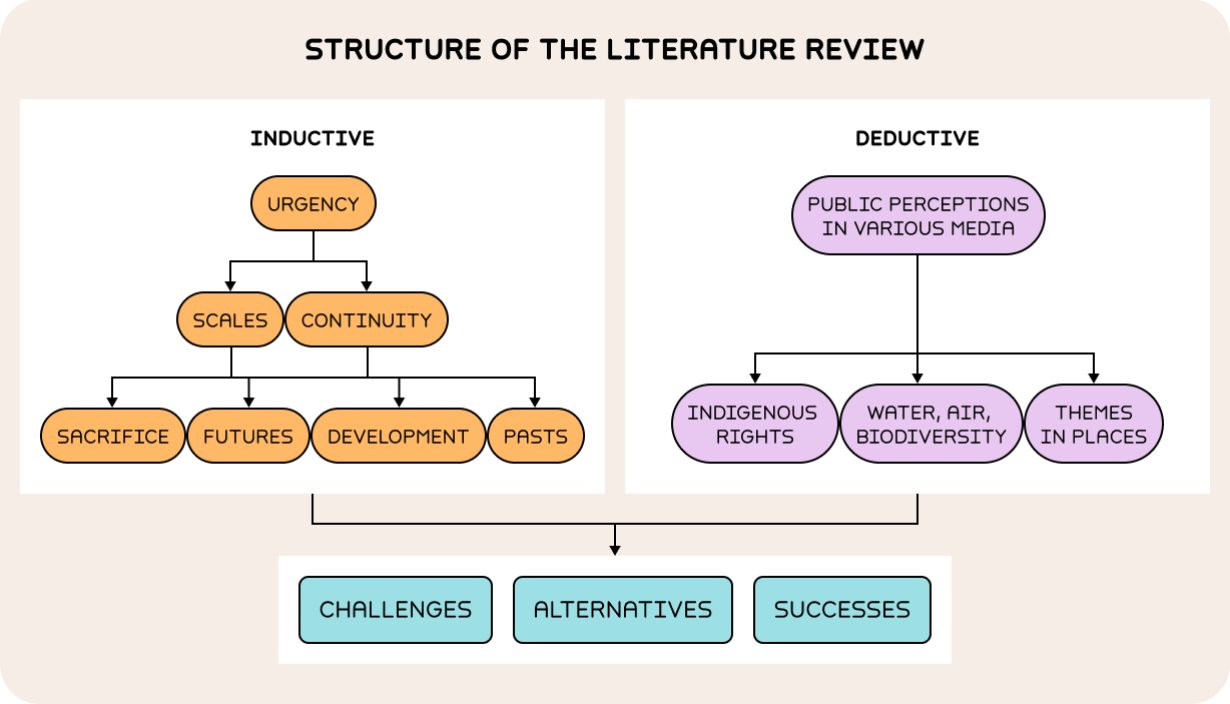
2019, Wilkinson 2023), or to emphasize that the technology itself is the spectacle of ETM discourse (see Deep-Sea Mining). However, one entry in this corpus (Krishnan and Butt 2022) engages beyond simple mentions with the technologies that ETM are meant to create, such as lithium-ion batteries and permanent magnets. This aligns with findings in Kügerl et al. (2023) and Overland (2019), who describe how this can be important: the specific material demands of technologies have not been consistent, so framing mines as ETM- or climate-related both obscures this uncertainty and bolsters corporate messaging about the climate 'benefits' of mining projects.

THIS REPORT PRIMARILY FOCUSES on the ETM discourse that concerns mining, rather than demand reduction or other sources of materials, like recycling and reuse. The searches used to create the corpus for this review did not surface articles related to discourses about these alternative options for material production (see Summary of Searches appendix).

THE LITERATURE TENDS to be critical of the narratives it describes. Often authors propose alternative narratives or conclude with recommendations to improve narratives, the operations of mines, or related policies. Criticism of particular ETM narratives, however, don't necessarily lead to alignment of proposed solutions. For example, Giurco et al. (2014) urges industry and policymakers to prepare for the geopolitics of ETM, whereas Overland (2019) contends that the geopolitics of ETM are overblown. Lin et al. (2025) and Agusdinata and Liu (2023) both trawl news media to identify concerns about social impacts, but one is interested in creating metrics for mining firms to maintain support, while the other is interested in improving governance.

BECAUSE EACH PIECE of literature is not able to grasp all dimensions of a particular conflict, the Places section offers unique insights by overlapping research, drawing out a more complete picture of the stories in particular places. For instance, Kingsbury (2024), Wilkinson (2023), and Ritz et al. (2024) study the same project in Quebec but ask different questions. By combining their findings, we can uncover underlying principles of communication strategies, which in this case triangulate to suggest ETM discourse targets the interests of extractive firms and officials.

IN THE CORPUS that this review draws from, with important exceptions, movements against mining projects don't often articulate specific alternatives to the development of a mine, other than flat rejections of mine construction. Scholars may simply be interested in other topics, or mining opponents may not feel a need to articulate an alternative other than rejection. I've highlighted in the alternatives section how some works have communicated alternatives. Authors in the corpus diverge on whether discourses around specific projects change over time. Brooks et al. (2024), in evaluating debates in news media, found there was general persistence of the same themes over the period 2005-2022, save for the 2021 entrance of ETM contributions to climate policies. In contrast, Ritz et al. (2024) found distinct changes over just four years of discourse (see Ritz et al. Narrative Summary appendix).



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Structure

THIS REVIEW SYNTHESIZES 97 works of scholarly literature. I have used both inductive and deductive techniques to draw conclusions about particular themes, alternatives, challenges, and successes that scholars identify in the literature. The inductive techniques are based on my reading of the corpus and prominent themes that emerge. The deductive techniques use categories identified from public discourse and Harmony Labs' discourse analysis to synthesize findings. These themes often overlap and interact. The corpus I've collected includes a variety of approaches, including ethnographic, bibliometric, and critical discourse analysis of documents from government institutions, media, activists, and mining firms.

I pull out several themes from the corpus of literature and detail them in a narrative fashion, which I've graphically outlined above. After providing some context for the ETM discourse and its historical foundations, I begin exploring the themes, starting with "Urgency." By starting with urgency, the most prevalent theme, I set the stage for the tensions that are implicit in the themes that follow.

The urgency theme derives from just one side of the tension mentioned above: the urgency to reduce emissions to avoid cascading climate change disasters. Scholars have used scalar analysis to critique the trope of urgency. For instance, the climate discourse has a broad, planetary scale logic, even though mining necessarily has local impacts and is shaped by local concerns. Underlying the ETM discourse is the assumption that materials mined in one place will improve the climate, which is felt by everyone everywhere. The planetary scale of reducing greenhouse gas emissions, then, trumps the harms experienced in just one place. By attending to scales, scholars call out imbalances and injustices regarding who gets to decide the character not only of mining, but also of climate policy. Within the theme of scales, I include discussion of the themes of sacrifice and visions of the future, because their subthemes are elaborated in terms of conflicting aims at different scales of analysis.

A number of scholars also deconstruct urgency narratives by emphasizing continuity, i.e. that this phase of extraction is not new in terms of the actors, injustices, and structures that enable it. This section includes the economic development theme, as this has long been prominent in mining discourse and marks a continued theme in ETM discourse. This theme also overlaps significantly with the scales theme, as economic development is discussed in the literature in terms of various spatial scales (i.e. local, regional, national). The Pasts theme here discusses how histories of mining have appeared in narratives of ETM discourse, and thus how various actors in ETM discourse have sought either to distance themselves from past mining or emphasize its persistence into mining for ETM.

The corpus collected includes a variety of approaches, including ethnographic, bibliometric, and critical discourse analysis of documents from government institutions, media, activists, and mining firms.

Continuing in the deductive side of the analysis, public perceptions of ETM act as an entrance into a broad set of topics that discourse highlights, such as social and environmental impacts. The categories used in this literature, in combination with themes that emerged from Harmony Labs' analysis, are used to offer insights about the particular topics and places. The Places section offers cross-cutting insights, as each piece of literature is not able to capture all dimensions of a topic, and by overlapping the research, new conclusions can emerge. From the data presented, I then summarize how scholars have encountered Challenges and Alternatives to the status quo and some Successes they identify, both from opponents and proponents of the status quo.

Definitions

THE DEFINITIONS OF critical minerals, transition minerals, and other related terms vary across the literature. Below I summarize some reasons why this is important. Public discourse has not settled on how to refer to the materials required for technologies meant to reduce emissions. In this report, I use energy transition materials, abbreviated as ETM. I select materials, because minerals, metals, and mining each only encompass a portion of the topic (see Mining Terms appendix for list of included materials). The discourse that includes the contributions of mining to climate policies and the tensions that underlie this fact is defined as ETM discourse.

Most countries' determination of a "critical mineral" centers on the mineral's role in national security and vulnerability of its production. The U.S., for example, requires three conditions for a mineral (although it also lists chemical elements) to be a critical mineral: (1) it must be essential to the economic or national security of the U.S.; (2) it must serve an essential function in the manufacturing of a product; and (3) its supply chain must be vulnerable to disruption, such as political risk and abrupt demand growth (USGS, 2025).

Researchers have evaluated such definitions in policy and peer-reviewed literature, identifying inconsistencies and

criticisms. Schellens and Gisladottir (2018) examine the definitions of criticality in scholarly literature, finding that economic concerns predominate, rather than the potential of minerals to have positive environmental effects. Importantly for the discussion of minerals here, these terms originate in the Global North, where extraction is not currently concentrated.

Coumans (2024) challenges the definitions of critical minerals, particularly as they are applied to green notions of climate action. Critical minerals chiefly indicate materials that government agencies define as important to national security, and in particular the military. However, the term is commonly used to refer to ETM (e.g. Fikru & Koppera 2024). Additionally, there are no mechanisms to guarantee ETM will go toward climate-related uses. Coumans posits that minerals used to support war should instead be called 'conflict minerals' and their mines 'conflict mines.'

Andersson (2020) helpfully highlights that Chinese assessments of criticality include much more nuance than other countries. Like other places, attributing criticality to a product serves to legitimize the exceptional use of state power to ensure access and production. Criticality in China has multiple layers, including, for example, advantageous minerals, strategic emerging industry minerals, and staple minerals. Some of these categorizations indicate that the government would like to maintain the control of a particular industry, and others that more attention is needed to strengthen the country's influence on a market.

:HISTORY, MINING BEFORE ETM DISCOURSE

ETM discourse in this corpus has not always been part of mining or climate discourse, i.e., it has a birth date. The literature included in this analysis pinpoints it roughly to 2019, mirroring the findings of Kügerl et al. (2023) regarding the spurt in "responsible sourcing" literature. More important for this analysis, however, is understanding how and why it emerges among particular groups and particular places. This section elaborates three main conclusions that arise from historical considerations:

1. While the mining industry was aware of mineral contributions to the energy transition as early as 1990, mining firms rarely mentioned this in public facing documents like sustainability reports.

2. The emergence of ETM discourse in the sector, including among policymakers, appears to coincide with escalating geopolitical concerns.

3. ETM discourse is after this period not an omnipresent topic. Research continues to find after this point that there are debates about mining that neglect the ETM contribution, despite the opportunity to raise it.

Explicitly normative arguments of climate protection are used to justify social-ecological depletion and destruction.

THE MATERIAL DEMANDS of energy transitions have received increased attention in the scholarly literature since roughly 2019, and the corpus selected for this review reflects that change (See Literature by Year appendix). Before this date, debates about mining were already vibrant and touched on many of the same themes described below. In this period, there was little engagement with the contributions of the mining industry to climate policies, and with the fates of their products in supply chains as a whole. This is meaningful. Actors engaged in the development of mining projects have continued to debate the same themes, despite recent efforts to link mining and climate policies. Caraccioli's (2015) chapter on Bolivian lithium, for example, mentions the use of lithium in electronics, but did not center it in the analysis of energy narratives. A few years later, research on Bolivian lithium would engage directly with climate policies that funnel down supply chains to sites of lithium extraction. Goodale (2024), however, describes pro-mining communities who resist the ETM lithium rush in Bolivia, calling it a conduit for state corruption. ETM discourse hasn't necessarily changed the character of opposition, nor the practices of the private sector and government officials. This is more thoroughly documented in the Continuity section. ETM discourse in this sense is so far more transient than other themes discussed. (Indeed, after the inauguration of the new U.S. federal administration, mining firms that once trumpeted their potential contributions to climate policy have associated themselves instead with national security interests.)

That the ETM discourse has an apparent moment of inception is significant for a number of reasons. First, it appears that mining firms have been aware of the material demands of renewable energy technologies for decades, but did not use it as marketing material. Vikström (2020) analyzes news articles in Mining Journal from 1980 to 2014 that mention energy transitions and the materials that would support them. Since 1990, the publication considered the energy transition an opportunity for mining companies, and it considered supply problems beginning in 2010. Giurco et al. (2014) agrees that the mineral-energy nexus— their term for what becomes ETM discourse, particularly relating to rare earth elements in renewable energy production—goes widely unacknowledged in this period. They write that while the energy sector is planning decades into the future, the mining industry largely limits its view to a decade ahead.

For this reason, mining firms' publications mention the benefits of resources to

society, but do not mention their contributions to climate mitigation, according to an analysis of their publications by Han Onn and Woodley (2014). The authors find that mining firms focused in their 2000-2012 sustainability publications on "transferable sustainability," which foregrounds their contributions to communities and society in general. Mining firms only addressed the supply chain beyond their mines when considering life cycle assessments of products, but generally the end use of products was not considered. Similarly, Hatayama (2022) finds that mining firms' sustainability reports published through 2019 in the mining industry rarely mention their contribution to climate action. This, as we will see in the themes below, marks a stark contrast to the industry's contemporary communications about its products in the context of climate policies.

Secondly, the period before 2019 also differed in its relative lack of emphasis on geopolitical battles. Wübbeke (2013) finds that, despite widespread public discourse on the geopolitical battles over rare earth elements between China and western countries, Chinese policymakers did not consider geopolitics an important factor in crafting mining policy within their country. This is a significant finding, considering many commentators raised geopolitical worries after China interrupted rare earth element exports in 2010, even though there is no indication of a geopolitical intent. Geopolitical tensions are among the main concerns that Giurco et al. (2014) raises with the lack of attention to their so-called mineral-energy nexus. This suggests there are connections between the emergence of ETM discourse and geopolitical concerns among policymakers and mining firms.

Thirdly, authors of a few studies marginalize or even fail to mention a mine's connection to electrification technologies, despite the opportunity to do so. This is important, as climate themes, which are highlighted by inductive methods identifying urgency, scales, and continuity, are not omnipresent. Mining has a long history, and the industry interacts with communities in diverse ways at each location. Our interest in reviewing the themes that emerge related to ETM is in the diversity of experiences and discourses that scholars have identified.

Kügerl et al. (2023) review literature regarding "responsible sourcing," a term which signifies corporate efforts to manage sustainable supply chains, and which precedes and is amplified by ETM discourse. Significantly, they uncover a dearth of research that also includes consideration of "natural resource justice," which assesses the distribution of power, of rights to resources, and of benefits and burdens. They write that research regarding justice in this field is "immature" and "limited." Responsible sourcing is a prominent topic in ETM discourse, as it connects the aims of consumers with the practices of extraction and production and seeks to resolve the tensions outlined in the summary. The deficit they find is stark compared with literature on responsible sourcing in other industries, despite decades of scholarship in the field. They identify major gaps, including broad failure to engage with the interactions between social and technological issues, such as the designs of technologies that ostensibly aim to solve social problems.

To conclude this discussion of the antecedents to ETM discourse, I include a diagram from Dorn et al. (2022, Fig. 4) that describes the transitions in South America between different discursive framings of "extractivism," which includes mining. The authors label this phase "green extractivism" to draw out their critique that this phase relies on a climate change consensus, which is posed as a non-ideological reframing of commodity extraction. Framing the climate consensus as non-ideological, they write, serves to shield the framing from scrutiny, especially regarding the methods to reduce emissions.

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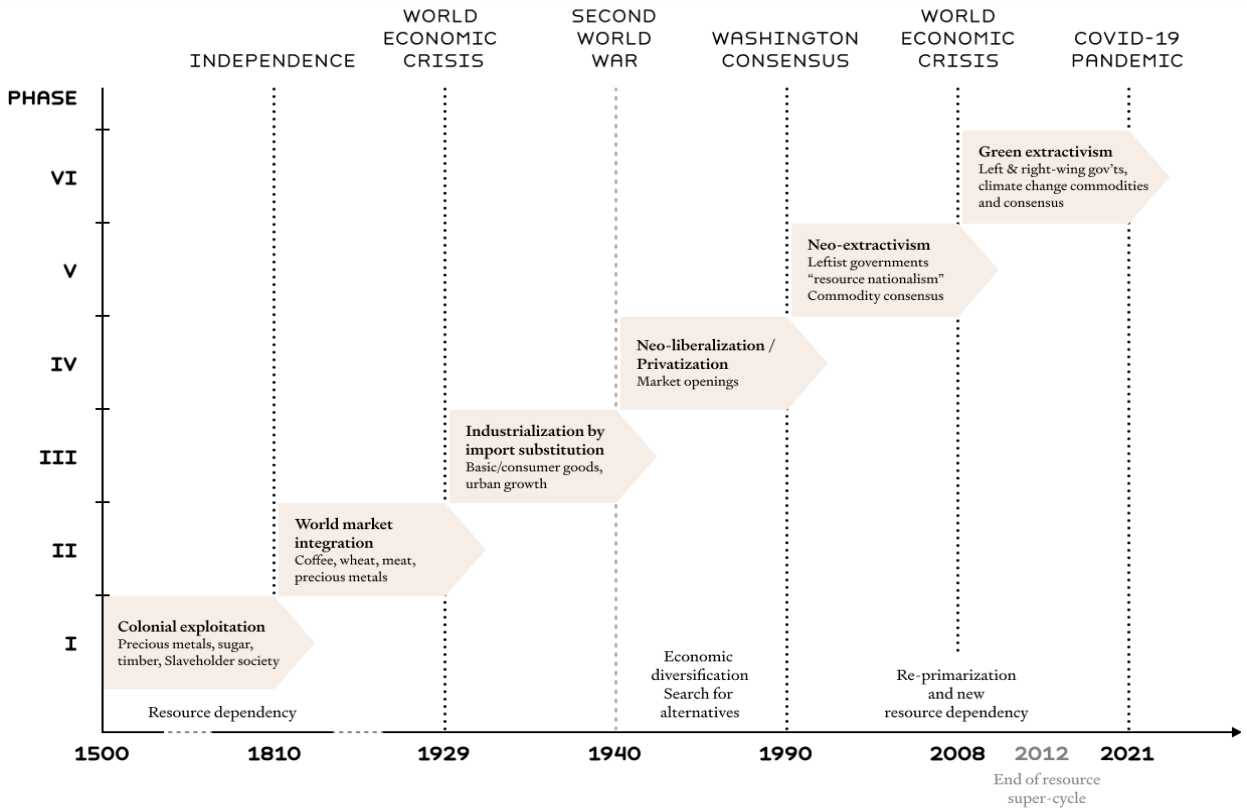


Fig. 4. *Resources and development in South America. Source: modified after Coy et al., 2017.*

Drawing from interviews with companies, officials, activists, and communities, the authors find that this non-ideological framing itself hinges on norms that seek to legitimize mining: "Explicitly normative arguments of climate protection are used to justify social-ecological depletion and destruction" (1). (This theme is elaborated with several more pieces of literature in the Scales section.)

:ORIGINS OF ETM DEBATES, INTRODUCTION TO THEME

The introduction of climate into mining conversations coincides with what Agusdinata et al. (2022) describes as a geographical bifurcation between supply and demand that places disproportionate weight on the demand for materials in the Global North, defined by higher-consuming lifestyles and higher carbon emissions. This reflects critical literature of supply chains that identify the focus on end use as a constitutive logic.

By defining this literature review in terms of ETM (as opposed to mining production, for example), this report may contribute to that dynamic. Indeed, the vast majority of the literature was authored by scholars in Global North countries (see appendix). This theme is confronted in the preceding discussion of history and in the themes described below.

This imbalance can also be seen in Strindevall (2021), which traces the root of debates about ETM to contrasting diagnoses of the climate problem: climate change is either a problem of rising greenhouse-gas emissions (end use logic), or it is a social justice problem rooted in global inequality (production). Strindevall evaluates the Climate-Smart Mining Facility introduced by the World Bank in 2019 as an effort to mitigate climate change, reduce mining impacts, and create market opportunities. Analyzing reports and interviews from actors both supporting and criticizing the initiative, Strindevall uncovers three tensions that arise from the aforementioned disagreement: (1) global vs. local scales of priorities, (2) the urgency to reduce emissions vs. the urgency to adapt to climate change impacts, and (3) energy transitions defined by new technology vs. energy transitions defined by political transformations. Highlighting these tensions are important for understanding ETM debates, but they simultaneously place the locus of debate within the climate context. The section on scales and continuity offer alternative ways to balance the priorities of climate mitigation and the rights of communities negatively impacted by mining.

Climate change is either a problem of rising greenhouse-gas emissions (end use logic), or it is a social justice problem rooted in global inequality (production).

:URGENCY

ETM may be said to entail a sense of urgency, as this label signifies a solution to avoid worsening climate catastrophes. Scholars have found this theme across many countries, and some analyze the global conversations and financial moves that leverage this theme to expand ETM mining. This section begins with a summary of a popular piece of work that describes the tensions that urgency creates, particularly as it relates to justice.

To explain the theme of urgency in this corpus, here is a brief summary of van Bommel et al. (2023), which identified a framework for understanding urgency as it pertains to justice. The authors analyzed peer-reviewed literature about the energy transition that mention urgency and justice. While the article does not focus on mining, it mentions it as a justification for researching how urgency is applied to the energy transition (specifically, forced labor in the production of polysilicon for solar panels and in lithium mining in China). Below are three views of the relationship between urgency and justice as it pertains to ETM.

1. Urgency and justice as trade-offs.

a. The urgency of climate action jeopardizes justice; e.g. fast-tracked mining projects may trample on rights.

b. Calls for justice may jeopardize the speed of the transition.

2. Urgency and justice as reinforcing each other.

a. Urgent climate action enabled by mined materials will achieve justice for communities at risk of climate impacts. Hence the mining industry is cast as a "climate savior" (Riofrancos 2023, 35).

b. Incorporating justice into ETM projects can decrease risk and make mining production more stable for seamless climate action.

c. Reducing demand for material-intensive technologies can lead to justice at potential mine sites and at the sites of consumption.

3. Urgency of tackling injustice in the energy system.

a.Addressing the harms of mining is itself an urgent task alongside climate action.

b. It is urgent to achieve energy equity such that everyone can access zero-emission electricity.

It's clear there is more than one way to cast this relationship, as (1) and (3) include contrasting manifestations in ETM discourse. Dorn et al. (2022) helps readers through these divergences by applying a critical lens not only to mining, but also to climate action. They write that the imposition of climate urgency on mining projects as a non-ideological framing, presented as neither left- nor right-wing, obscures social and ecological harm in the name of an implied greater good. In the mining and climate tension, then, the appearance of urgency from climate is shown to entail a set of assumptions that are not given but rather dependent on existing ideologies, and that locate solutions in the production of new material technologies.

Hine et al. (2023) similarly finds "that crisis narratives and regulatory fast-tracking mask serious socio-environmental justice concerns, while neglecting material blockages" (233). They put forward "counter-urgencies" such as the necessity to scrutinize critical minerals expansion and advocate for just outcomes.

In this context, scholars identify the tools that institutional actors (firms, government officials, banks) use to establish the idea of urgency, shifting attention in the mining-climate balance toward climate and, more importantly, the expediencies it implies for these actors' activities.

Matanzima (2024) examines the arrival of a lithium project in Zimbabwe, finding that the devotion to urgency has translated into fast-tracked development by way of weak governance and corruption. Here, officials developed resettlement policies before the arrival of ETM discourse, which mining firms leveraged as an urgency to hasten resettlement. Matanzima identifies simultaneous problems, such as the manipulation of consent, as he suggests that ETM discourse destabilizes policy and practice. The urgency discourse here retroactively justified resettlement for a project that had existed before decarbonization was on the agenda.

Warner et al. (2022) evaluate narratives of graphite mining in Mozambique drylands, finding that like other areas, the image of an empty landscape distorts history and power. Urgency is added on top of this, generated by actors in Global North countries seeking an energy transition. They contend that mining for the energy transition is not inherently positive, as the narrative holds, but rather it must encounter the heterogeneous effects of mining, just as anywhere else.

For several authors, the urgency narrative derives from the ways businesses operate. Voskoboynik and Andreucci (2021) found a sense of urgency was created in the Lithium triangle with the help of market concepts like rushes, bonanzas, and fevers. Similar language is also found by Kingsbury (2023, 2024), who finds that terms like "buzz" help attract financial investment in mining projects. de Leeuw and Vogl (2024) discover hype in Sweden related to green steel imaginaries that work to make space available to mining, undermine democratic processes, build on problematic histories of extractive wealth, and present alternatives as impossible.

The imposition of climate urgency on mining projects as a non-ideological framing obscures social and ecological harm in the name of an implied greater good.

Two academic theses have similar findings:

- *Zutt (2023) focuses a discourse analysis on lithium cooperation between Chile and the EU, finding that "The literature has demonstrated that the uttering of terms such as 'critical,' 'urgent,' 'essential,' 'competition,' or 'green mining' can be misused for political or economic gain as it shapes people's perceptions and subsequently has the ability to justify extreme and unsustainable policies" (51). This language is found in the EU's critical minerals strategy, where the author argues the urgency legitimizes political involvement in mineral-rich, "developing" countries.*

- *Olufsen (2024) leverages the urgency framework developed by van Bommel et al. (2023) to a discourse analysis of news media about Indonesia's nickel industry published between March 2023 and March 2024, identifying four categories of discourse of ETM: (1) energy transition and electric vehicles, (2) opportunity for economic development, (3) future political and geopolitical considerations, and (4) environmental and social impacts. The theme of urgency arises from these theses in two ways: the urgency to reduce emissions and the urgency for Indonesia to capitalize on the demand for nickel, reflected in the strong attention to economic aspects of nickel production and lives in surrounding communities.*

:SCALE

Although mining is a very local phenomenon, in terms of its physical extractive operations, the process of energy transition in which ETM are embedded can create new scales of meaning, as it is essentially a world-making project. There are multiple "scales of meaning" in the field of ETM, ranging from hyper-local to "universal." These categories can be overlapping, and there are multiple rationalizations within each scale. Scales can be thought of as levels of analysis, within which actors situate their discourse.

For example:

- ***Hyperlocal:*** *A mine may bring benefits or harms to those it employs or communities it interacts with.*
- ***Local:*** *Local officials and businesses interact with mines.*
- ***Regional:*** *Mines may bring economic development.*
- ***National:*** *Mines may bring taxes and royalties.*
- ***International:*** *Mines may bring geopolitical value.*
- ***Global:*** *ETM will reduce climate-warming emissions.*
- ***"Universal:"*** *Mining is a fundamental part of human progress.*

Discursive strategies work within scales, some attempt to bridge scales, and others seek to negate scales. Scales are not natural but rather created. Goodale (2024) explains how firms and communities create scales of meaning. He concludes his discussion of lithium scale-making with the contention that the critical importance of lithium to reducing emissions does not fit neatly into the scales of lithium that have been created around Bolivia's salt flats.

Preference for one scale over another can lead to trade-offs. For example, as mentioned in the introduction, the tension in ETM discourse suggests that one must choose between the harms of mining on the ground and the harms of global climate change impacts. Scholars have found that opponents to some mining projects have refused to engage with debates that take place on large scales and can force hegemonic discourses to adjust (see Successes). Separately, activist groups have coalesced to form planetary-scale advocacy to support community rights in mining projects. In this corpus, only Walter et al. (2024) speaks to this theme.

The act of scale-making delineates the spatial contexts in which various proponents and opponents of mining projects have articulated their claims.

- *Leino (2024) describes how proponents and opponents of ETM mining can align themselves to particular scales. Leino examines mining debates in Finland and discourses on micro, meso, and macro scales. Industry tended to present positive narratives on macro scales, such as decarbonization. While opposition tended to develop resistance on micro scales, such as biodiversity protection even as it was expressed in terms of international commitments. Narratives were often framed in terms of justice, so the author plots these claims across scales, which I copy in an appendix.*

- *Paliewicz (2022b) reveals in public hearings about a copper project in Arizona that the firms steer attention away from the local scale by leaning on planetary-scale arguments. Meanwhile, opposition frames itself as rooted in place, emphasizing the value of a particular piece of land to human identity. In this way, the opposition refused to argue on the firm's terms. In a separate article, Paliewicz (2022a) addresses the meaning of this type of argument. Paliewicz finds that the firm has benefitted from the arguments that accuse them of green colonialism, as they were able to leverage the framing to shape debate in terms of trade-offs across scales. Nevertheless, the firms created localized sustainability identities in the places where they extract: Rio Tinto and BHP claim to be sustainable actors that include cultural care for affected communities.*

- *Noever Castelos (2023) analyzes in policy and other publicity documents how different actors cast their values in evaluating mining projects. To summarize: EU publicity focuses on the need to reduce emissions; EU policy documents on geopolitical risks operating on regional scales; national politicians have leveraged a scale of global resource justice whereby national jurisdictions are offered as safer options against other countries; within Spain, Noever Castelos' focus,*

various levels of government rely more heavily on the scale of local economic development, outweighing sustainability concerns.

As the three examples above demonstrate, attention to larger scales in this corpus generally originates with private sector actors and parts of the world with high energy and material consumption. As mentioned before, Agusdinata et al. (2022) conclude from a review of scholarly literature that Global North perspectives drive research in the governance of critical mineral extraction (which includes ETM). This conclusion is important, not only because local mining projects gain material and financial support by attending to the interests of non-local actors, primarily in the Global North, but also because the management of social and environmental impacts is designed according to the needs of a supply chain defined by non-local consumers. Supporting this implication, Riofrancos (2023) finds that EV makers position themselves as climate saviors while avoiding the costs of ensuring sustainable supply chains.

Köppel and Scoville-Simonds (2024) illustrate how this impacts common narrative framings of ETM. They identify two ideas seemingly in conflict: "To solve climate change, humanity must electrify energy, and lithium-ion batteries are a key technology to facilitate this;" and "Materials like lithium need to be mined in particular places, which threatens local communities and their environments" (1). This, Köppel and Scoville-Simonds observe, is an ethical double bind: by prioritizing one, the other suffers. However, they ask, do "we" all face this dilemma? Does the "whole world" really need lithium? This tension is the effect of extending the scale of lithium production to communities who are not at the site of extraction. The authors explore this tension through vignettes of supporters of mining lithium in Bolivia, one capitalist in the U.S. and three mining supporters near the salt flats in Bolivia. They conclude only that public discourse ought to pay more attention to the "we," i.e. who is experiencing the tension across scales.

The global climate scale seems to have taken over the definition of sustainability, as Archer and Calvão (2024) report that mining industry actors conflate decarbonization with sustainability, i.e. framing anything that reduces emissions as sustainable. The authors explain the success of the mining industry's campaign to become a climate savior as such: "Underlying the success of this claim is a discourse of sustainability that, on the one hand, equates sustainability with decarbonisation and, on the other hand, insists that the rapid expansion of renewable energy generation and storage infrastructures is the only viable way to decarbonise" (1).

Lilford and Allen (2023) provide an important complication to the summary above that suggested that opponents to ETM projects prefer to frame arguments on smaller scales. Pacific Island communities that oppose deep-sea mining have appealed to the oceanic scale to assert that the impacts of DSM would likely spread and interrupt lives that depend on distant parts of the ocean. In this framing, the ocean is conceived as a diverse but connected place that affects the small scales of coastlines and local fisheries. In response, industry has sought to present evidence that impacts would remain on a small scale.

Many sources identify that companies and proponents of mines place greater weight on two justifications for mining that operate at larger scales: the requirements of the energy transition and modernist development, such as technological innovation and increased resource efficiency. At the same time, the social and environmental harms at local levels are downplayed.

This is evident in Kelley (2023), Baca (2024), and Dorn and Dietz (2024), as well as the works I describe below.

- *Ritz et al. (2024) reports that mining firms and proponents relied on expert reports to demonstrate that the potential environmental and social harms of the project were under control and that the mine was necessary to solve the climate crisis.*

- *Walter et al. (2024) take 25 cases of ETM conflict in the Americas from the EJAtlas to understand the hegemonic discourses mobilized by governments, firms, and development institutions. The discourse they find associates "the pursuit of critical material extraction projects with positive and urgent local, national (development, green transition, security), and global (climate and human salvation, mitigation, sustainability) goals" (18). Meanwhile, resistance to these projects aims to reframe this scalar framing to include local scales. On local scales, resistance was better able to pull out multiple dimensions of impacts, including environmental, social, cultural, human rights, and spiritual dimensions*
  .
- *Wilkinson (2023) asks local stakeholders in proposed lithium projects in Canada how they perceive the clean energy positioning of firms and governments who wish to produce lithium. To respondents, lithium's role in clean energy did not factor into their views of projects.*

- *Buu-Sao et al. (2024) compares the experiences of communities in France and Spain contending with extractive projects, arguing that in both places, large scales of meaning are a tool to perpetuate previous frameworks of accountability and acceptability. Yet the narratives play out differently in each locale. They write, "In the French case, the climate argument is secondary to supporting the national strategy for securing supplies... By comparison, in Andalusia, the climate argument appears as a reformulation of the justification for an economic solution for a stricken region, aimed at promoting reindustrialization through the revival of mining" (39).*

Lyytimäki (2023) is critical of the "win-win" storylines identified in ETM mining in Finland as well as two other sustainability initiatives reviewed in comparison. The article concludes: "Such sustainability storylines are inevitably normative—or even manipulative—as they aim to advance certain viewpoints and redirect societal attention and action" (177) from alternatives toward new technologies.

Within scales, even the most local scale, conflicts and actors' political affiliations can be inconsistent. Actors in debates around ETM projects did not always fall into the conventional categories that bird's-eye-view analyses fell into. For instance, Malone et al. (2023) finds in reviewing two polarized ETM project debates, one in Idaho and another in Minnesota, that environmentalists are cast as outsiders. The most local level is claimed by proponents of mining who seek jobs. Stepanović (2024) found that conservative patriots opposed a lithium project in Serbia on the grounds of preserving the country's natural and cultural heritage, even as they would conventionally follow the country's pro-mining conservative government.

The global climate scale seems to have taken over the definition of sustainability...

Sacrifice

The theme of sacrifice emerged often in literature, as scholars have criticized how the pursuit of transition materials tends to value the benefits in one area while ignoring or diminishing another. The theme of sacrifice fits under the general "scales" theme, because the "sacrifice" that scholars identify places the impacts of mining in relation to issues on other scales. The harms of a mining project have been seen as necessary when compared to imagined benefits.

Stepanović (2024) found that protesters in Serbia against a lithium mine criticized the balance between the need for lithium and the potential poisoning of arable lands where many people lived. Protesters on social media in the article's analysis used the term sacrifice as a criticism of this policy.

In Portugal, van Meer and Zografos (2024) find that national and EU officials wield a discourse of "responsibility" to persuade populations to accept the sacrifice for the good of the planet and for vulnerable populations who would otherwise need to mine lithium. (DRC miners are cast as vulnerable populations, despite the irrelevance to lithium.) As they write, "While this argument is advanced by invoking 'responsibility', it simultaneously facilitates the operation of the second understanding of sacrifice, in which Barroso's land and underground resources are consumed to re-establish or maintain connections to economic growth threatened in the midst of climate chaos" (1324). In this sense, they find this discourse is used to maintain continuity with growth and capitalist paradigms. Sacrifice, then, is not a new term, but rather a persistent disbalancing of scales that provide support for extraction.

Most authors seem to offer the sacrifice rhetoric as a 'final blow' criticism without interrogating it further. There is little indication in the corpus that authors question whether ETM discourse, climate action or mining in general must necessarily entail sacrifice. For instance, the term "sacrifice" may negate the agency of mining-affected communities to determine the outcomes of mining. Discourse that engages with sacrifice may also inadvertently justify the use of large scales to determine the development of a mine. An additional level of analysis could suggest that framing any zones as sacrificial imposes scales on places and people that are outside their control, even if the criticism is leveled in the name of justice. For instance, Kingsbury (2022) finds institutional discourse orients lithium by "commonsensical acceptance by those in the North that sacrifices will have to be made—by other people" (600). Kingsbury's article, however, doesn't simultaneously critically analyze climate policy as the side of the sacrifice that is meant to benefit.

Barandiarán (2019) and Voskoboynik and Andreucci (2021) identify in the Lithium Triangle that the acceptance of sacrifice can be enabled by claims that devalue the place where mining is to happen. The Lithium Triangle is thus cast as a barren landscape where life for humans is already difficult. Lidström et al. (2024) and Larsen (2024) assert the same claim regarding deep-sea mining: in promotional videos, the seabed is generated with computer graphics as lifeless. In Australia, Hine et al. (2023) witness in government discourse "a disturbing echo of frontier mentalities and colonial 'terra nullius' (and 'sub terra nullius') rhetoric—positioning surface terrain and subsurface volumes not as First Nations Country, but as unknown, 'empty' space to be (re)discovered for its critical minerals potential" (243).

Futures

AS LARSEN (2024) WRITES, "Narratives of extraction are, in essence, speculations about imagined futures" (315). There are a number of reasons for this, one being financial: to acquire the funds to develop mine, creditors must agree on a future return. In the context of this literature review, another reason may be that climate impacts will worsen unless emissions are reduced, and mined materials may play a role in that.

Pusceddu's (2024) discussion of the future is framed in terms of the 'politics of anticipation,' which is a helpful starting point for this section. For Pusceddu, the construction of a future in which lithium is valuable and important to survival is necessary for the policymaking and financing of lithium projects. The "lithium revival" is speculative, Pusceddu writes (391). By articulating an unwritten future in the public domain, lithium industry actors, including officials, are actively creating the legitimacy needed for growth in large-scale mining.

Araújo et al. (2022) writes that protesters in Portugal attempt to appropriate space in the future by deploying the phrase "mined future," which expresses their lack of confidence in mining to deliver a prosperous future and in policymakers to anticipate negative impacts. The protests the authors describe claim that the future ought not to be in the hands of mining projects, and they offer as alternatives only broad-scale rejections of mining projects.

Pusceddu reports that in Europe as a whole, "the mining-energy transition nexus is unfolding in the European mining revival" (392). Carpanese et al. (2024), in studying lithium in Bolivia, find that lithium is instilled with a similar future orientation. The context in Bolivia is important, as small-scale mining has taken many lives and poisoned landscapes since the 1500s, and as such the industry of mining rests in Bolivians' minds as destructive. The government, in an effort to exploit the country's lithium reserves, crafted a program to distinguish the lithium industry from past mining. To do so, it emphasized how different mining lithium from the salt flats was with conventional hardrock mining: mining by evaporation was presented as a cleaner extraction process.

For Carrasco et al. (2023), the urgency they find from 30 interviews with lithium industry participants, academics, critics, and officials in Chile is an urgency tied to a fast-paced business, not climate. They find that the climate urgency of lithium is more accurately conceived as a market urgency that lithium producers face in a fast-moving market. There are three ideas about the future that can be found in their lithium discourse: (1) that it will be key in the economic transformation and its market value will rise; (2) that current upward trends in the lithium market will not last forever; (3) that Chile's lithium contribution is under threat as other countries increase their own production of the metal. These narratives, however, don't prescribe a specific action; instead, they find that even within these narratives, actors may come to different conclusions about the right courses of action, e.g. regarding the level of state involvement.

Larsen (2024) evaluates the discourses of deep-sea mining advocates at a conference in Norway, discovering that with computer-generated visual simulations of mining equipment and the deep sea, the industry makes the imagined but untested autonomous extractive process real. Deep-sea mining, Larsen writes, becomes not a mining phenomenon but a deliverer of future prosperity based on renewable energy.

:CONTINUITY

Mining firms have posited ETM mining as a new phase in extraction, one marked by cleaner technologies and greater respect for rights. Below are examples of this narrative and the actors pushing it, followed by summarized critiques of the narrative.

- *Westpfahl (2024), for instance, finds that Mexican mining companies portray their acceptance of the necessity to reduce emissions and their own contributions toward that end as economic growth opportunities.*

- *Officials in Canada have followed a similar path, writes Gilchrist-Blackwood (2020,) in an analysis of government press releases between 2004 and 2019. There, agencies attempt to position themselves as moral leaders on a new wave of mining that they claim will benefit all of humanity. Mining's contribution to low-carbon technology first entered government publications in 2016.*

- *Baca (2024) shows that South Korean mining firms in Argentina follow a lineage of corporations that portray the climate crisis as the outcome of outdated technology and a lack of innovation. The firms design this narrative to cast their lithium as state-of-the-art innovation that has solved the emissions problem.*

- *Flåt (2021) found through interviews with members of the Bolivian lithium sector that there was a pervasive stated goal to break with colonial patterns and decolonize extraction by distributing wider benefits, building out value-added industries, and centering Indigenous Bolivian knowledge, such as Vivir Bien, or living well within environmental constraints.*

- *Olarte-Sánchez et al. (2022) write: "In Peru, high official environmental standards and environmentally strict corporate practices are contrasted with unsustainable 'old' and informal mining. For Mexico, the current government denounces the 'past' extractivist offensive pledging to prioritize collective benefits while companies refer to economic prosperity with a commitment to human rights in green terms which is yet to be seen" (100).*

YET SCHOLARS HAVE FREQUENTLY argued that ETM mining relies on structures, policies, and technologies that are similar or the same as those before climate action was a part of the conversation. Westpfahl (2020) concludes that Mexican firms rely on already entrenched tactics to justify large-scale mining. Authors have variously referred to this by naming ETM as "green extractivism," "green colonialism," or "greenwashing," i.e. the same harms just in a different color. Olarte-Sanchez et al. (2022) report that the private sector has made efforts to "green" the mining industry since the 1990s.

Dunlap et al. (2024) summarizes the tenets of green extractivist discourse as "the use of socioecological and climate crises to reinforce existing or generate new markets and profit-generation opportunities; and the mobilization of claims of ecological sustainability and 'carbon neutrality' to legitimize and rationalize extraction" (1). In this definition, the mine's products claim to aid a certain kind of decarbonization, and the mine itself must also make claims to environmental friendliness. Recognizing the foundations of low-carbon energy in extraction is the first step toward creating systems based on legitimate sustainability and renewability, the authors conclude.

Olarte-Sanchez et al (2022) and Krishnan and Butt (2022) both connect the aforementioned continuity at mine sites with continuity on the consumption side of the supply chain. This is significant, as the climate imperative is envisioned as a change in consumers' purchases, i.e. the claim that the ETM are necessary comes from consumption of fossil fuels by consumers of cars and electricity. By engaging with the aspects of consumption that continue despite the claims that the nature of consumption is changing, these authors help highlight another direction from which narratives are crafting ETM discourse.

- *Olarte-Sanchez et al (2022) explore in Mexico, Peru, and Chile the effects of "the imperial mode of living," a framework derived from German sociologists writing in 2021 about high-consuming lifestyles' dependence on cheap labor and flagrant pollution elsewhere. By applying it to the ETM discourse, Olarte-Sanchez et al question the assumption that electric vehicles and renewable energy indicate any shift from the practices that created the climate crisis in the first place.*

- *Krishnan and Butt (2022) introduce the concept of "points of continuity" which connect the gasoline vehicle user experience and the electric vehicle experience. The points of continuity—such as vehicle size, refuel time, and vehicle speed—are created by capitalist incentives in place since the creation of the gasoline car. With attention to mining, they write, "The growth of the EV industry, facilitated by points of continuity, stands to perpetuate the environmental violence of green capitalism" (8).*

Dunlap and Marin (2022) address one specific, popular argument of mining firms and their supporters: that ETM break with the past because the needs of ETM are far less than the current use of coal. This is misleading, the authors write, as it presents a false dichotomy that assumes an instantaneous transition from one to the other, rather than the reality of energy and extractive "addition." It also negates the wastes that are produced to create the final transition mineral products.

[1] *Examples in the corpus include Voskoboynik & Andreucci (2021), Tiefenbach (2023), Dorn et al. (2022), Dunlap et al. (2024), Dunlap & Marin (2022), Kügerl et al. (2023), da Silva Hyldmo et al. (2024), Gilchrist-Blackwood (2020), Quevedo (2023), Flåt (2021), Olarte-Sanchez et al. (2022).*

Development

ECONOMIC DEVELOPMENT has been touted as a benefit of mining at local, regional, and national scales, and may also fit under the umbrella theme of Scales. Development has long been at the center of justifications for extraction. Mining firms, policymakers, and investors tout the potential for mining to employ locals, contribute taxes, and in general bring wealth to regions cast as needing market development (Akong 2020, Ritz et al. 2024). In some recent cases, ETM proponents and opponents have not made reference to their contributions to climate, but rather to economic development (Purwins 2021, Dragan et al. 2024). This indicates the persistent importance of local narratives about development, despite ETM discourse entailing strong engagement with planetary scale of meaning.

Barandiarán (2019), in a widely cited article, provides a helpful introduction to this topic. She argues that the mining industry's effort to distinguish past practices from current practices indicates a crisis of confidence in the popular development narrative around mining. She writes in reference to the Lithium Triangle: "Unlike past rounds of mining, leaders are feeling a need to articulate a more ambitious development agenda around lithium. This is evidence of a growing crisis of confidence in development that responds to a historical moment marked by frustration with mining" (390). Essentially, mining firms are in need of a new narrative to support their operations. So stakeholders, including activists and industry players, are using lithium to force a debate about the contribution of mining to development.

These stakeholders use the tool of an "imaginary" (see Summary) that hinges on the material lithium. However, Barandiarán writes, "This imaginary projects a binary between raw and industrial materials and deterministically assumes that science and technology will transform the former into the latter" (384). She goes on to discuss how lithium has come to embody a rhetorical strategy to grant authority to experts who are assumed to have the interests of universal prosperity in mind. Her critique of the mining industry in the Lithium Triangle pertains to its continued efforts to shield its practices with a paradigm of progress. ETM differ not in their connection to the imperative of reducing emissions, but rather in their historical emergence amid rising awareness of the harms of mining. Wijaya and Sinclair (2024) find a similar story in Indonesia, in that EVs offer a narrative that solves declining legitimacy.

Scholars, especially from Europe, have critiqued policy discourse as a tool to buttress the instability of "green growth" that can "achieve a just transition," "do no harm," and "leave no one behind." Da Silva Hyldmo et al. (2024) scrutinized 195 policy documents, concluding that they silence the tension between extractivism and the 'just transition' promoted by the European Green Deal. Lyytmäki (2022) similarly found that sustainability storylines "replicate the untenable ideal of indefinite growth in limited space" (177).

Pasts

SCHOLARS HAVE FOUND that the past can figure prominently in the debates regarding particular mining projects. In particular, positive or negative memories about a particular practice can influence how people may support or oppose mining projects. This overlaps with the development theme, as mining and economic development have often been connected in the past.

History weighs heavily on communities when considering response to mining projects. Buu-Sao (2024) shows how mining firms can nudge perceptions of history toward more positive directions. At the same time, people who have personal or family histories can encourage positive histories. This "from below" perspective, Buu-Sao writes, does not often consider the sustainability of a mine (both in terms of longevity and environmental aspects), but rather the prospects of jobs, even if employment precariousness had resulted from the prior decline of the mining industry. Buu-Sao theorizes that a community's range of conflicting views are like the raw ores, and hopes and aspirations are the materials to be extracted by the project's proponents.

Mirroring Buu-Sao in the US, Kojola (2020) observes that opposite sides of a proposed project in Minnesota's Iron Range rely on history to ground their positions. Proponents, such as working class residents and mining corporations, see the region as an already industrial landscape forged by mining and look to new mines to renew a prosperous past. Meanwhile, environmental groups oppose mining based on visions of clean outdoor recreation that facilitated family vacations. For Kojola, this indicates that both reactionary and progressive movements can make use of environmental imaginaries.

Lilford and Allen (2023) write about Pacific Island civil society groups that leverage the past to directly counter a deep-sea mining (DSM) firm's future-oriented normative claims about saving the climate. The past these opponents refer to is the successful campaigns against marine pollution, destructive fishing, and nuclear testing, which were led by activists in Pacific Island states. DSM in this framing is another in a long line of destructive practices that provoke their opposition.

Pescuddu (2024) investigates a lithium project in Portugal where one might have found a similar dynamic, but Pescuddu finds that positive memories of a mining industry arise as a result of centralized decision-making that marginalizes rural communities. Pescuddu suggests that the country does not have strong enough mechanisms to obtain community consent for projects, so decision-making is brought into urban centers and interpreted solely through technical lenses. In this analysis, divergent memories of mining originate in uneven distribution of decision-making power for proposed projects.

Sanchez-Lopez (2019) writes that Bolivia's Uyuni Salt Flat used to be a "worthless landscape" and is now the "world's largest deposit of lithium." She interrogates how communities viewed the salt flat before this transformation to become a magnet of global attention. Communities living nearby have long extracted fertilizer from the flat through cooperatives and with broadly distributed benefits. The introduction of lithium as a target of extraction is wholly different and entails the involvement of the state and higher levels of investment. Sanchez-Lopez argues that this difference is important and shapes how communities react to the arrival of well-funded, state-supported, foreign companies.

:PUBLIC PERCEPTIONS

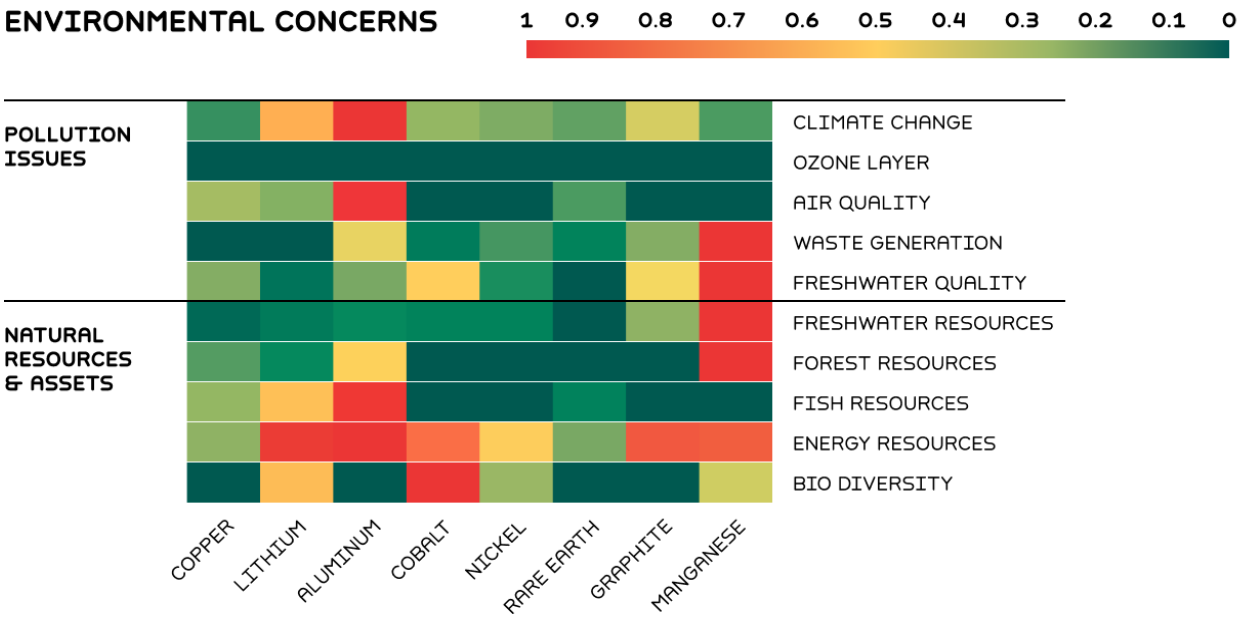
This section begins the deductive section, guided by the findings of various media and public perceptions analyses to deduce the topics that are of interest to various public actors. This section includes studies that aim to identify public perceptions from corpuses of media to identify what people care about related to ETM mining, combined with themes emerging from Harmony Labs' work, namely water, air, forests, and Indigenous rights.

News Media

THIS FIRST SECTION on media focuses on how the news media attends to ETM. Analyses of news media broadly found that specific materials and discursive themes are often correlated with one another. For instance, cobalt and child labor were most often found together in news articles.

Agusdinata and Liu (2023) reviewed anglophone news media coverage of eight ETM between 2015 and 2021 (nickel, lithium, cobalt, graphite, manganese, rare earths (conceived as one), copper, and aluminum). Below are two helpful charts that describe their results regarding negative impacts (benefits were not coded), which are discussed below. Their definitions for social and environmental impacts follow UN and OECD definitions that guide life cycle assessments. Media coverage was quantified by totaling the number of stories on a topic, as well as by calculating an intensity using Mediacloud.org-generated keywords per story.

They found the topics that received the most coverage were related to Indigenous rights, community access to material and immaterial resources, social benefits, and conflicts. Copper, aluminum, cobalt, and manganese received high coverage on social impacts, while cobalt and graphite received the most intensive attention.



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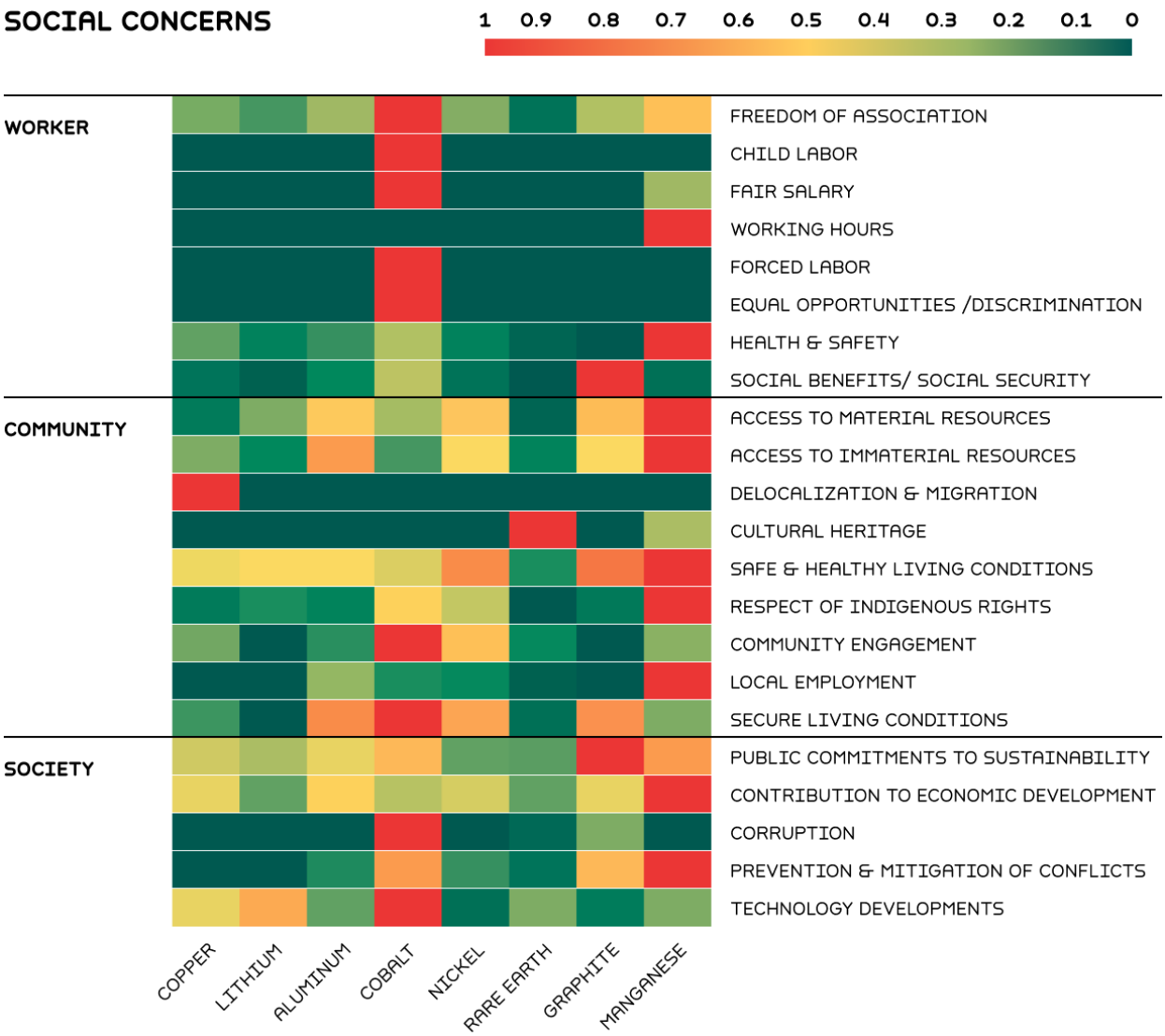

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DANIELLE MORRIS

BELOW ARE SOME OF THE AUTHORS' CONCLUSIONS, WHICH CAN ALSO BE SEEN IN THE CHARTS ABOVE.

Environmental Concerns

- *Aluminum coverage concerned fish reserves, since aluminum production relies on intense hydropower, which affects fish. Because of its high energy demands, its coverage also connected strongly with climate change topics.*
- *Copper and rare earths have the lowest coverage, but the former's coverage focused much more on air and freshwater quality, and the latter focused more on waste generation.*
- *Manganese, cobalt, and nickel received high coverage for impacts to marine life, through waste generation and deep-sea mining.*
- *Coverage about lithium mentions its threats to biodiversity, as flamingos in the salt flats are commonly cited.*

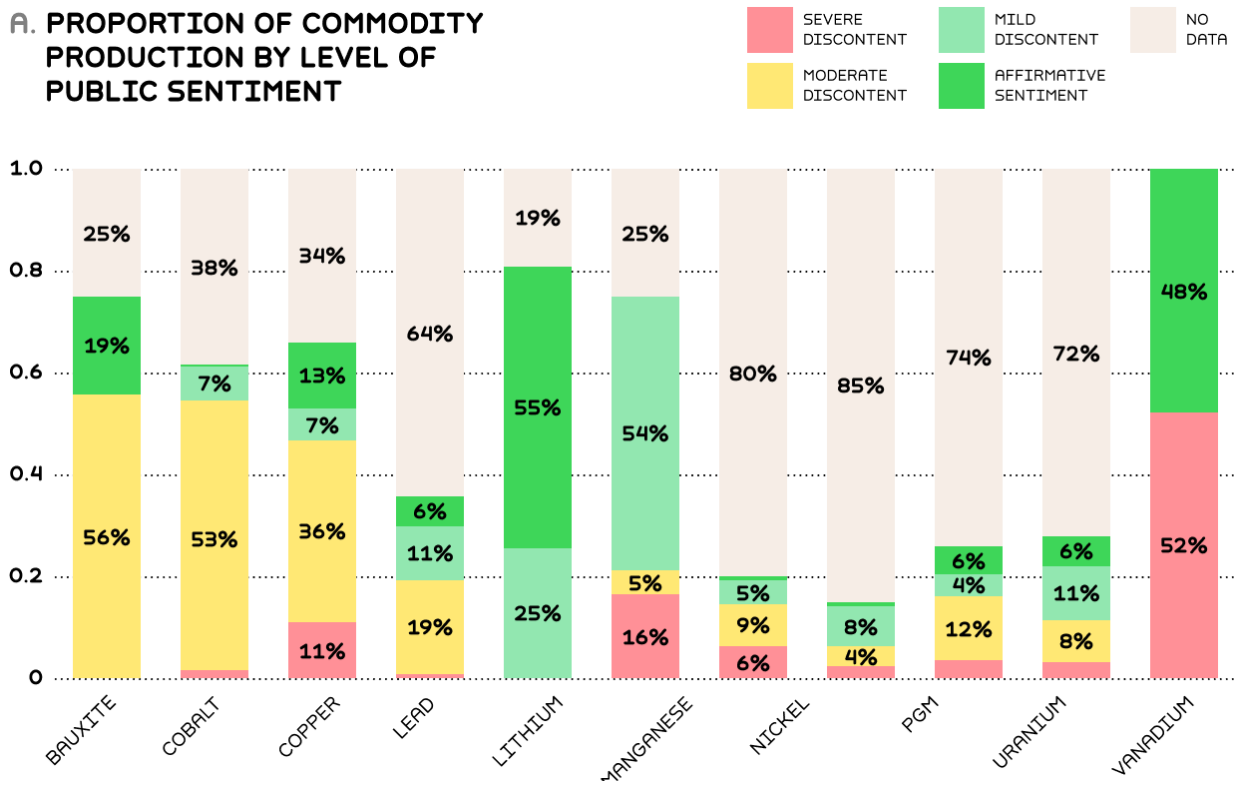
Social Concerns

- *Graphite and cobalt received the most coverage regarding supply chain security.*
- *Some topics were broadly distributed across the ETM, such as safe and healthy living conditions.*
- *Topics related to labor were more narrowly distributed: Forced and child labor were commonly identified with cobalt, and working hours concerns with manganese.*
- *The topic delocalization and migration was dominated by coverage of copper mining.*
- *Rare earth mining was most linked with concerns about losing cultural heritage.*

SOME OF THESE FINDINGS REQUIRE CONTEXT. For instance, rare earth mining in the authors' estimation, has only intensified recently. This may contribute to their finding that rare earth mining is associated with concerns about cultural heritage. Early on in project development, residents and activists may not know how to articulate their opposition, and there may be a paucity of data that could justify other claims. Also, lithium's high correlation with energy resources is not explained in the paper. One explanation may be that lithium is often associated directly and implicitly with electrification technologies and its production often mentions low-carbon solar power directly from the sun. The metric of media intensity may not necessarily indicate negative impacts regarding the respective topic.

Lin et al. (2025) and Agusdinata and Liu (2023) both trawl news media to identify concerns about social impacts, but the former are interested in creating metrics for mining firms to gain community support, while the latter are interested in improving governance. Lin et al. investigates news media to explore public sentiments regarding water issues related to 12 ETM and 511 mines. Using the Global Database of Events, Language, and Tone (GDELT), they are more attentive to the type of sentiments inferred from news text analysis and include data from the database's more than 100 live-translated languages. In the chart below, they show how the range of coverage for particular materials is distributed from "severe discontent" to "affirmative sentiment," defined as the difference between negatively and positively charged words per story. The study aggregates all stories regarding water and the production of a particular mineral. (Note: bauxite is the ore used to produce aluminum, and PGM is platinum group metals.)

A. PROPORTION OF COMMODITY PRODUCTION BY LEVEL OF PUBLIC SENTIMENT



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FROM THE CHART ABOVE, the authors conclude that 52% of the production of vanadium is associated with severe discontent, and the rest by affirmative sentiment. Cobalt and platinum are associated with the most negative sentiment, particularly concerning water quality and pollution. Manganese is linked to concerns over drought and desertification. The authors also quantify sentiments according to the phase of individual projects, finding that for cobalt, lithium, manganese, molybdenum, and nickel, there is more negative attention regarding water issues on projects under development than operational ones, leading them to conclude that this reflects rising awareness of the impacts of mining.

Roche et al. (2023) conducted a similar review of anglophone articles from 2000 through 2020 regarding specific incidents at extraction sites of 15 ETM. They focused on social impacts. Coverage of these incidents focused overwhelmingly on the impacts to local communities, followed by workers. Their concerns were reported as: access to material resources, safe and healthy living conditions, community engagement, respect of Indigenous rights, delocalization and migration, secure living conditions, and cultural heritage. Social impacts related to copper mining were the most widely reported.

Methodologies like the above that rely on translating qualitative research into quantitative results assume that articles and actors are solely in favor or against mining. This can obscure the gray areas and evidence that constructive conversations are happening between groups. Beaton (2021) consults news media to understand the controversies over Minnesota ETM mines, but remains critical of news media as a source to learn about conflict. He concludes that coverage reduces the debates to two sides, when there are, in fact, many. In addition, this makes it difficult to see the alternatives proposed by stakeholders, including public ownership of mines (see Alternatives).

Several other scholars focus their analysis of media to smaller scales. On these scales, authors generally find evidence to support the previously discussed theme of Development.

- *Lyytimäki et al. (2021) found in an assessment of mining representations in Finnish, German, and Spanish newspapers between 2018 and 2020 that debates were centered around mining revival, mining events and social interaction, history of mining, and damages related to mining. The authors recognized the increasing demand on minerals for transitions, but that concern was not reflected in their results.*

- *Diamante et al. (2021) finds that news media regarding mining in the Philippines relied on economic discourses to generate perceptions of mining, and environmental topics like biodiversity did not factor highly.*

- *Brooks et al. (2024) analyzed news media surrounding the Rosemont copper mine. Based on divergent ideas about the relationship between humans and their environment, polarization was prominent and irreconcilable. Opponents build a pro-environmentalist network to publicize the issues relative to the mining project and the importance of defending southwestern habitats and landscape. Mining proponents similarly rely on business communities to underscore the importance of hardrock mining for things like decarbonized energy and modern living.*

Protest Media

STEPANOVIĆ (2024) ANALYZED social media hashtags during protests in Serbia against plans for lithium, which successfully pushed the government to rescind permits (at least for the time being). While much literature describes polarized reactions to ETM projects, Stepanović found that ecological issues escaped the traditional right vs. left dichotomy. Stepanović offers instead that a better model to explain positions on the mine is attention to local and global scales and "ecology activism," which mixes patriotism, anti-government sentiments, and local land management and protection. Water emerged as the central environmental concern (alongside corruption more generally), particularly pertaining to aquifer depletion, downstream wastewater, and poisoning soils of nearby farming communities.

Palma and Alcaíno (2020) spotlight a case study in Chile in which a copper mining firm and state officials control discourse on the level of national and regional newspapers, and a local community builds a radio news service to present counter claims. The authors demonstrate how the radio became an outlet to overcome fear about worsening air pollution, especially during and after two dramatic disasters in 2007 and 2018.

Pro-Mining Media

LÖFGREN (2023) BRINGS A CRITICAL LENS to a marketing campaign in Sweden that promoted mining as crucial to climate change mitigation and human progress. Witnessing large billboards that link materials like aluminum, copper, and nickel to images of family households, parties, and innovation, the author finds: "the campaign aestheticises 'green' industrial progress by tokenising multiculturalism, fetishising consumption, and romancing national identity" (194). The article considers it to be propaganda, as it is designed to engineer consent for an energy transition it casts as green.

Deberdt (2024) analyzed LinkedIn posts offering services to obtain responsibly sourced cobalt to understand their efforts to carve a space into the market. Through written narrative, photographic practices, and knowledge production, these small companies rely on white supremacist, racist, and (post)colonial conceptions of African miners. "Through invisibilization, fetishization, saviorism, and business development [loyalty prioritizing corporate actors], these LinkedIn tales negate miners' agencies," (1) making solutions more difficult to achieve.

Hyatt (2024) examines Chinese state media to find that it emphasizes China's leadership in rare earth elements, lithium, and cobalt, alongside the nation's strategic narrative. Concerns represented in the media and thus assumed to be driving policy include not only national security, but also environmental regulation, industry development, and supply chain stability. Chinese state media critiques the West's politicization of strategic mineral issues.

Public Surveys

SURVEYS HAVE GENERALLY REPORTED low public understanding of mining and ETM and confirmed a general interest in addressing the environmental impacts of mining. Most authors who conducted surveys took as their starting point that ETM are necessary for an energy transition (Ribeiro et al. 2021, Fikru & Koppera 2024, Uji et al. 2023). Interestingly, public surveys have found that respondents do not rank climate policies as the primary reasons for supporting ETM projects, but rather security and material availability. Additionally, no surveys asked about the social impacts of mining, and environmental impacts were largely left undefined.

The adverse mining impacts were well recognized, but the importance of addressing them was not a high priority.

Fikru and Koppera (2024) conducted a survey across 1,200 respondents in the U.S. to learn about public perceptions of critical minerals, which they define only in relation to the energy transition. Their aims were to understand how ETM policies could be more widely accepted, and these policies included addressing environmental impacts, international cooperation, and educating the public. Even though only 38% of respondents stated familiarity with the term 'critical minerals,' over 80% recognized the importance of minerals in the energy transition. Most of those who recognized this importance also supported mineral policies, and additional concerns about shortages overlapped with support for domestic mining. All told, though, domestic mining received less support compared to improved minerals research and addressing environmental impacts. Respondents on average rated "environmental harm" the least important qualification for a critical minerals determination," and those who did support it opposed domestic mining and supported recycling.

Uji et al. (2023) assessed public perceptions among residents surrounding the Thacker Pass mine in Nevada. They found that unlike a framing around climate, national security framing increases public support. As the only survey study included in the corpus that assessed populations near the mine in question, it found that potential economic benefits increased support only among those who live close to the mine.

Liu et al. (2022) surveyed EV owners for their understanding of the impacts of "EV mineral" extraction. The authors claim that respondents reported a few contradictory opinions, which they call "cognitive dissonance." The adverse mining impacts were well recognized, but the importance of addressing them was not a high priority. Respondents generally said they did not prefer to address harms through their purchases,

but they supported more consumer pressures on producers for supply chain sustainability. Policy interventions were anticipated, but their potential negative effects on EV adoptions were of major concern. Consumers believed something ought to be done, but without jeopardizing EV adoption.

Two sources in the corpus provide context for an important part of ETM mining: the exploration phase, when residents are introduced to the idea of mining locally. Ribeiro et al. (2021) take as their starting point that lithium is critical to energy transitions and investigate what people near a proposed lithium project understand about the nature of mining. They find through surveys that residents could not identify the stages of mining or the nature of prospecting near their homes. Social media was the main channel where respondents learned about mining projects near their homes, and firms had no communications or outreach strategy to engage the local population. Respondents reported that information provided by experts and the prospecting firm did not improve the transparency of the project. Social media ranked slightly better, but the authors criticize social media as lacking technical knowledge and conclude that respondents did not have solid enough information to come to informed conclusions about the project. The authors editorialize that the community's lack of understanding about the project fueled its opposition, suggesting that improved knowledge would lead to support for the project.

Bleicher et al. (2022) interrogates how communication strategies from the mining industry assume qualities of the public. The authors interviewed engineers designing technologies to improve prospecting and asked how their perceptions of public understandings shaped how they created and marketed technologies. Increasingly, exploration technologies use remote satellites, instead of the more traditional on-the-ground methods that simultaneously introduce the idea of mining to local residents. Broadly, they find that the designs of these technologies and their communication strategies rely on particular conceptualizations of the public.

Bleicher et al. (2022) find that engineers conceived of the public in terms of variable and stable characteristics. Stable characteristics, such as a public that wants better products and thus creates demand for mining, influenced the designs of technology. This includes prioritizing technologies that minimize visible and audible irritation, as the public is also conceived to want to avoid the invasiveness that mining may cause. Variable characteristics included a weak familiarity with mining that casts the public as "blank-slate" participants who are in need of knowledge. The assumption entails the expectation that the lack of knowledge leads to opposition, and that only expert "truths" can fill in the gap. This births communication strategies that use experts to demonstrate technologies and explain how they work. Within the terms of this report, it's important to note that the identification of the public's characteristics doesn't necessarily come before the designs of technologies. Rather, these expectations of the public may derive retroactively from separate motives to pursue mining.

:INDIGENOUS RIGHTS

As seen above, Indigenous rights figure prominently in the ETM discourse and have risen in prominence along with ETM. The mining industry is not unique as an industry that does not respect the right to free, prior, and informed consent (FPIC) of Indigenous groups, as few regulatory systems in the world currently uphold this principle established by the UN Declaration of the Rights of Indigenous Peoples in 2007 and the ones that do continue to have Indigenous resistance to mining projects.[2] The mining industry, however, does have a unique relationship with the principle of FPIC, as mining alters landscapes and downstream areas indefinitely, geologically, chemically, and biologically.

[2] The U.N. Declaration on the Rights of Indigenous Peoples (only USA, Canada, Australia, New Zealand voted against) and ILO Convention 169 (ratified by only 24 states) both articulate that Indigenous Peoples have the right to free, prior, and informed consent. Countries like the Philippines which ensbrines this right in its constitution continue to have problems enforcing it (see Amnesty International). Activists like SIRGE and industry bodies like ICMM recognize that no state protects FPIC to the level of UNDRIP.

LI AND PEÑAFIEL (2019), in telling the stories of Indigenous women in Peru opposing mining, provide helpful context that people who pursue Indigenous rights may also decenter humans as the only actors opposing mining. In the cases reviewed in Peru's Northern Highlands, the conflicts around mineral extraction are about protecting local worlds in which communities don't view humans as the primary actors in an ecosystem and solutions in better management of impacts. As such, the women described their opposition in terms of their relationship with the land in question, rather than engaging in normative arguments about the operations and purposes of a mine. For instance, the mountain proposed to become a mine is framed as sacred and central to a "cosmovision" that volarizes the mountain for providing shade, natural medicines, and wild animals. Indigenous rights in this context may also include rights to land, FPIC, and protections from pollution.

Although the chapter by Li and Peñafiel does not connect their struggles to the pursuit of ETM, it is nevertheless insightful for understanding the discourses that some Indigenous opponents levy against ETM projects. For instance, this theme is reflected in Paliewicz (2022b), in which a Native American group in opposition to a mine framed explicitly in terms of ETM structures counter appeals to the value of place to local culture.

Lawrence and Moritz (2019) interview members of the mining sector in Sweden to explore how mining firms shape discourses of Indigenous rights, and FPIC in particular. They find that the industry applies contradictory discourses. On the one hand, Sweden's regulatory system has strong human rights protections. On the other hand, firms claim that implementing FPIC would threaten the entire industry.

The authors identify three rhetorical strategies that mining firms employ to avoid FPIC:

1. States and mining firms often use minimalist (we are already doing enough) and maximalist (FPIC would undermine all society) interpretation to maintain the status quo. The authors believe there is opportunity to explore flexible implementations of FPIC (described in Alternatives).

2. Mining firms argue that FPIC is not applicable in Sweden, because colonization never took place in Sweden in the same way it did in Australia or Canada. This functions to invisibilize the injustices taking place against Sámi people, who are the only recognized Indigenous group in Europe, and whom mining firms have claimed are not "different enough" to deserve special protection. De Leeuw and Vogl (2024) mirror this finding.

3. Mining firms erect a barrier between the technical focus of the firm and the "political" issues of land rights.

There are elements of this story in Sweden which are unique (e.g. claims that colonization did not happen in Sámi lands), but many elements have been found elsewhere, as well. For instance, Matanzima (2024) documents resettlement practices in Zimbabwe driven by the urgency of ETM mining that undermined the lengthy process of FPIC. Angervil (2024) describes in one of five subplots of resistance (see plots in appendix) that Alaska Native groups referred to international standards to claim that they have the right to decide whether the mine could go forward. (US law is already supposed to treat Native groups as sovereign nations with that right.) In the deep-sea, Lilford and Allen (2023) report that Pacific Island states have had trouble persuading UN-sponsored regulators that seabed mining requires their FPIC, as impacts are likely to spread long distances.

Indigenous rights are sometimes conspicuously absent from discourse. Malone et al. (2023) witnesses that Indigenous groups are not considered stakeholders in two projects reviewed in Idaho and Minnesota, an unfortunate parallel to the article's dismissive treatment of the colonial dimensions of the two U.S. ETM projects assessed. Diamante et al. (2021) find that the media failed to capture other researchers' observations that Indigenous rights were employed in strategies to contest mining projects.

Authors have found that Indigenous groups mounting opposition to ETM projects do not only focus on the pursuit of FPIC. Kelley (2023) finds that activists against a lithium mine in Nevada construct a narrative that mining is part of much longer history of genocide against Indigenous people that began with the country's foundational mining law in 1872. Since then, the law has provided government backing for emptying Native lands and systematically directing resources away from protecting the rights of Indigenous people, leading to the problems raised by the Missing and Murdered Indigenous Women movement. Paliewicz (2022b) records similarly that resistance to a copper project in Arizona that continued mining is continued colonization of Indigenous lands. ETM mining in this framing is a continuation of the same systems that devalue Indigenous lives and withhold Indigenous rights.

ETM mining in this framing is a continuation of the same systems that devalue Indigenous lives and withhold Indigenous rights.

:WATER, AIR, BIODIVERSITY

The themes of water, air, and biodiversity often appear together as overlapping themes that illustrate a mining project's effects on human and non-human life. Mining firms can refer to these themes to justify their practices; e.g. water quality is maintained or a project preserves more biodiversity than others (see deep-sea mining). Opponents to mining have used this tactic to present an alternate reality in which the impacts of a project outweigh the benefits. For the anti-mining activists captured in Tiefenbach's (2023) interviews and publication review, damage to these environmental elements were at the root of human rights violations and other social problems. Appealing to these themes has enabled mining labor groups to expand their reach among citizens in Peru, according to Reeder et al. (2022).

MINING IS OFTEN SAID to be a water industry, as it not only pollutes uncountable quantities of water by exposing soil and rocks that chemically react to produce new toxicants, but also uses immense quantities of water to make ore easier to process. As a result, opponents refer both to polluted water and the over-consumption of once-abundant water. Scholars in this corpus have found frequently that environmental and social concerns are framed in terms of water. To make this legible to a legal system, this is often referred to as a right to access clean water.

As climate change-fueled water scarcities increasingly affected communities in the Lithium Triangle, continued and expanded extraction of water-based lithium presents a clear impediment to climate adaptation.

- *Purwins (2021) observes that environmental organizations in Ghana opposing a large aluminum industrial project have mobilized a discourse about access to clean water, as well as the biodiversity of the Atewa Forest, where the project is located. Water emerges as the most prominent theme as it is also adopted by people in the capital, which lies downstream, demonstrating that the movement is benefitting from the characteristic of water to travel widely and thus connect people.*

- *Walter et al. (2024) find that across Latin America, water is at the center of concerns about mining. Lithium in particular is argued to be a "water mega-mining frontier" (14).*

- *In a community near a lithium mine in Argentina, opponents' motto is "water and life are worth more than lithium" (Bringel & Svampa 2024, 249).*

- *Stepanovic (2024) discovers in social media posts by Serbian activists that sentiments about polluted and depleted water, about the country's worsening air quality, and against the government were the basis of an opposition that crossed typical party lines.*

- *Lin et al (2025) construct a media analysis to understand the distribution of water-related concerns, so that mining firms and governments can better manage social licenses to operate, a conceptual tool representing whether conflict with surrounding communities exists. While some of their more granular results are presented above, they come to the general conclusion that in every region they assess, public discontent in news media remains high.*

Such opposition has prompted mining firms to articulate their efforts to address these problems. The Thacker Pass mine claims to recycle water in the arid Nevada desert and rely on zero-emission electricity sources (Riofrancos 2023). In Sweden, steel firms marketing their new green practices appropriate the image of water to

claim that their only waste product is water (assuming an idealized use of hydrogen fuel) (de Leeuw and Vogl 2024).

Voskoboynik and Andreucci (2021) observes that as climate change-fueled water scarcities increasingly affected communities in the Lithium Triangle, continued and expanded extraction of water-based lithium presents a clear impediment to climate adaptation. Recognizing the precariousness of life in the desert, mining sector actors there frame their extraction as "little more than the mining of water" (795). Yet, even as the opposition in the Salar de Atacama is typically portrayed as focusing on the depletion and transformation of water as a result of brine extraction, Quevedo (2023) reports that lithium production there has been difficult to challenge, as companies and officials classify water differently at different stages of production. Lithium producers and the Chilean government classify the brine as a mineral, but the waste as water. This raises the stakes of conflicts between firms and communities over water rights, which in Chile are entirely privatized.

These environmental themes are commonly conceived as localized problems. Leino (2024), for instance, observed that opponents to mining projects would appeal to the protection of biodiversity in the face of ETM projects in Finland. At the same time, however, these opponents framed the duty to care for biodiversity with international commitments. This, to the civil society organizations crafting the argument, was evidence of contradictions between climate and biodiversity commitments.

Biodiversity loss emerges as a prominent theme in deep-sea mining (DSM) discourse (Hallgren and Hansson 2021). Childs (2019) notes that this loss appears in corporate storytelling as "no net loss" in a "linguistic sleight of hand" (5) meant to provide a conceptual buffer for firms to exploit an uncertainty about how much is lost as a result of possible DSM operations. Scientists struggle to contradict this discursive tool, as they often claim only that a loss of biodiversity is unavoidable, which operates within this "net." Biodiversity often appears in comparison with terrestrial life, which is cast as more valuable and more robust than the life that exists around small rocks in the Clarion-Clipperton zone, to which a DSM company attributes the title "the largest desert on earth" (Lilford and Allen 2023, 293). Biodiversity in the corporate framing is only local, as the singular ecosystems of places like hydrothermal vents are not considered valuable for their endemicity globally, but rather as a small percentage of earth's total "biomass" (Larsen 2024, 329).

:DEEP-SEA MINING

Deep-sea mining, or seabed mining in international waters, does not yet exist. As a result, it is a project constructed mainly with discursive tools. For example, DSM in international waters may not be legally tenable without the climate crisis, because the practice is governed by the UN Law of the Sea requires that any DSM must be used to the "benefit of mankind as a whole" (UN Law of the Sea, Section 2, Article 140; Hallgren & Hansson 2021). By posing deep-sea mining as critical to the development of renewable energy technologies, mining firms clear this hurdle. In this way, uncritical acceptance that these materials will reduce emissions contributes to the possibility that they will be mined.

HALLGREN AND HANSSON (2021) IDENTIFY FOUR NARRATIVES FUELING SCHOLARLY DSM DISCOURSE, WHICH ARE SUMMARIZED IN THE TABLE BELOW.

Infographic styled by DANIELLE MORRIS

	EMPHASIS ON			
NARRATIVE 1 **A GREEN ECONOMY IN A BLUE WORLD**	DSM can be aligned with economic viability and sustainability	DSM can provide potential large-scale economic gains	Actual costs and benefits still remain unknown	
NARRATIVE 2 **THE SHARING OF DSM PROFITS**	The governance and potential for equal sharing of global resources are main challenges	DSM can provide potential large-scale economic gains	Actual costs and benefits still remain unknown	The real benefit for humankind (due to DSM) will be an increase in the flow of metals on the global market
NARRATIVE 3 **THE DEPTHS OF THE UNKNOWN**	There are significant remaining uncertainties when it comes to the deep sea ecosystems	The payment scheme and global redistribution is not yet robust enough	It is naïve to believe the ISA can govern the 'benefit everyone' ideal	
NARRATIVE 4 **LET THE MINERALS BE**	The morally correct action would be to set the vast majority of these ecosystems under moratorium until further notice	A moratorium and shift focus on closing the loop on metals on land instead of venturing to new exploitation		

THESE SCHOLARLY NARRATIVES stand in contrast to the narratives found among the private sector that seeks to exploit seabed minerals. Larsen (2024) attends a Norwegian conference on deep-sea mining, reporting back that proponents relied heavily on the industry's claim to accelerate energy transitions and liberate humans from the dangerous work of mining on land, such as in the image of child labor in the DRC. With visualizations, clean technology is placed on a lifeless seabed, void of biodiversity.

Even though deep-sea mining is frequently framed alongside the mineral needs of energy transitions, Childs (2019) finds that early DSM projects in Papua New Guinea were legitimized by many different discursive frames at the time of research. As a result of the novelty of the industry, many discursive frames were related to low-impact technology and painting a picture of an empty seabed. The distance from human settlements was emphasized in company materials to claim that DSM would have no human impact. Contrasting the perception that DSM is necessary for climate action, Coumans (2024) highlights a DSM firm that also markets itself as a secure source of military supplies.

Lidström et al. (2024) sees parallels in the discourse around DSM and marine carbon removal. Just as DSM-affiliated firms and officials had not recognized the diversity of life at seabed mining sites until the 1970s, carbon removal similarly casts it as a featureless abyss without connection to other life. Childs (2022) describes the shaping of perceptions about the seabed that enable it to become a zone of extraction; namely, that the increased visibility posits it as a legitimate and understandable site of extraction, which simplifies comparisons to terrestrial mining, where problems are highlighted. Terrestrial mining is cast as an

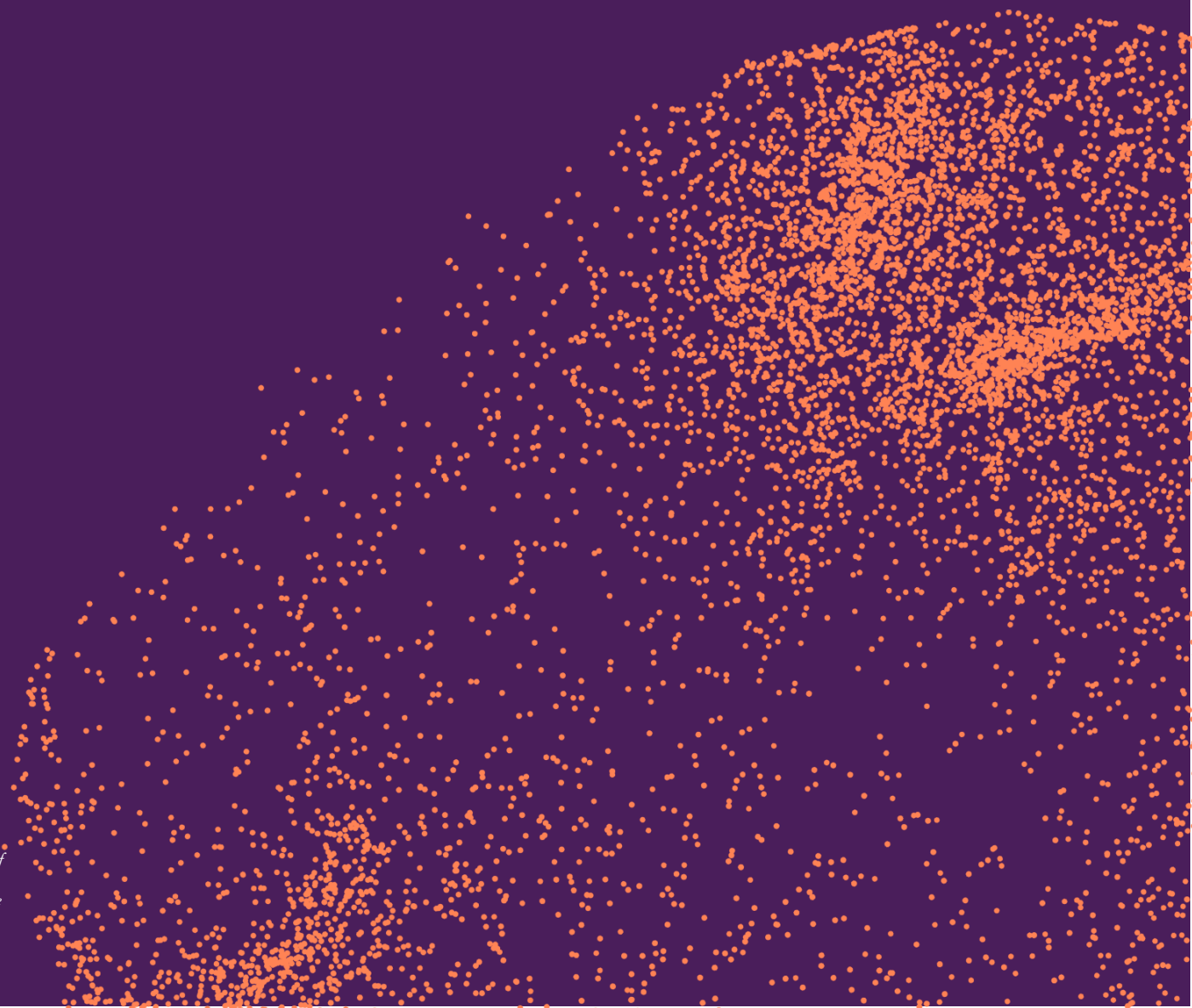
outdated form of mining, which DSM hopes to replace.

Opponents to mining have shifted tactics as the industry has discursively broadened its scope from the claims of limited local impacts to benefits for the low-carbon economy. Lilford and Allen (2023) report that "the discourses of Pacific civil society actors have shifted from an earlier focus on local- and national-scale social and environmental impacts, to a growing emphasis on the 'oceanic scale' expressed in terms of both Indigenous Pacific ontologies of the ocean and earlier episodes of Pacific-wide solidarity in the face of foreign threats" (284). These opponents to DSM articulate the oceanic scale through reference to historical successes in fighting the environmental harms of nuclear testing, driftnet fishing, bottom trawling, and marine pollution. The author notes that while this may not be immediately successful, the narrative sits "in perfect tension with the future-oriented normative claims of responsibility and obligation mobilised by DeepGreen," (295) a DSM firm.

The distance from human settlements was emphasized in company materials to claim that Deep Sea Mining would have no human impact.

:PLACES

For more detail on how the corpus distributes across the places of interest in Harmony Labs' analysis, see the Literature by Region appendix.



Peru

LI AND PEÑAFIEL (2019) SUGGEST THAT, across Latin America, conflicts over resource extraction have occurred nowhere as intensely as Peru. Perhaps as a result, Reeder et al. (2022) reports that there are robust civil society networks that have built strong communication strategies to spread information about mining conflicts. Some of these employ "relational diffusion" that leverage personal ties and provide training to organize against extractive projects. Others are non-relational, in that they simply provide a platform for others to raise awareness about particular mining conflicts through social media.

Tiefenbach (2023) dug deeper to understand the messaging in activist publications and interviews. They find that activists articulate concrete "alternatives-to-extractivism" (5). This includes the complete rejection of dependence on mining for lives, through jobs and material products, preferring instead to protect communities' abilities to provide food for themselves. Often the alternatives are framed in terms of the buen vivir, an eco-centric "cosmovision" originating from Latin America and roughly translated as "the good life." For its size and value, I've copied Tiefenbach's mapping of mining critiques and of alternatives in an appendix.

Li's and Peñafiel's (2019) study on women's roles in Peruvian anti-mining activism reiterates similar themes. They describe the ways women posit their opposition to mining activities in terms of their relationship to land, connection to place, and identity. In doing so, these activists offer their imagined futures as alternatives to extraction.

Mexico

Westpfahl (2024) analyzed public company documents to understand how Mexican firms "obscure the social and ecological costs of mineral production" to promote the acceptance of mining. While firms very explicitly address the concerns of climate change, Westpfahl finds that "rather than transitioning within the sector toward extracting so-called 'green' minerals, the articulation analysis indicates that the discursive adoption of the energy transition is integrated into the already entrenched heuristics of (sustainable) development, technological progress, and economic growth." Gold mining firms, for example, emphasized their role in the low-carbon economy, even as their products are not conventionally defined as ETM. Legacy copper miners have used the climate crisis to emphasize their importance in zero-emission electronics.

Olarte-Sánchez et al. (2022) finds a similar discursive tactic used by silver mining firms in Mexico. The authors follow this rhetoric to also analyse the activist responses to it: increasingly opponents refer to death in their arguments. While the land is associated with life, metals are associated with death, producing the phrase "Life yes, Mine no" (99), which may be an adaptation of the international anglophone activist phrase "Yes to Life, No to Mining."

Democratic Republic of Congo

THE DRC STANDS OUT in ETM discourse, as publications about child labor starting in 2016 were some of the most widely reported issues in ETM. Since then, according to the work covered in this corpus, narratives about minerals from the DRC have essentialized the child labor problem at the expense of other important issues. Four of the authors reviewed below (Umpula & Dummett 2024, Deberdt 2024, Laudati & Mertens 2019, Katz-Lavigne 2024) argue that this dynamic has served to hide other issues like pollution, workers rights violations, and corruption. It also frames small-scale mining as criminal and illegitimate, while obscuring possibilities for solutions. Deberdt (2024) and Katz-Lavigne (2024) claim that industry groups push this framing, while Laudati and Mertens (2019) also report that the narrative was also beneficial to NGOs campaigning.

For background, it's worthwhile to review the argument made by Chaffetz (2021): the Dodd-Frank legislation that aimed to improve transparency around conflict minerals and address violence in eastern Congo has failed to improve the lives of small-scale miners and has ignored the wider networks of mineral extraction that include cobalt- and copper-bearing ore. Chaffetz then urges rewriting the narrative around conflict minerals. Specifically, the problem is not with minerals that are by nature creating conflict, but rather the violent and dangerous conditions that miners experience in seeking to earn a livelihood. The term conflict minerals and its replication in narratives about cobalt and copper—misplaces the source of the problem.

Umpula and Dummett (2024) extend this critique. The authors, two creators of the original Amnesty International report that could be said to have started the critique of transition mineral supply chains, states that the emerging "blood cobalt" narrative popularized by Siddharth Kara's book Cobalt Red risks actually harming small-scale miners in the DRC. Small-scale cobalt production is only roughly 20% of production in the DRC, and large-scale mines have wielded the narrative to bolster their own, perhaps much more harmful, businesses. The narrative ignores the livelihoods built on small-scale mining and risks pushing actors in the cobalt supply chain away from DRC's cobalt. "Countries and companies whose economies and business interests rely on these precious natural resources should engage with [the DRC's long proposed] roadmap rather than disengaging from the country's mining sector altogether" (314).

Deberdt (2024) analyzed LinkedIn posts from responsible cobalt service providers to understand their efforts to carve a space into the market. Through written narrative, photographic practices, and knowledge production, these small companies rely on white supremacist, racist, and (post)colonial conceptions of African miners. "Through invisibilization, fetishization, saviorism, and business development (unequal loyalty), these LinkedIn tales negate miners' agencies" (1) making solutions more difficult to achieve.

Laudati and Mertens (2019) trace the making of narratives in the DRC and critique the essentializing and inappropriately casual discourse of rape and resources, which they contend lacks "historical context, gendered conflict dynamics, and armed group/civilian activity and mobilization, which are critical to understanding the scale and scope of violence in the region more broadly and the perpetration of instances of rape more specifically" (57). They write that a narrative that over-relies on assumed connections between rape and mining became a political-discursive substitute for addressing the complexity and harms of rape and resource extraction.

Similarly, Katz-Lavigne (2024) leverages fieldwork and interviews with stakeholders in DRC to address common stories about the DRC. The article links many of these stories to industry bodies, whose businesses benefit when small-scale miners receive less business. "This framing erases the negative impacts of [large-scale mining], connections between the two, and illicit 'taxation' by public and private security forces" (109).

Chile

CHILE, AS A PROMINENT PRODUCER of lithium and copper, figures as a sort of spectacle of ETM discourse for its colossal copper mines and evaporative techniques to create lithium salts. As such, many of the themes above have been identified in research that focuses on the country. The mining industry and its supporters cast lithium in temporal terms, as a material for future prosperity, and in spatial terms, as one that comes from a barren landscape where physical impacts can be disregarded.

The Lithium Triangle, which also spreads to Argentina and Bolivia, is commonly imagined as vast, dry salt flats that wield the power of the sun to turn brines into lithium salts. Lithium extraction, then, is cast as clean and climate-friendly as the electric vehicles are meant to be. Voskoboynik and Andreucci (2021) and Olarte-Sánchez et al. (2022) identify this as a discursive tool that paves over the social and ecological costs of mining and further processing. However, it does not apply to salt flats in Bolivia and some places in Argentina, as evaporation is not enough to distill lithium salts. Quevedo (2023) suggests that discursive techniques extend the labels of the lithium-rich brines as "minerals" instead of water, but its wastes as "water." Water is thus at the center of opponents' concerns about lithium, according to Walter et al. (2024).

Voskoboynik and Andreucci (2021) is a popular work cited often. It highlights prominent themes found elsewhere in the corpus and examines discursive strategies deployed by officials, politicians, and firms to "render acceptable" (787) lithium mining in the Lithium Triangle. The strategies reproduce imaginaries of prosperity and modernization, which have for decades been attached to oil and mineral wealth, but obscure the commodity crashes associated with other types of mining. The strategies also inject new connections with high-tech industries (digital technologies, zero-emission transportation, renewable electricity) and jobs considered "green."

The extractive sector and its supporters also leverage sentiments for national sovereignty, locating it in the dependence on succeeding in a geopolitical race to jumpstart production in the Lithium Triangle. Voskoboynik and Andreucci (2021) find that this race is built on the imagery of rushes, extractive fevers, and bonanzas. Zutt (2023) identifies the hype in policy documents in Chile and the EU that refer to urgency, competition, and critical and essential materials. Carrasco et al. (2023) write that this shapes lithium into a future-oriented material, embodying three central beliefs about the future: the lithium and its rising value is key to economic transformation; that Chile is in a sprint against other countries to develop assets; and that this trend is likely to last for a very long time.

Like Barandiarán (2019) and Kingsbury (2023), Voskoboynik and Andreucci (2021) observe that this institutional discourse replicates the idea that the extractive sector feeds economic development and modernization, emphasized in descriptors like "The Saudi Arabia of Lithium," "white

gold," and digital modernity. Barandiarán's article uniquely argues that the discursive tactic to link lithium with seemingly new ideas of climate urgency, environmental friendliness, and societal progress is a reaction to decades of failed hegemonic discourse to justify mining on the basis of economic benefits. Carrasco et al. (2023) similarly identifies that the Chilean state is primarily interested in lithium for its contributions to other economic and political projects from local to global scales, summarized in their table below.

Palma and Alcaíno (2020) spotlight a unique type of opposition, where a community creates a radio news outlet as a place to manage fears about out-of-control air pollution. This new outlet stands in stark contrast with the communication strategies of firms and officials, who maintain a grip on regional and national news outlets. The authors contend that national news outlets provide no space to dissident voices that contradict neoliberal or conservative views. The mining firm supplemented this strategy with leaflets and sustainability reports both to narrate a relationship with local communities and to shape a campaign that cast the region as a "sustainable region" (833) and itself as its sustainable leader.

Infographic styled by DANIELLE MORRIS

SPATIALIZATION AND INTERESTS IN THE LITHIUM INDUSTRY IN CHILE

SPATIALIZATION	ECONOMIC INTERESTS	POLITICAL INTERESTS
LOCAL LEVEL	Focus on negotiations with indigenous communities and local gains from crude lithium exports.	Relevance of the territory, and in the interrelation between environment and communities.
NATIONAL LEVEL	Expansion of exploitation from a liberal economic logic.	More active role of the state, both in the exploitation of lithium and in its industrialization.
GLOBAL LEVEL	Exploitation of crude lithium, replicating traditional extractive dynamics.	Discussion on lithium upgrading. How much progress can be made in the value chain from Chile and how to integrate with international partners.

Indonesia

WIJAYA AND SINCLAIR (2024) NOTE that Indonesia remains under-researched in comparison with other areas tied to ETM, such as Chile and the U.S. They find that electric vehicles have provided a solution to declining legitimacy of the mining industry, as well as reputational, financial, and oversupply problems. However, Olufsen (2024) finds in a news analysis that while the urgency of the transition appears often in anglophone media, debates center around economic development and the environmental and health impacts of mining. Putra et al. (2024) discovers in EV company marketing in Indonesia negligible discussion of battery waste, preferring instead to highlight the specifications and environmental benefits of EVs.

USA

RESEARCH ON ETM DISCOURSE in the U.S. benefits from an abundance of materials and proximity between researchers and subjects. As a result, most research focuses on specific projects. Riofrancos (2023) provides a helpful framework for understanding controversies as they play out on a national scale. She finds in her oft-cited article that governments and firms have aligned two narratives to form the foundation of ETM policy in the U.S.: ETM are more sustainable when mined in the U.S., and mining them in the U.S. protects national security. Her identification of this intersection of sustainability and security has been referenced in many publications that discuss local mining problems in other countries, indicating that scholars have found it resonates in other geographies.

A copper-nickel project in Minnesota's Iron Range is the focus of several works. Broadly, they find that the conventional categories of mining debates, whereby proponents ground arguments in economic development and nationalism, and opponents support environmental protection, do not map neatly onto the ways various actors engage in debate.

- *Malone et al. (2023) tries to understand why similar mines in the U.S. have received contrasting responses from communities. They report that the debates around discourses at a proposed project in Minnesota have been particularly tense. As the mining firm makes bold statements about its responsibility to minimize environmental harm, especially relative to mining outside the country, activists have relied on the term "greenwashing" to mount a counterargument. Academic critics have more narrowly targeted the firm's tactic to use expert studies, calling it out as a discursive technique to establish itself as an authority on its own practices. Proponents and opponents both attempt to use nationalist discourse to justify their positions: opposing the foreign-owned project is nationalist, and mining within the U.S. is also nationalist.*

- *Beaton (2021) finds that the media's representation of binary debates serves to obscure the gray areas and solutions that various stakeholders propose, such as public ownership.*

- *Kojola (2020) finds that nostalgia is used by all sides of a conflict, and all sides directly address the impacts to the environment. Supporters rely on memories of clean outdoor recreation. Opponents claim that the landscape is already industrial, and the return of mining will renew the prosperity that had brought people to settle the area.*

Kelley (2023) and Uji et al. (2023) can be juxtaposed, as they both assess debates around the same mine, Thacker Pass in Nevada. Kelley assesses discourses among proponents and opponents, and Uji et al. assess the perceptions of residents. While climate factors prominently in Kelley's analysis, Uji et al. find in their surveys that national security is a stronger predictor of support.

Angervil (2024) charts the policy narratives surrounding the Pebble Mine proposal in Alaska according to plots and subplots. The opponents' narrative (or "plot") was based on cultural protection, the author contends, and the proponents' narrative was based on economic development. Each of these has sub-narratives that reverberate on different scales and include the same themes, like climate, but in different fashions. I've copied the author's tabulation of these narratives in an appendix for further study.

Brooks et al. (2024) analyzed news media surrounding the Rosemont copper mine in Arizona. Founded on divergent ideas about the relationship between humans and their environment, polarization was prominent and irreconcilable. Opponents build a pro-environmentalist network

to publicize the issues relative to the mining project and the importance of defending southwestern habitats and landscape. Mining proponents similarly rely on business communities to underscore the importance of hardrock mining for things like decarbonized energy and modern living.

Also in Arizona, Paliewicz (2022b) uniquely describes how an Indigenous group crafted an opposition with unwavering loyalty to the cultural value of a particular place, even in the face of two of the largest mining firms in the world. Reflecting the findings of Li and Peñafiel (2019), this opposition does not engage with the prospect of mining on the firms' terms but instead sculpts arguments that embody alternative relationships between humans and land.

Canada

CANADA'S GOVERNMENTS AND MINING COMPANIES have recently seized opportunities to leverage ETM discourse to expand mining. The literature reviewed in this corpus finds that this discourse resonates little among communities weighing proposed mines and likely is designed to resonate with investors and officials who are not located around projects.

Ritz et al. (2024) analyzes how different actors in a transition mineral conflict in Canada use discursive tools to push their position. Firms and proponents describe lithium extraction as "sustainable development" and "necessary" for solving the climate crisis, while downplaying the effects at the local level. These actors leveraged authorization strategies and expert reports to bolster these claims. Opponents refuted the details of sustainable development ideals and the importance of the mine to the transition. In response, the authors found that proponents shifted their tactics into moralization, "when they realized that social acceptability had to be gained with the trust of the population and not with 'rational' argumentation" (7). These moralization strategies included emphasizing its social role in the community and its contribution to climate action. Importantly, the authors report that the government attempted to remain neutral, despite obligations to protect rights, and this resulted in closing off alternatives, such as compromise. The authors created a diagram to display the interactions between discursive techniques over the development of the project. It is reproduced in full in an appendix.

Kingsbury (2024) evaluated the same project, finding that the "buzz" of lithium and the Canadian energy transition pervades the private sector's side of the debate, but had little impact on persuading community members to accept the project. Wilkinson (2023) similarly finds in forty community interviews that climate concerns do not rank highly in determining views of a proposed mine. It might be concluded, therefore, the firm's moralization related to climate may not have been directed at community members, but rather the investors who were worried about the firm's reputational risks.

More broadly, Coumans (2024) finds that ETM discourse provides a shield for firms interested in status quo business development. She takes aim at Canada's critical minerals terminology, as officials claim that ETM are used to benefit society, but they instead fund war. Gilchrist-Blackwood (2020) discovers through ministerial press releases that an additional layer of Canadian exceptionalism serves to position the country as a moral leader in the energy transition. These findings suggest the climate-related ETM discourse is structured to provide officials and firms moral backing for extractive activities.

Germany

FEW SOURCES ON THE TOPIC concentrated on Germany. The only relevant one analyzed newspaper discourses across Germany, Finland, and Spain (Lyytimäki et al. 2021). Some others mention Germany only in passing, such as mentioning a German company with a lithium exploration contract in Bolivia.

Portugal

PORTUGAL ATTRACTED MUCH ATTENTION in 2020 for its protests against a lithium project in Barroso, labeled the largest in western Europe. Since then, scholars have interrogated how discourse led to material outcomes for certain actors.

Ribeiro et al. (2021), writing for a journal focusing on science education, explores through surveys how local residents understand the activities of the prospecting company. They conclude that the firm's engineers should take a more active role in spreading information among the community. The authors implicit intention is to acquire consent from the community, which they argue is impeded by a lack of knowledge about mining and prospecting (see Bleicher et al. 2022 for a critical analysis of this approach).

Nevertheless, opposition has remained strong. Araújo et al. (2022) evaluates these efforts as they have spread through journalism and around the country. In crossing distances and attracting new audiences, opponents have used the term "mined future" to call out politicians and firms who craft their positions according to the future benefits of mining, assumed to be distributed equally, and reduced emissions. Within this future, lithium proponents establish that current residents have a responsibility in what van Meer and Zografos (2024) call a "green sacrifice" (1313).

This discourse serves to extend the right to decide about mining to Portugal's centers of political decision-making, which are not well positioned to attend to the concerns of local residents, writes Pusceddu (2024). As a result of these "uneven territorial relations" (397), the discourses of proponents and opponents are also separated. On the local level, stakeholders debate over whether a mining revival will also revive prosperity or environmental harms. On the national scale, debates are oriented toward the future, as van Meer and Zografos (2024) point out.

:CHALLENGES

Opponents to mining projects have long posed a range of challenges to those projects. Researchers in this corpus identify many.Voskoboynik and Andreucci (2021) characterize opposition rebuttals as negations of the claim: the Lithium Triangle is a barren zone without the ability to support life; extracting water from brines does not damage the ecosystem; and more lithium enables progress.

MINING PROJECTS that have claimed to contribute to climate mitigation have received challenges regarding the necessity of a material to an energy transition and regarding the necessity of end products (e.g. electric vehicles) to the energy transition. However, individual projects in this corpus have not received more targeted pushback on the mine's individual contribution to climate mitigation. For instance, a lithium mine may also just as likely funnel its lithium to the military to make bombs.

Often Indigenous resistance is characterized by refusing to engage with a human-over-nature 'rationality' and choosing alternative relationships with the environment.

On a larger scale, Overland (2019) challenges four myths prevailing in debates about the geopolitics of renewable energy: (1) critical mineral extraction will increase geopolitical competition between countries, (2) this extraction will deepen the 'resource curse' in mineral-rich, poor countries, (3) electricity itself will become a geopolitical weapon across borders, and (4) electrification will increase cyber-security risks. The first two myths are relevant to this literature review. Overland challenges (1) by highlighting the uncertainty about which critical materials will be most in demand and the recyclability of energy technologies. Overland refutes (2) by emphasizing that mineral-rich countries have learned how to avoid the resource curse, and the nature of renewable energy may mean that there are more jobs that are more widely distributed. These myths might be better described as imagined futures, and Overland's challenges as alternatives.

As mentioned before, Indigenous opposition to ETM projects does not necessarily differ from Indigenous opposition to other kinds of extractive projects. In each case, Indigenous opponents seek to elevate the unique characteristics of a place to a people. Often Indigenous resistance is characterized by refusing to engage with a human-over-nature "rationality." Li and Peñafiel (2019) explain how Indigenous opposition in Peruvian highlands refers to respect for mountains and forests that is only earned by asking permission from the land in a reciprocating relationship. Women in their stories who stand against mining choose to frame their challenges to mining in terms of alternative relationships with the environment, which are often illegible to the extractive industry.

In another example, Paliewicz (2022a) urges a rethinking of the pursuit of the most rational argument in the case of Resolution Copper's project at Oak Flat. The firm's owners benefit from the binary argumentation offered by criticizing them in terms of green colonialism, because they "extract" what they need from the argument and sell that onward. This is not limited to the climate dimensions of ETM, but also to other sustainability aspects they lay claim to and leverage against accusations of greenwashing. Toward that end, the place-based argumentation described in Paliewicz (2022b) may be a kind of alternative to the extractive arguments he finds among firms.

Bringel and Svampa (2024) raise a discursive challenge to the colonial dynamics of extraction in defining the "decarbonization consensus", a descendant of the Washington and Commodities consensus. The article analyzes the shift from previous global capitalist discursive agreements to this new one, which forms an ideology that

deepens existing inequalities, exacerbates natural resource exploitation, and perpetuates the commodification of Nature. Similar to Dorn et al. (2022) efforts to protect the climate are cast as non-ideological, i.e. a predetermined universal value which brooks no rebuttal.

The existence of dissent is an important feature in narratives of sacrifice themselves, which have the potential to perpetuate the idea that other scales are worth bringing into the conversation. Paliewicz (2022a and 2022b), in particular, illuminates how these scalar rhetorical strategies can end up supporting status quo extraction, even if they aim to refute the narrative of mining firms. Levied as a moralized criticism without elaboration (defined in Ritz et al. 2024, 2), sacrifice engages with the terrain of rationality used by the mining sector, which enables firms and officials to hand off the decision about whether to mine to a public eager for debate. Then, as long as the debate remains active, proponents can point to its existence to avoid altering the status quo.

:ALTERNATIVES

The literature in this corpus does little to explore in depth the alternative pathways to a low-carbon future that do not include proliferating mineral extraction. That is not to say these do not exist; one may have to look beyond the ETM literature, to literature around, for instance, public transportation, urban justice, or community building. Tiefenbach (2023) demonstrates the non-mining nature of mining alternatives through interviews with activists in Peru. See her diagram of alternatives, such as "collectivity," "organic agriculture," and "strengthening of women," in an appendix (11).

Below is a summary of the literature that describes how hegemonic discourse works to erase the possibility of alternatives.

- *Lyytimäki (2023) finds in their Finland case study that the attention pulled toward advanced technologies and responsible practices of the mining sector steers attention away from alternatives, like urban mining and efficient recycling.*

- *De Leeuw and Vogl (2024) write that one of the ways this occurs is by persistent challenges to possibilities outside the dominant imaginary. They witness how "hype" overshadows and demands higher legitimacy from non-dominant visions of sustainable transitions.*

- *For Kojola (2020), visions of alternative futures are constrained by the creation of collective memories that valorizes industry. This hides past problems and presents capitalist extraction as inevitable. Kojola suggests alternative collective memories, particularly competing environmental imaginaries (see Pasts). Because there are shared identities in the Minnesota Iron Range regarding outdoor recreation and worker organizing, he suggests "environmental imaginaries linked to critiques of corporate power and protecting forests and lakes for public use could align local residents and local or regional environmentalists" (912).*

- *Quevedo (2023) reports that mining in the Atacama desert has driven people to sell their water rights (in Chile, all water is privatized) to mining firms. He writes: "Transition and green modernization strategies are premised on colonial and capitalist imaginaries and institutional arrangements that operate at an ontological level and foreclose the possibility of alternative modes of coexistence" (97).*

- *Kelley (2023) finds that the firm at Thacker Pass in Nevada aggressively aligned itself to climate action and placed its ideological priorities at the center of the solution. This, they write, serves to erase alternatives that address emissions, but do not have the firm at the center, such as lower consumption and improved public transportation.*

- *Beaton (2021) found that some activists were skeptical about compromises or alternatives, because, in the words of one conservationist, "we can't have smokestacks and outdoor amenities ... because one strategy defeats the other" (157). Mining proponents, in contrast, decried activists for failing to budge from a resolute position against mining. Very few people suggested alternatives, the most prominent being public ownership, and others tried to first find common understanding shared by both sides to begin negotiations for compromise (which have not occurred).*

- *Ritz et al. (2024) observe that the government attempted to remain neutral in the development of a lithium project, which served to restrict the options on the table to mine or not to mine, foregoing the opportunity for finding compromise.*

Several scholars cite stakeholders who propose practical alternatives to mining that has harmed communities and ecosystems. Wilkinson (2023) asked local stakeholders around a proposed lithium mine for proposed alternatives and received a number of strong responses. Their alternatives focused on the contribution of lithium writ large to the mitigation of greenhouse-gas emissions. I summarize them in Wilkinson's fourfold categorization:

1. Technical optimization of existing technologies

a. These were mainly proposed by people who already held pro-mining positions.

b.They include redesigning electric vehicle batteries with different materials, longer lifespans, and optimized production methods.

2. Improved mining governance frameworks

a. Suggestions included improving scientific knowledge of the impacts of draining land

of water and reforming regional laws over mining. Those proposed reforms included strengthening the requirements for consultation, forbidding self-regulation of firms, enforcing environmental rules during exploration, and better funding to agencies.

3. *Broad extractive planning in Québec*

   a. These included asking whether a particular project is really needed, especially when there are so many projects already in operation.

4. *Overall consumption reduction*

   a. These included longer lives of cars, less personal transport vehicles, increased circularity of materials.

The attention pulled toward advanced technologies and responsible practices of the mining sector steers attention away from alternatives, like urban mining and efficient recycling.

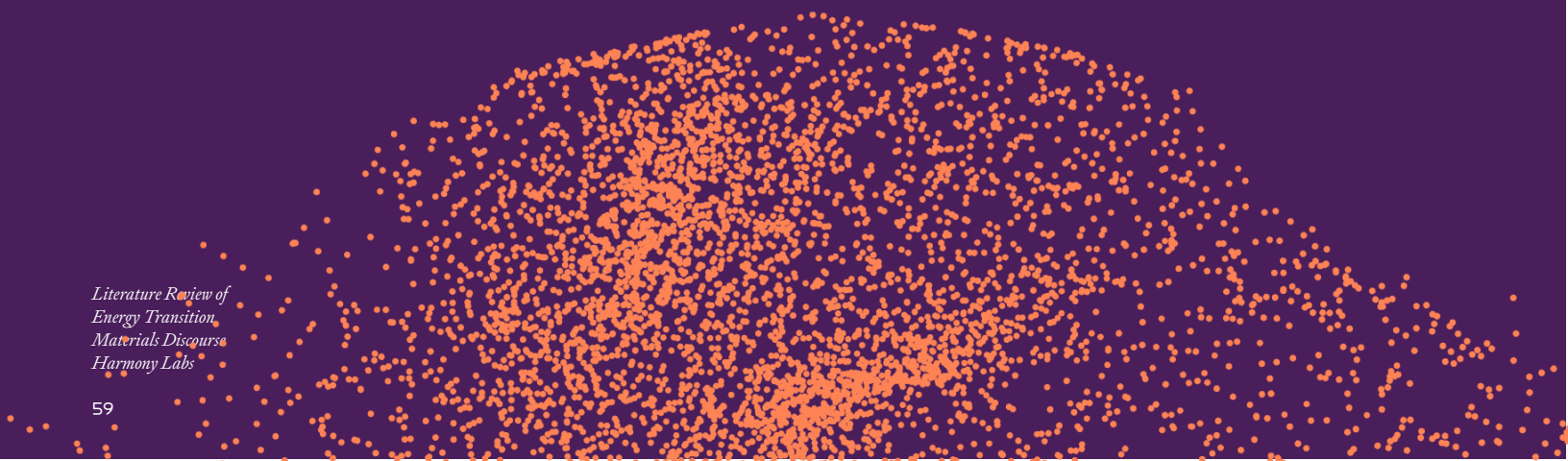
Additionally, Lawrence and Moritz (2019), in assessing the rhetorical obstacles that mining firms build in the way of FPIC, suggest a "flexible" approach to Indigenous rights and consent. This approach, as they say in recent international court decisions, is based on a sliding scale of consent vis a vis the severity of the proposed land use change and its impacts on the survival of an Indigenous group. The authors suggest exploring this approach, as mining firms often use minimalist and maximalist interpretations of FPIC to refuse or problematize its implementation.

Chaffetz (2021) and Laudati and Mertens (2019) call out mining narratives about eastern Congo that essentialize small-scale mining as inherently violent. Laudati and Mertens assert that the narrative connecting rape and mining closes down alternatives, which are described as multifaceted analyses that include "historical context, gendered conflict dynamics, armed group/civilian activity, and mobilization" (75). Chaffetz goes further to present an alternative approach to the failed Dodd-Frank policies that ignore how and why people engage in small-scale mining. Any new legislation, he writes, must include a perspective shift that replaces the risk placed on consumer firms with the risk that small-scale miners may lose livelihoods. Additionally, legislation should include combining tactics with the cobalt supply chain, directly addressing health and safety in both small- and large-scale mining, and improving wages in artisanal mining.

Li and Peñafiel (2019) and Paliewicz (2022b) offer alternative framings of ETM discourse that do not engage with the rationalities that extend beyond the local scale. The authors show through stories of Indigenous resistance to mining that while achieving limited success, narratives that remain true to the relationships that Indigenous groups may have to place, existing long before a mining project introduced other scales and rationalities, have shaped lasting opposition to persistent extraction. At the risk of contradicting their scales of meaning, there may also be value in these kinds of narratives to educate others and orient new perspectives about mining and energy production.

:SUCCESSES

The success most often seen in this corpus is the success of the discourse of private firms and government officials to achieve their aims to develop a project. Archer & Calvão 2024 asserts that the mining industry as a whole has successfully aligned itself with ideas of climate-friendly economic development.



IT IS IMPORTANT TO NOTE that the fate of a mining project is not necessarily dependent on the discourses surrounding it. There may be other reasons mines are stopped or greenlit. As Olarte-Sánchez (2022) and Kingsbury (2023) observe, expanding extraction is often seen as the common sense option that does not demand the same critical attention that opposition to mining does.

Successes of narratives opposing or altering mining projects are scant in this corpus. Success would be defined here as achieving the aim to prevent a mining firm from developing a mine or to alter a mine's practices in accordance with opponents' discourse. Nevertheless, Reeder et al. (2022) find that the communication networks of environmental justice organizations surrounding 25 mining conflicts explain how mining conflicts cluster in time and space, as the organizations amplify conflict by helping to spread awareness. The involvement of these organizations, they conclude, can "make the difference between a successful campaign or a missed opportunity" (10). Additionally, the authors point out that Peruvian organizations that have focused on Indigenous rights have not always been successful in attracting a wider audience, but they have had success in anticipating and preparing for mining conflicts that have later stretched beyond solely Indigenous concerns

Success may be better analyzed starting with a particular project, and the works in the corpus can shed light on how that may have been achieved.

- *The Pebble Mine in Alaska appears to have been almost completely jettisoned, although a new U.S. federal administration may remove barriers created at the federal level. Angervil (2024) sheds light on the various "plots" that activists have used to contest the project, as well as the responses from firms and officials. The 2023 federal decision to dismiss the project's permit applications was based on an assessment of environmental impacts.*

- *Malone et al. (2023) reports that projects in Minnesota were the target of sustained environmental activism, and courts eventually found that environmental impacts would have been too large to be contained. In Idaho, where local proponents seemed to have outweighed environmentalist opponents, the mine stalled due to changes in the market.*

- *In Portugal, a lithium mine experienced several setbacks over the last several years, but it makes incremental advances, as it gains access to new land and continues to pursue the project. Opposition there, as described by Araújo et al. (2022), Pusceddu (2024), and van Meer and Zografos (2024), stretched to the national scale and engaged with the temporal scale put forward by the firm and politicians.*

- *Lilford and Allen (2023) argue vis a vis deep sea mining (DSM) that "the discourses of Pacific civil society actors have shifted from an earlier focus on local- and national-scale social and environmental impacts, to a growing emphasis on the 'oceanic scale' expressed in terms of both Indigenous Pacific ontologies of the ocean and earlier episodes of Pacific-wide solidarity in the face of foreign threats" (284). Some of the biggest car and tech companies have signed a petition to establish a moratorium on DSM until its impacts are better understood, suggesting that the oceanic scale has been accepted by actors who are in a position to prevent the possibility of DSM.*

- *Purwins (2021) reports that activists' appeals to Ghanaian's rights to access clean water transports the anti-mining argument downstream to the capital, where decision-makers are more likely to listen. However, this has yet to prove successful in preventing the large industrial project, while the pro-mining camp centers on shrinking Ghana's dependence on foreign aid.*

On the opposite side, scholars have noted the success of some narratives in support of mining in particular places.

- *Dorn and Dietz (2024) train their eyes on pro-mining communities in Argentina near lithium mines, evaluating how consent has been achieved. They argue that the firms, with the support of official statements, legitimize their extraction with two arguments: the mine will bring sustainable economic development; and the mine will reduce global emissions. This marks a success of the planetary-scale narratives that human progress derives from exploiting natural resources and creating technologies that are climate-friendly. Interviewees told the authors that concerns about local environmental impacts were marginalized, as firms claimed to address them.*

- *Carpanese et al. (2024) found that President Evo Morales's effort in Bolivia to distinguish lithium exploitation from the country's other destructive mining practices has been successful. "The fact that this perception endured even when people had lost trust in the Morales government itself indicates the effectiveness of Morales' original communication strategy, but also the power of collective memory and the desire of people to believe in the constructed image of lithium as a 'clean' and 'future-oriented' mineral" (8).*

- *Ritz et al. (2024) describe how a lithium firm in Quebec altered its communication strategy to match the moralization strategies that it faced in opposition. Instead of responding with rational argumentation, it cast itself as a community member benefitting local residents and an important contributor to climate action. The project, while not yet operating, has continued its development. Kingsbury's (2024) and Wilkinson's (2023) findings that the lithium-climate argument had little impact on community members suggests that the firm's success was achieved in relation not to the community, but to officials and investors.*

:CONCLUSION

The Urgency, Scale and Continuity sections above suggested that arguments about new and urgent extraction to reduce emissions mainly originate from institutional actors, such as mining firms and government agencies that support extractive projects. Opponents to such ETM projects have tended to craft opposition that focused on smaller scales and raised challenges to beliefs that scaffold proponents' framings, such as the perception that certain lands are barren and that ETM mining marks a new phase in extraction.

THE Public Perceptions SECTION above helped to situate ETM discourse in its interpretations by a diverse set of people in terms of social and environmental issues. The Places section above is particularly useful for grasping multiple dimensions of individual mining conflicts and debates around proposed projects, as it layers multiple studies on the same places.

A few features of ETM discourse have emerged from this literature review:

- *The connection between mining and climate policies has been recognized by actors in the mining industry for a few decades. However, ETM discourse only emerged prominently coinciding with geopolitical concerns around roughly 2019.*

- *ETM discourse embodies assumptions about the urgency to reduce emissions, which has come into conflict with continued concerns long tied to mining projects, such as environmental pollution and social transformations.*

- *The large-scale nature of ETM discourse has shifted criticisms to similarly large scales, as scholars in this corpus call out systems of extraction that remain even as mining firms construct narratives that place them at the center of a sustainable future.*

- *In certain projects where ETM discourse has pervaded, it has resonated differently with different groups of people. Local communities have not necessarily ranked it as an important reason for support, but on a larger scale, the reference to ETM have resonated with the mining sector, including firms, officials, and investors. ETM discourses in this respect have most substantially benefited firms.*

- *Opponents to ETM projects have proposed alternatives, and they seem not often to address the rationalities for mining directly, but rather redirect focus to alternative methods for reducing emissions or sustaining alternate systems of value and well being.*

As Barandiarán (2019) and Wijaya and Sinclair (2024) argue, electric vehicles and climate urgency appear to offer a solution to declining legitimacy across the EV sector, i.e., a renewed moral and financial narrative that addresses reputational and oversupply problems. This argument finds further evidence in other places, where a firm has overcome opposition by referencing its moralized contribution to climate action (e.g. Ritz et al. 2024, Dorn & Dietz 2024). As mentioned throughout this report, ETM discourse can contribute to a broader intellectual project that prioritizes extractive rationalities that need only the appearance of large-scale support to persist (Paliewicz 2022a).

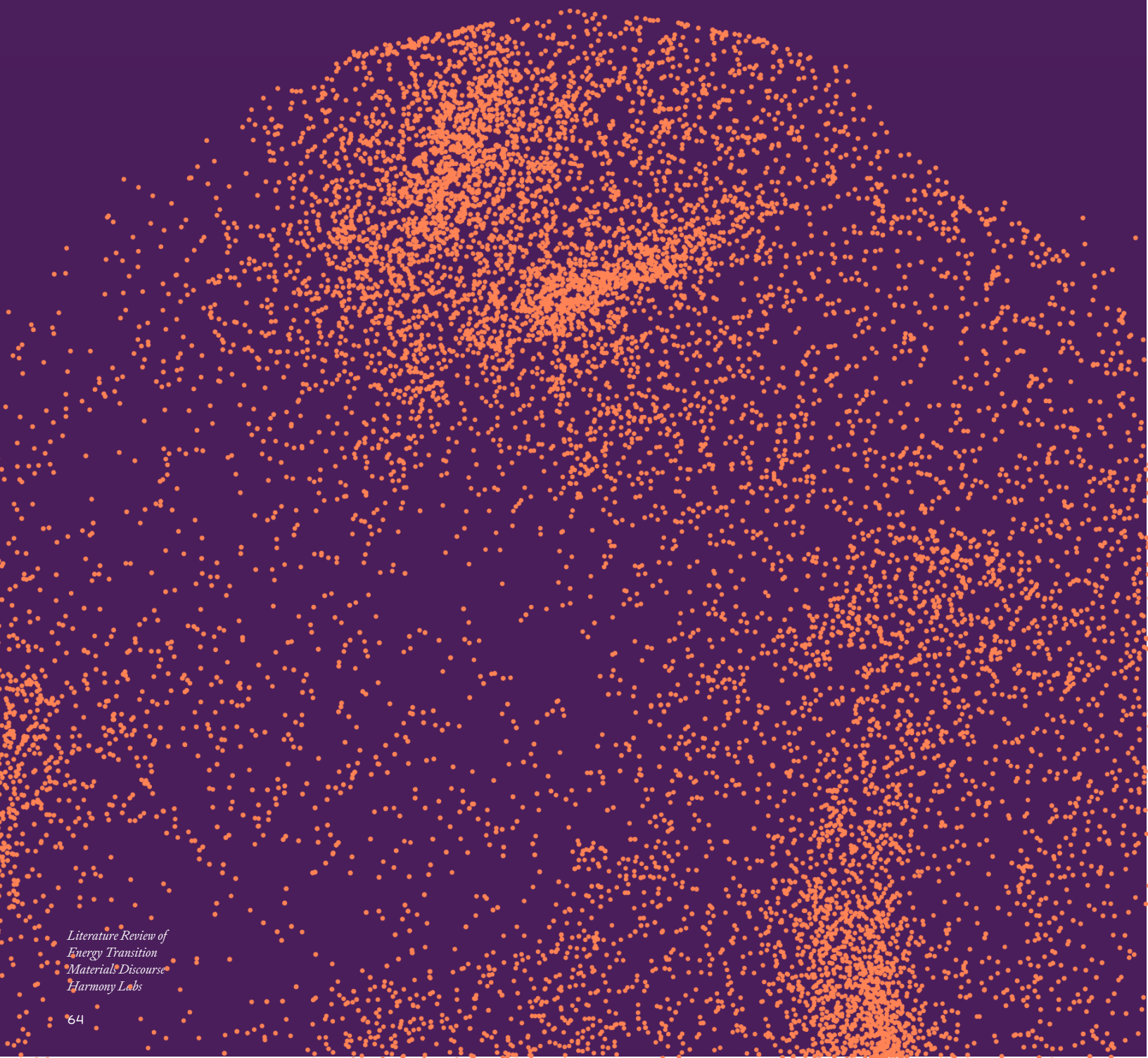
A few other sources in this corpus that have been particular useful for understanding ETM discourse include:

- *Paliewicz (2022b)*
- *Voskoboynik and Andreucci (2021)*
- *Kügerl et al. (2023)*
- *Tiefenbach (2023)*
- *Dunlap et al. (2024)*
- *Bleicher et al. (2022)*
- *Bringel and Svampa (2024)*

A few notable topic absences in this corpus include:

- *Discourse about the proposal that improved recycling is an alternative to ETM mining.*
- *The narratives of various stakeholders about the omnipresence of waste in the ETM industry.*
- *Interrogations of the technologies demanding ETM and whether ETM will actually be used for those products.*
- *Activist discursive practices when they are not labeled as such, and instead research simply elevates their opposition, or the conflict.*
- *ETM connection to geopolitical battles and especially China.*
- *Narratives among workers in the ETM industry.*

:APPENDICES



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Summary of Methods

1. I iterated searches in Google Scholar, Scopus, and Web of Science, using the discourse, Tier 1, and Tier 2 terms, which are listed in the Terms appendix. Only results in English were reviewed. I summarize the searches I conducted in the Summary of Searches appendix, mirroring the methods used by Kügerl et al (2023).
    a. Many searches return tens of thousands to millions of results and in these cases, I surveyed the first few dozen pages of results organized by relevance.
        i. Note: In many searches, the inclusion of specific elements in Tier 1 in the search returned results from medical journals as highly relevant.
        ii. Some searches were experimental, for me to understand the shape of the corpus of relevant results.
        iii. In some cases, I noticed a lack of particular topics, such as recycling, coltan, or Germany and crafted searches that specified results to those topics. These narrowed searches did not turn up more results.
        iv. I conducted searches in these journals: The Extractive Industries and Society, Energy Research & Social Science, Public Relations Review, and Public Understanding of Science. There were no results that were both relevant and unique in these searches.
    b. Then, I specified the search to focus on the results that were most relevant. I specified the search in a few ways:
        i. I disaggregated the mining-related terms from Tier 1, to ensure that any result that satisfied the inclusion of elements also related to mining.
        ii. In some cases, I disaggregated the transition-related terms from Tier 2 to ensure that any result related to the transition. As discussed over Slack, I conducted other searches to make sure the source material also included research that didn't directly tie to the energy transition, as this is an important theme to be described below.
        iii. In the course of searching, I came across a few search terms related to discourses that I believed to be relevant. After speaking with Klinger Lab, I decided to incorporate only "discursive" as an extra search term, as this term can indicate distinct kinds of analysis that is relevant.
2. After obtaining my initial corpus of relevant literature (115 articles) after 31 distinct

searches, I reviewed the literature to confirm each source's relevance, to conduct further searches through literature related to each source, and to identify themes.

a. I removed 39 sources that I found were not relevant.
b. I reviewed the sources for literature authors' use as supporting work. I also used Google Scholar to list the articles that cite the work and to list the "related articles". In general, I surveyed the first three pages of each, if the list was that long. From this process, I added 19 sources.
c. The searches turned up many Master's theses, and where possible, I replaced them in my corpus with peer-reviewed work. However, there were six theses that I found to contribute significantly to this literature review, and I have noted them in the synthesis below.
d. I listed keywords for each source to streamline the identification of themes, places, materials, and methods.
e. I included in the corpus several sources which do not deal directly with energy transitions, but which include robust analyses of narratives in relevant sectors.
f. All work in this corpus is peer-reviewed, except where I mention that a work is a thesis. I choose to include theses only when the research is highly relevant, the methods are sound, and the results are meaningful.
g. The final corpus is 97 sources.

3. I structured a draft synthesis review that highlighted a number of themes and the literature that described these themes as they relate to ETM.
4. Harmony Labs and Klinger Lab provided feedback on the draft.
   a. In response to feedback, I conducted several more searches (numbered 28-36 in the search appendix) that sought to ensure I didn't miss relevant literature regarding Germany, the term "trade-offs" and work specifically in communications. This search turned up one more piece of literature. I found an additional piece of literature (Lin et al. 2025) from a listserv focused on ETM.
   b. I then responded to comments with a new draft. The comments requested edits regarding:
      i. Format (APA style)
      ii. Streamlining themes, adding "water, air, forests", Indigenous rights.
      iii. Clarifying scope of each document
      iv. Highlighting successes and alternatives (the the status quo)

Literature by Region

TOPIC REGION	SOURCES	TOPIC REGION	SOURCES
CANADA	6	PERU	5
MEXICO	4	GENERAL	26
CHILE	9	PORTUGAL	4
OTHER	31	INDONESIA	3
REGIONAL		USA	13
DRC	6		

The total is more than the size of the corpus, because some sources related to multiple geographies. Additionally, the number of cited sources in each respective section above may be less than the figure in the chart, as the number in this chart refers to regions covered in literature, which may not necessarily discuss in detail the discourse in each place.

Literature by Country of First Author's Institution

COUNTRY	SOURCES	COUNTRY	SOURCES
USA	22	UK	4
FRANCE	2	HUNGARY	1
SWEDEN	8	THE NETHERLANDS	3
CHILE	2	ETHIOPIA	1
CANADA	8	SPAIN	3
SOUTH KOREA	1	DRC	1
GERMANY	6	PORTUGAL	3
ROMANIA	1	DENMARK	1
AUSTRIA	6	FINLAND	3
PHILIPPINES	1	CHINA	1
AUSTRALIA	6	SWITZERLAND	2
PAKISTAN	1	BRAZIL	1
NORWAY	5	JAPAN	2
INDONESIA	1	BELGIUM	1

Literature by Source

TYPE/JOURNAL	SOURCES
THE EXTRACTIVE INDUSTRIES AND SOCIETY	14
MASTER'S THESIS	6
ENERGY RESEARCH & SOCIAL SCIENCE	5
JOURNAL OF CLEANER PRODUCTION	3
WORLD DEVELOPMENT	2
RESOURCES POLICY	2
JOURNAL OF POLITICAL ECOLOGY	2
ENVIRONMENTAL COMMUNICATION	2
ENVIRONMENT AND PLANNING E: NATURE AND SPACE	2
ANTIPODE	2
ANTHROPOLOGICAL QUARTERLY	2

Included are only locations where more than one source was included in the corpus

Literature by Publication Year

YEAR	SOURCES
2013	1
2014	2
2015	1
2016	0
2017	0
2018	1
2019	7
2020	6
2021	11
2022	15
2023	16
2024	36
2025	1
TOTAL	**97**

Search Terms

DISCOURSE TERMS

Discourse
Discussion
Propaganda
Audiences
Spokespeople
Media studies
Conversation
Narrative
Communication
Public Sphere
Constituency
Public Relations
Debate
Persuasion
Activism
Marketing
Stakeholders

TIER 1 TERMS (mining and mineral terms)

Nickel
Platinum
Neodymium
Thulium
mineral
Copper
Palladium
Promethium
Ytterbium
extraction
Lithium
Rhodium
Samarium
Lutetium
precious metal
Niobium
Ruthenium
Europium
Scandium
raw materials
Tantalum
Iridium
Gadolinium
Yttrium
raw material
Coltan
Osmium
Terbium
cobalt
tailings
Graphite
Lanthanum
Dysprosium
rare earth
artisanal mine
Aluminum
Cerium
Holmium
metals
smelting
Aluminium
Praseodymium
Erbium
mining

TIER 2 TERMS

ELECTRIFICATION

battery
electric
electrification
transition
electrical
energy
energies
semiconductor
EV
EVs

SUSTAINABILITY AND CLIMATE

climate
transition
sustainable
sustainability
responsible
environmental
vehicle
vehicles
fossil
green
recycle
renewable
carbon
net zero
circular economy
responsible sourcing
traceability
downstream
upstream
trade-offs
governance
value added
incentives
safeguards
forecast
benefit sharing
reputational

HUMAN WORDS

indigenous
justice
labor
laborer
laborers
child
children
community
workers
exploitation
exploited
child labor
human rights
self-determination

BUSINESS AND SUPPLY CHAIN

practices
shortage
business
businesses
enterprise
enterprises
company
policy
regulation
standards
norms
companies
economic
macroeconomic
supply
export
trade
firms
demand
analysis
percent
technologies
consumption
stockpile
reserves
innovation

dispossession
displacement
marginalization
resettlement

NATURAL RESOURCE WORDS

deforestation
forest
water
lands
areas
biodiversity
conservation
land use
protected areas

REGION

Peru
mexico
congo
Chile
china
chinese
DRC
democratic republic of congo
indonesia
united states
america
Canada
Germany
Portugal
EU
European Union

Example General Query Structure

FOR GOOGLE SCHOLAR SYNTAX:

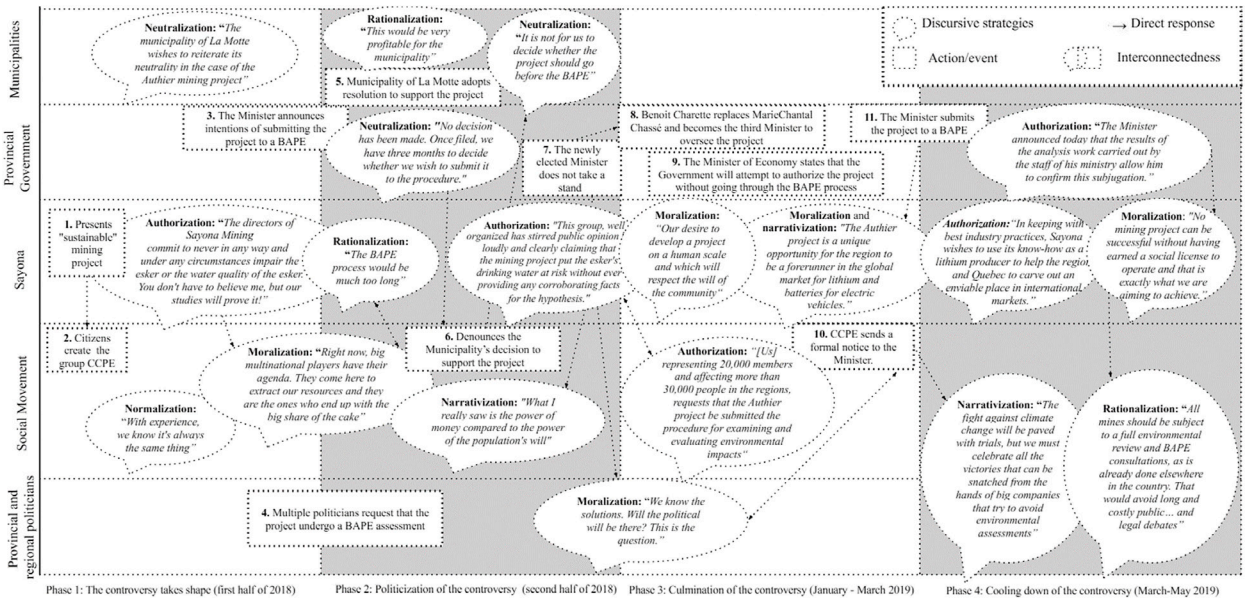
(discourse OR conversation OR debate OR discussion OR narrative OR persuasion OR propaganda OR communication OR activism OR audiences OR "public sphere" OR marketing OR spokespeople OR constituency OR stakeholders OR media studies OR "public relations") AND (nickel OR copper OR lithium OR niobium OR tantalum OR coltan OR graphite OR aluminum OR aluminium OR platinum OR palladium OR rhodium OR ruthenium OR iridium OR osmium OR lanthanum OR cerium OR praseodymium OR neodymium OR promethium OR samarium OR europium OR gadolinium OR terbium OR dysprosium OR holmium OR erbium OR thulium OR ytterbium OR lutetium OR scandium OR yttrium OR cobalt OR "rare earth" OR metals OR mining OR mineral OR extraction OR "precious metal" OR "raw materials" OR "raw material" OR tailings OR "artisanal mine" OR smelting) AND (battery OR electric OR electrification OR electrical OR energy OR energies OR semiconductor OR ev OR evs OR climate OR transition OR sustainable OR sustainability OR responsible OR environmental OR vehicle OR vehicles OR fossil OR green OR recycle OR renewable OR carbon OR "net zero" OR "circular economy" OR "responsible sourcing" OR traceability OR downstream OR upstream OR trade-offs OR governance OR "value added" OR incentives OR safeguards OR forecast OR "benefit sharing" OR reputational OR practices OR shortage OR business OR businesses OR enterprise OR enterprises OR company OR policy OR regulation OR standards OR norms OR companies OR economic OR macroeconomic OR supply OR export OR trade OR firms OR demand OR analysis OR percent OR technologies OR consumption OR stockpile OR reserves OR innovation OR indigenous OR justice OR labor OR laborer OR laborers OR child OR children OR community OR workers OR exploitation OR exploited OR "child labor" OR "human rights" OR self-determination OR dispossession OR displacement OR marginalization OR resettlement OR deforestation OR forest OR water OR lands OR areas OR biodiversity OR conservation OR "land use" OR "protected areas" OR peru OR mexico OR congo OR chile OR china OR chinese OR drc OR "democratic republic of congo" OR indonesia OR "united states" OR america OR canada OR germany OR eu OR "european union")

Summary of Searches

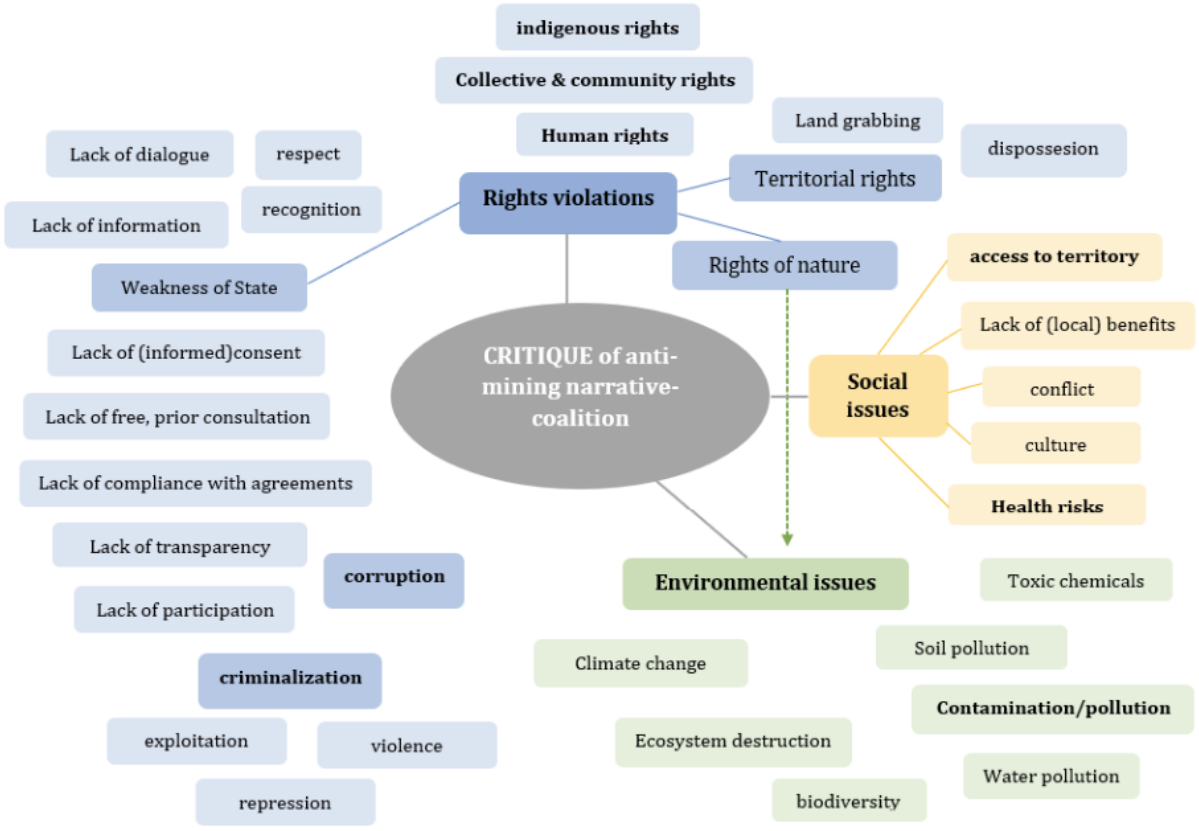
Further Details on "Searches" page of HL Discourse Lit Review Working Sheet

LABEL	ENGINE	STRUCTURE	FURTHER SPECIFICATIONS	RESULTS	ITEMS
1	GScholar	*"discourse" Tier 1 & 2*		411K	10
2	GScholar	*"communication" Tier 1 & 2*		3.5M	0
3	GScholar	*"conversation" Tier 1 & 2*		540K	0
4	Web of Science			17	0
5	GScholar	*"discourse", Tier 2, Removes elements from Tier 1*		2.4M	0
5.1	GScholar	*"discourse" Removes elements from Tier 1*	*2019 on*	63K	0
6	Gscholar	*"discourse" Tier 1*	*mining, transition*	408K	0
7	Gscholar	*"communication strategies" Tier 1 & 2*		13.4K	2
8	Gscholar	*"communication strategies" Tier 1 & 2*	*mining, transition*	11.4K	3
8.2	Gscholar	*"communication strategies" Tier 1 & 2*	*mining, transition, 2020 on*	5.4K	3
9	Web of Science	*"discourse" Tier 1 & 2 (pared down)*	*mining, transition, elements w/o REEs*	9	3
10	Gscholar	*"communication" Tier 1 & 2*	*mining, transition*	22K	0
11.1	Gscholar	*"discourse" Tier 1 & 2*	*mining, transition, 2020 on*	23.5K	16
11.2	Gscholar	*"discourse" Tier 1 & 2*	*mining, transition, before 2020*	21K	1
12	Scopus	*"discourse" Tier 1 & 2*		1708	0
12.1	Scopus	*"discourse" Tier 1 & 2*	*mining, transition*	1708	2
13	Scopus	*all discourse terms, Tier 1 & 2*		6.5M	3
14	Scopus	*"narrative" Tier 1 & 2*		160K	0
15	Scopus	*"narrative" Tier 1 & 2*	*mining, transition*	2,244	5
16	Public Relations Review	*mining, transition terms*	*Similar on other journals*		0
17	Public Relations Review	*all discourse terms, Tier 1 & 2*	*Similar on other journals*	83	0
18	Web of Science	*"narrative" Tier 1 & 2 (pared down)*	*mining, transition, elements w/o REEs*	4	1
19	Gscholar	*all discourse terms, Tier 1 & 2*	*mining, transition, no elements*	804K	0
20	GScholar	*"discursive" Tier 1 & 2*	*mining, transition*	53.8K	14
21	GScholar	*"discourse" Tier 1 & 2*	*"recycling"*	14.2K	2
22	Web of Science	*"discourse" Tier 1 & 2*	*"recycling", removed REEs, cut down generic Tier 2*	21	0
23	Scopus	*"discourse" Tier 1 & 2*	*"recycling"*	4K	1
24.1	GScholar	*"narrative" Tier 1 & 2*	*2019 on*	35K	1
24.2	GScholar	*"narrative" Tier 1 & 2*	*before 2019*	109K	0
25	GScholar	*"narrative" Tier 1 & 2*	*mining*	299K	5
25.1	GScholar	*"narrative" Tier 1 & 2*	*mining*	24.3K	2
	Various	*in "related articles"*			18
26	GScholar	*"discourse" Tier 1 & 2*	*specify germany*	128K	2
27	GScholar	*"discourse" Tier 1 & 2*	*specify coltan, tantalum, aluminum, mining terms*	40.4K	1
28	Scopus	*"discourse" Tier 1 & 2*	*transition/mining terms, Germany*	607	0
29	Scopus	*all discourse terms, Tier 1 & 2*	*transition/mining terms, Germany*	17.7K	0
30	GScholar	*"discourse" Tier 1 & 2*	*mining terms, Germany*	240K	0
31	GScholar		*mining/transition terms only, germany, no coal*	150K	0
32	GScholar	*all discourse terms, Tier 1 & 2*	*specify trade offs, mining/transition terms*	454K	0
33	Web of Science		*comms work*	777	0
34	Web of Science		*transition/mining terms, keyword communication*	252	0
35	Web of Science		*transition/mining terms, WoS topic communication*	89	1
36	Web of Science		*specify trade offs*	350	0
OTHER			*Found externally*		1
					97

Ritz et al. (2024) Narrative Summary



Tiefenbach (2023) Protest Discourse



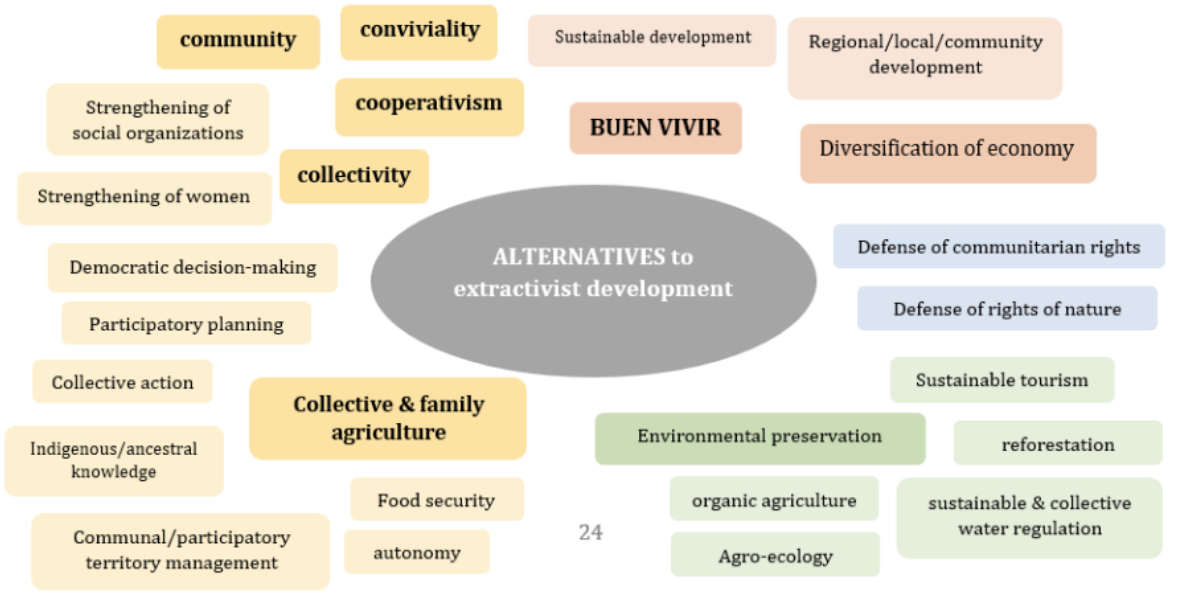


Table 2
Multidimensional and multiscalar (in)justice articulated in the justice claims. Note that this table is simplified to clarify the results. It does not consider complex interlinkages and partial overlap of the claims. LOs = Local organizations (incl. movements, ALFRA, MTK).

	Distributional	Procedural	Recognition	Restorative	Cosmopolitan
Macro	Increasing CM mining is a way of carrying responsibility in the EU regarding security, self-sufficiency, and the Green Deal. (FinnMin) CM mining financially benefits transnational companies at the state's expense. (LOs) The impacts of mining should be redistributed based on the consumption of CMs. (FinnMin)	CETA creates a power imbalance, benefiting transnational companies over the state. (FANC, movements) Centralized authority and decision-making guarantee the EU's interests. (FinnMin)	–	–	CMs contribute to climate mitigation. (FinnMin) CM mining contributes to global biodiversity loss. (FANC, SWM) Producing CMs in countries with adequate workers' rights and environmental regulation is morally right. (FinnMin)
Meso	Increasing CM mining creates economic benefits through investments and employment. (FinnMin) Increasing CM mining harms the economy by impacting other industries. (LOs) Increasing CM mining harms the national brand and affects other industries. (Movements, ALFRA) Increasing CM mining contributes to security and self-sufficiency, benefiting industries and increasing resilience. (FinnMin) Increasing CM mining harms Finnish nature and water sites. (Movements, FANC, ALFRA)	CM governance is biased toward the mining industry. (Movements) Centralized authority and decision-making guarantee the societal benefits of CM mining. (FinnMin)	Environmental and cultural values are misrecognized in CM governance. (Movements) Environmental basic rights are misrecognized in CM governance. (Movements) The societal significance of the mining industry and CMs is inadequately recognized. (FinnMin)	The benefits and responsibilities of CM mining should be redistributed by implementing a mining tax and directing the revenues to the state. (Movements, FANC) Implementing a mining tax would harm employment and climate mitigation efforts. (FinnMin) Environmental and cultural values need prioritizing by creating no-go zones and strengthening environmental permit regulations. (SWM, FANC) Agricultural fields should be excluded from mineral exploration to ensure food production. (MTK) National-level benefits and burdens should be comprehensively assessed by cost-benefit analysis. (Movements, FANC) Guarantee and fund mechanisms should be established to redistribute responsibility for possible harm and aftercare of mining. (Movements, FANC)	CM mining contributes to national biodiversity loss. (FANC, SWM) Increasing CM mining jeopardizes future generations' clean water supplies and the right to a healthy environment. (Movements, FANC) Depleting mineral resources through increased CM mining diminishes resources for future generations. (Movements)
Micro	Increasing CM mining harms local environments and livelihoods. (LOs, FANC) Increasing CM mining generates positive economic impacts and strengthens municipalities' vitality. (FinnMin) Increasing CM mining adds a financial burden on municipalities without adequate economic benefits. (ALFRA, movements) Uncertainty from mineral exploration harms livelihoods. (LOs, FANC)	The permitting system lacks effective participation procedures and means to confirm locals' consent. (LOs, FANC) The permitting system lacks transparency and available knowledge, benefitting the CM companies over the locals. (Movements, MTK, FANC) Decentralizing authority and decision-making contribute to uncertainty and complications for CM companies. (FinnMin)	Locals' rights, values, and knowledge are misrecognized, creating a bias toward economic values and natural scientific knowledge. (LOs, FANC) Locals' experiences of harm are misrecognized. (LOs, FANC) The landowners' property rights are misrecognized. (Movements, MTK, FANC)	Decentralizing decision-making power to municipalities by adopting a municipal zoning prerequisite. (Movements, ALFRA, FANC) A comprehensive assessment of project-specific benefits and burdens is needed. (Movements, FANC) The benefits and responsibilities of CM mining should be redistributed by implementing a mining tax and directing the revenues to the municipalities. (ALFRA) The reservation system should be abolished to reduce uncertainty. (Movements, MTK) Reservation fees should be directed to municipalities. (ALFRA) Reservation fees should be directed to landowners. (MTK)	Increasing CM mining jeopardizes future generations' rights to a healthy environment. (Movements, FANC)

Angervil (2024) Plots about the Pebble Mine

TABLE 2 Structure of the policy narrative opposing the Pebble Mine.

Internal plots	Themes	Settings	Characters/actors[b]	Moral of story, solutions
Plot (BME)	Bristol Bay's cultures	Cultural: Thousands of years of subsistence fishing, modern tourism, recreation fishing Legal: Clean Water Act, Alaska legislation Decisional/historical: 1972–2022 EPA decisions about activities in water Political: Local ballot win Evidential: Environmental study/Pebble Mine review results Geological: Bay's geological conditions Geographical/locational: Bay's natural wealth, the United States, Canada, the United Kingdom, Seattle, Hawaii, Alaska, Bristol Bay, federal agencies, Anchorage Superior Court, Alaska Supreme Court, Alaska U.S. District Court, U.S. Congress, DNR, open public spaces, U.S. Supreme Court	Subsistence users Tribal organizations (e.g., UTBB, BBNC, PRB, Nunamta Aulukestai) Cost Salish Tribes Fishing organizations Other organizations (e.g., Earthjustice, Alaska Conservation Foundation, Bristol Bay Defense Fund, SalmonState) Youths and other individuals U.S. Congresspeople Former federal administrators IUCN Animals Land Water EPA USACE Alaska U.S. District Court Scientists/biologists Activists	Pebble Mine would destroy the entire ecosystem
Subplot 1 (Middle)	U.S. national interest	Economic: National labor[a] Decisional: Federal land reserve policies[a] Locational: Presidency,[a] Bristol Bay	Tribal organizations Subsistence users Biologists Activists Alaska Marine Conservation Council Sen. Maria Cantwell	
Subplot 2 (Middle, End)	Democracy	Decisional: Citizen voices in Pebble decision-making[a] Locational: EPA, Bristol Bay, Alaska	BBNC UTBB Nunamta Aulukestai SalmonState Bristol Bay Defense Fund Earthjustice	Opposition to Pebble Mine meant people spoke, and governmental authorities should have listened

TABLE 2 (Continued)

Internal plots	Themes	Settings	Characters/actors[b]	Moral of story, solutions
Subplot 3 (Middle)	Climate	Evidential: Climate change research[a] Geographical/locational: Global climate,[a] Bristol Bay, Alaska	Alaska Conservation Foundation CAP	
Subplot 4 (BME)	Natives' sovereignty	Historical: Thousands of years of ownership and self-determination[a] Legal/normative[a]: Federal indigenous legislation, indigenous principles, indigenous legislation, international principles Locational: Bristol Bay, Alaska, Seattle, federal government[a]	BBNC IVC PBC UTBB Cost Salish Tribes Nunamta Aulukestai CAP	The government must respect the traditional practices, principles, and legal standards establishing Natives' sovereignty
Subplot 5 (BME)	Alaska's constitutional requirement for applying public good principles in decision-making	Constitutional: Alaska Constitution[a] Locational: Alaska, DNR, Anchorage Alaska Superior Court, Alaska Supreme Court	Nunamta Aulukestai Individuals Alaska Supreme Court	The Pebble Mine exploration permit was unconstitutional *Policy narrative resolution: EPA should have stopped Pebble Mine and established permanent protection for Bristol Bay*

:ABOUT HARMONY LABS

WE ARE A MEDIA RESEARCH LAB, using science, data, and creativity to research and reshape society's relationship with media. For more than a decade, Harmony Labs has helped storytellers and strategists, decision makers and dreamers, harness the immense power of media to shape a positive, pluralistic future. With the Narrative Observatory, for the first time ever, we're harnessing industry relationships to deliver one-of-a-kind data infrastructure that empowers partners to find, reach, and resonate with the right audience in today's media minefield. The Narrative Observatory delivers audience-based insights, narrative and network analysis, and empirical validation of cultural strategy and content—all derived from the actual behavior of real people and true audiences, not survey results, demographic groups, or inauthentic online activity.

We work with a wide range of partners on issues of existential importance, like climate, democracy, equity, immigration, political violence, public education, identity, artificial intelligence, and more, using an approach to research that is rigorous, participatory, and public. One of the first papers we co-authored looked at fracking narratives in documentary film. The outputs we've created with our partners include websites, presentations, peer-reviewed publications, toolkits, blog posts, curriculum, interactives, white papers, and media. And our work has been covered in the press, like in this New York Times article.

Founded by John S. Johnson in 2008, Harmony Labs is a 501(c)3 incorporated in New York State. Funders include Atlantic Foundation, Gates Foundation, Robert Wood Johnson Foundation, John D. and Catherine T. MacArthur Foundation, Mellon Foundation, Omidyar Network, Open Society Foundations, Melliore Foundation, Nathan Cummings Foundation, Google, and more. Learn more at harmonylabs.org.