LAURA DEL DUCA, ADRIANA ABRIL, RASMUS KLØCKER LARSEN, BILJANA MACURA, NEAL R. HADDAWAY & MARIA BOSTRÖM IN COLLABORATION WITH MUONIO REINDEER HERDING COMMUNITY, VILHELMINA SÖDRA REINDEER HERDING COMMUNITY & VOERNESE REINDEER HERDING COMMUNITY

Knowledge Gaps about Mining Impacts on Sami Lands

A Call for Epistemic Justice in European Minerals Extraction

ABSTRACT In the context of the EU's Critical Raw Materials Act, which prioritizes mineral extraction and imposes time limits on project approvals, there have been a surge of policy proposals that aim to expedite licenses for green industry projects. Meanwhile, the academic literature largely overlooks risks for Indigenous Sami rights and reindeer herding. In this paper, we examine if a similar knowledge gap exists in a key part of the practitioner literature informing licensing decisions for new mines, namely environmental impact assessments (EIAs). To do so, we undertake a comparative synthesis of results from i) unpublished findings from a review of selected EIAs from mining companies in Sweden, and ii) a review of Sami knowledge about impacts at two mining sites in Sweden. Findings reveal a considerable mismatch between predicted impacts in corporate EIAs and those impacts experienced by herding communities. Using an epistemic justice lens, we argue that this knowledge gap is no coincidence—instead it reflects an epistemic injustice underlying European and hence Swedish minerals policy and its ambitions to fast-track licensing and exploit Sami lands in the name of the green transition.

KEYWORDS green transition, epistemic justice, Indigenous, Sami, mineral extraction, environmental impact assessments

Introduction

The Nordic countries are poised to play a pivotal role in aiding Europe's Green New Deal and meeting climate targets, as member states will be expected to provide increasing supplies of critical raw materials. In recent years there has been a surge of policy proposals focused on expediting licenses for green industry projects, including projects that target mineral deposits in the north of Sweden. There, as in other places in the world, minerals exist on Indigenous lands, governed by policies that demonstrate a limited understanding of the human consequences of mining projects.[1] The EU's Critical Raw Materials (CRM) Act 2024[2] epitomises these developments: it is motivated not only by climate concerns but also by geopolitical and financial interests, driven by global competition for raw materials and land for commercial activities.

The CRM Act, which prioritises mineral extraction over other concerns and imposes time limits on project permitting and consultation processes, is likely to exacerbate already significant—and arguably legitimate[3]—resistance from Sami and environmental groups. In Sweden, these issues have been brought to the fore as state-owned Swedish mining company Luossavaara-Kiirunavaara Aktiebolag (LKAB) announced plans[4] to exploit rare earth minerals near Kiruna, triggering opposition[5] from affected Sami reindeer herding communities.

The Sami homeland, Sápmi, hosts 13 out of 16 active metal mines in Sweden.[6] The region contributes, in one estimate, 98.5% of Sweden's mineral extraction value.[7] Existing mines in Sápmi draw extensive criticism from both environmental and Sami organizations, particularly reindeer herding communities, of the harms the mines cause to native flora and fauna, traditional land uses, and rights and culture. While empirical academic research on social and cultural impacts on Indigenous peoples remains scarce,[8] our own studies have shown that the actual impacts on herding communities exceed estimates provided by private industry or government actors in project proposals.[9]

When we initiated the research presented here, in November 2018, 585 studies existed in the published research, comprising both primary empirical and secondary scientific studies on impacts of mining in Sweden, Russia, Finland, and Norway

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1 Kemp & Owen, "Researching 'resource frontiers' is vital for understanding the human consequences of scaling up renewable energy technologies," 2024.

2 See Regulation (EU) 2024/1252.

3 See CERD = International Convention on the Elimination of All Forms of Racial Discrimination, 2020.

4 LKAB, Europe's Largest Deposit of Rare Earth Elements 25 Percent Larger. Today Marks First Step in Critical Review, 2023.

5 Kejerhag, "LKAB:s gruvfynd kom som en chock för samebyn" ['LKAB's mining discovery came as a shock to the Sami reindeer herding community'], 2023.

6 Lawrence & Åhren, "Mining as colonisation. The need for restorative justice and restitution of traditional Sami lands," 2016. In addition to the 12 mines noted, the first mine in 10 years was opened in Sweden in 2024, see "Sveriges första nya gruva på tio år öppnas i Vindelgransele. 'Finns guld för en miljard i området'" ['Sweden's first mine in ten years. "Gold worth a million in the area"'], 2024.

7 Lawrence & Åhren, "Mining as colonisation. The need for restorative justice and restitution of traditional Sami lands," 2016.

8 Haddaway et al., "Evidence of the impacts of metal mining and the effectiveness of mining mitigation measures on social-ecological systems in Arctic and boreal regions. A systematic map," 2022.

9 Kløcker Larsen et al., "The impacts of mining on Sámi lands. A knowledge synthesis from three reindeer herding districts," 2022.

(nations encompassing Sápmi).[10] Of these studies, only nine (4%) mentioned Sami reindeer herding communities, and there were no empirical studies on impacts on the Sami people, let alone reindeer herding communities specifically. Some studies focused broadly on perceptions of residents in northern Finland; others provided interview data from Sami communities, but as part of legal or justice-related analysis rather than assessments of actual impacts, while others discussed governance or political issues about mining and Sami rights. A subsequent qualitative review that we undertook during 2021 indicated that this pattern had not changed.[11] In summary, whereas the research literature shows an awareness and discusses important governance issues on the topic, it contains scant empirical data about mining impacts on Sami communities.

Taking note of this knowledge gap in the academic literature, the objective of this paper is to examine if a similar gap exists in a key part of the practitioner literature typically informing licensing decisions for new mines, namely environmental impact assessments (EIAs), and discuss some of the possible reasons and implications for this. To do so, we compare results from unpublished findings from i) a review of selected EIAs from mining companies in Sweden,[12] and ii) a review of Sami knowledge about impacts at two mining sites in Swedish Sápmi.[13] We refer to the original sources for readers, who wish to read about the respective methods in detail.

Our larger argument is about a concern that policy proposals to fast-track licensing to enable the green transition are formulated with a lack of awareness of risks to the economic, social, and cultural rights of the Sami. Theoretically, whilst lacking the space for a comprehensive discussion, we situate this study in a meeting between two literatures. First, earlier work on impact assessments and Indigenous (Sami) rights is used to guide the broader framing of the paper and understand the study context and materials. Second, an epistemic justice lens is adopted to help make sense of the findings, providing for an argument that the documented knowledge gap is no coincidence. Instead, we propose, it reflects an underlying injustice in knowledge production, serving a green colonialism agenda in the European North.

Since the 1970s—ironically around the time impact assessments became standard—feminist standpoint theory highlighted that the most marginalized hold unique knowledge of societal problems and related solutions.[14] When epistemic justice is not achieved, the resulting epistemic *in*justice can be two-pronged, comprising both of a testimonial injustice (where knowledge is not valued as such due to the bias of the knowledge receiver) and hermeneutical injustice (where groups are kept from contributing to understanding).[15] Epistemic violence must be considered a form of vio-

[10] Haddaway et al, "Evidence of the impacts of metal mining and the effectiveness of mining mitigation measures on social-ecological systems in Arctic and boreal regions. A systematic map," 2022.

[11] Kløcker Larsen et al., "The impacts of mining on Sámi lands. A knowledge synthesis from three reindeer herding districts," 2022; see also Tolvanen et al., "Mining in the Arctic environment. A review from ecological, socioeconomic and legal perspectives," 2019.

[12] Macura et al., "Mapping the predicted and potential impacts of metal mining and its mitigation measures in Arctic and boreal regions using environmental and social impact assessments. A systematic map protocol," 2019.

[13] Kløcker Larsen et al., "The impacts of mining on Sámi lands. A knowledge synthesis from three reindeer herding districts," 2022.

[14] Harding, *The Science Question in Feminism*, 1996.

[15] Fricker, *Epistemic Injustice. Power and the Ethics of Knowing*, 2007.

lence even if the intention is not violence.[16] Indigenous peoples' knowledge has long been considered inferior[17] and unscientific for not meeting some of the criteria of Western science such as universality, or even being in writing and referenced.[18]

Methodology

Partly in response to the knowledge gap in the academic literature highlighted above, we conducted an empirical study, during 2019–2020, evaluating mining impacts from the perspective of affected Sami reindeer herding communities. The study followed principles of participatory action research and Indigenous research, in a collaboration between three Sami reindeer herding communities, the Sámiid Riikkasearvi (The National Association of the Sami People in Sweden, SSR) and an independent research institute.[19] This study identified a host of environmental, social and cultural impacts that the three communities have experienced as a result of mining on their traditional territories, such as disturbances and stress to the reindeer, substantially increased workload, constrained opportunities for Sami youth to continue traditional reindeer herding, and destruction of cultural relicts and sacred sites (see Fig. 1).

For the analysis presented in this paper, we drew on the unpublished dataset by Macura et al.[20] This dataset was prepared for a systematic map of predicted and potential impacts of metal mining and its mitigation measures in Arctic and boreal regions using environmental and social impact assessments (SIAs), combining Swedish and English language searches on specialist websites and Google Scholar with direct requests to relevant stakeholders for additional information.[21] The dataset contains a subset of EIAs for Swedish mining projects, the selection of which was based on the type of mined mineral, type of mining (underground or above ground), and location of the project, aiming for a set of mining projects as diverse as possible. We filtered the Macura et al. dataset (which included mines at different stages of operation, including post-closure and abandoned mines) which yielded 11 EIAs relevant for 11 Swedish mining projects, prepared between 2001 and 2016.

EIAs of large mining development projects in Sweden have been conducted since the 1970s. SIAs are not mandatory in Sweden, while EIAs are, as part of the statutory licensing for mining projects. Macura et al. categorized impacts predicted in the EIAs into six groups, namely impacts on:

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16 Dotson, "Tracking epistemic violence, tracking practices of silencing," 2011.

17 Agrawal, "Dismantling the divide between indigenous and scientific knowledge," 1995.

18 Sultana, "The unbearable heaviness of climate coloniality," 2022.

19 Kløcker Larsen et al., "The impacts of mining on Sámi lands. A knowledge synthesis from three reindeer herding districts," 2022.

20 Macura et al., "Mapping the predicted and potential impacts of metal mining and its mitigation measures in Arctic and boreal regions using environmental and social impact assessments. A systematic map protocol," 2019.

21 Macura et al., "Mapping the predicted and potential impacts of metal mining and its mitigation measures in Arctic and boreal regions using environmental and social impact assessments. A systematic map protocol," 2019.

- soil;
- surface water, groundwater, ice, or marine water;
- climate or atmosphere;
- flora, fauna, or ecosystems;
- landscapes, economic impacts, service and infrastructure, culture and history, or health and wellbeing; or
- impacts spanning more than one of these categories.

To compare Sami experiences of actual impacts with the predicted impacts portrayed in the EIAs, we defined which of the 391 impacts recorded in the Swedish dataset are relevant to reindeer herding communities. We considered as "relevant" those categories of impacts identified by the three reindeer herding communities participating in our empirical study introduced above.[22] Other impacts were also coded as relevant through an additional detailed reading of the data, for instance when the reports explicitly referred to reindeer herding communities or activities but with unclear statements about the types of impact.

Finally, we compared the predicted impacts in the selected Swedish EIA data to the impacts collected from Sami experiences, identifying gaps and overlaps. This comparative analysis was done by matching the description of each relevant impact from the EIA dataset to impacts identified by Sami herding communities, where possible (Fig. 1, see left column). Where a recorded impact could be categorized in multiple ways, it would be counted for each applicable category. To mitigate risk of misinterpretation, an initial impact categorization conducted by the academic researchers behind this study was shared with the Sámiid Riikkasearvi for consolidation.

As with other parts of the work described above, this paper is the product of a project collaboration between three reindeer herding communities, the Sámiid Riikkasearvi, and an international research institute. The community contributions to this text have been approved for publication by the community boards. The researchers are solely responsible for the policy analysis and academic theorization.

As regards study limitations, we acknowledge that the included EIAs were undertaken at different times and for different types of mining projects. They have hence also been subject to partly differing legal requirements and other expectations on the assessments, e.g., related to government policy and understanding of good practice. Moreover, we do not claim to give anything near a complete representation of impacts on Sami culture. The comparison is only with a smaller subset of reindeer herding communities and crucial parts of Sami culture and relations to land are not captured, e.g., as relevant to the Sami populations that are without membership in the herding communities.

Results

When contrasting the types of impacts predicted by the 11 corporate EIAs with those impacts that Sami herding communities actually experience, we find that Sami knowledge is poorly reflected. Out of 391 predicted impacts described in the EIAs, most

[22] Kløcker Larsen et al., "The impacts of mining on Sámi lands. A knowledge synthesis from three reindeer herding districts," 2022.

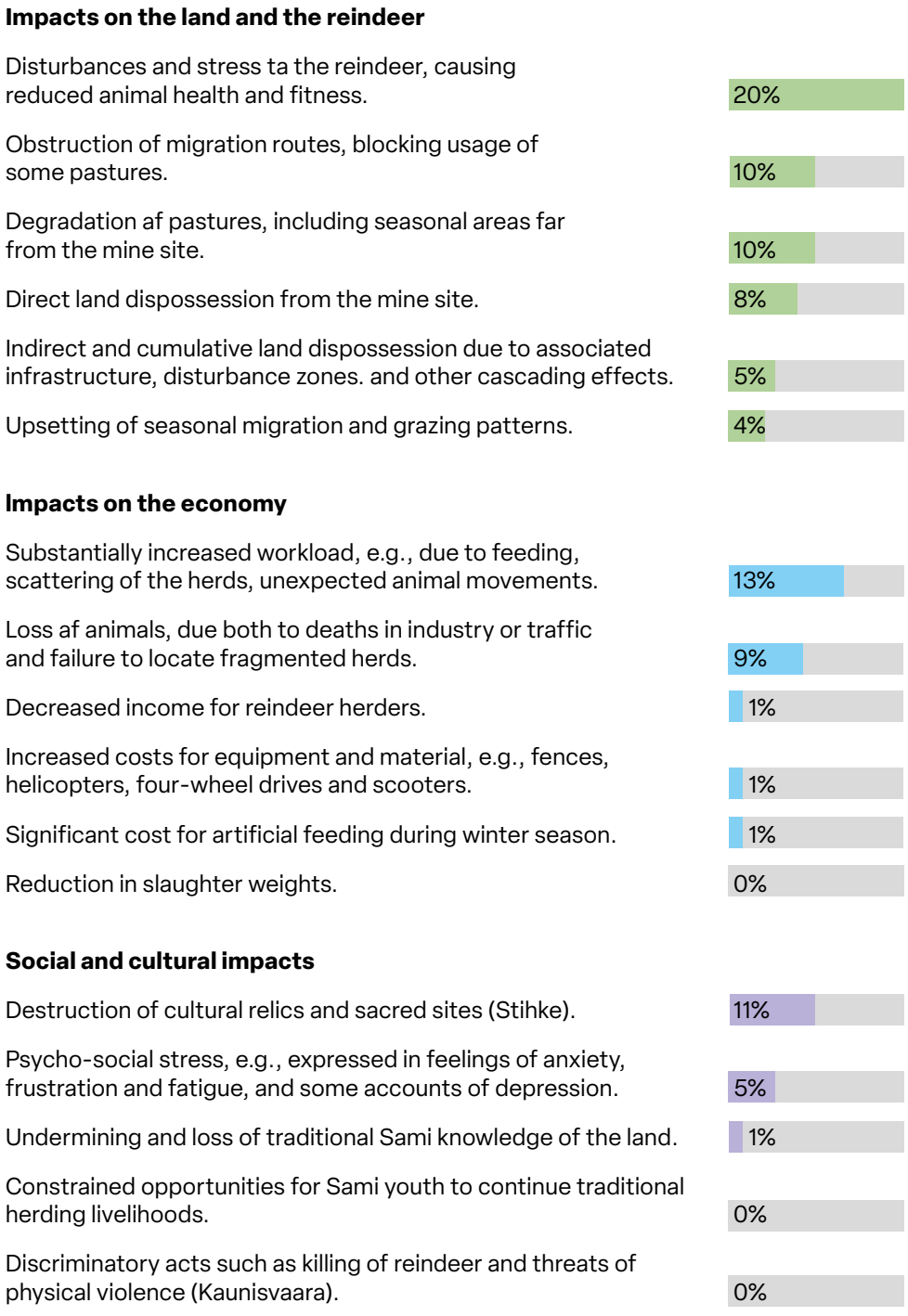

Fig. 1. Percentage of the 391 distinct predicted impacts on reindeer herding communities, as reported in 11 EIAs for mining projects in the Swedish part of Sápmi, that map categories of impact identified by Sami herding communities. Source for the summary of impacts of mining on Sami lands, right column: Kløcker Larsen et al. 2022.

(323, or 83%) were about impacts not perceived, in the EIAs, to have a consequence for Sami herding communities. The remaining predicted impacts (68, or 17%) referred to impacts on reindeer herding communities but concentrated on few distinct types of impact, with little attention to impact categories deemed critical by the herding communities themselves (Fig. 1). Over half (57%) of the impacts concerning reindeer herding described in the EIAs pertained to direct effects on land and reindeer, with considerably less attention to economic (25%) or socio-cultural impacts (18%).

Of the 17 impact categories identified as important by the three herding communities themselves, seven are mentioned only once or not at all in the 11 EIA reports (these seven categories are labelled with 0% or 1% in Fig. 1). These seven categories include economic impacts such as decreased income for reindeer herders, increased costs for equipment and material, significant cost for artificial feeding, and reduction in slaughter weights, and socio-cultural effects such as undermining and loss of traditional Sami knowledge, constrained opportunities for Sami youth to continue traditional livelihoods, and the risk of harassment or discrimination. The three impacts on reindeer herding communities identified by Sami herding communities and most commonly predicted in the EIAs refer to disturbance and stress to reindeer (representing 20% of predicted impacts), substantially increased workload (13%), and destruction of cultural relics and sacred sites (11%).

Discussion

The above analysis shows that, just as for the academic literature, EIAs undertaken by project proponents yield little understanding of the impacts of mining experienced by Indigenous Sami herding communities. While documented, datasets of this size are rare in the literature.[23] What are the reasons for this gap between how Sami herding communities experience and understand mining impacts and information on impacts in the public domain, whether in academic research or EIAs from companies or consultancies?

We have elsewhere[24] discussed potential factors that may contribute to the lack of research into the impacts of mining on Sami lands, including the persistence of a colonial logic in the practice of science itself and risks of reviewer bias working against studies aimed to understand impacts from the perspective of affected communities.[25] It is also possible that researchers self-censor and, even unconsciously, avoid topics such as this, which can be perceived as controversial and carry the risk of being exposed to criticism. There are several examples where industry organizations have attempted to stifle researchers and undermine legitimacy of published research.[26] It is worth recalling the growing number of calls from both Sami organ-

[23] O'Faircheallaigh, *Indigenous Peoples and Mining. A Global Perspective*, 2023.

[24] Kløcker Larsen et al., "The impacts of mining on Sámi lands. A knowledge synthesis from three reindeer herding districts," 2022.

[25] Schipper et al., "Equity in climate scholarship. A manifesto for action," 2021; Lewis et al., "Mining and environmental health disparities in Native American communities," 2017.

[26] Lawrence & Raitio, "Academia and activism in Saami research. Negotiating the blurred spaces between," 2016; Gunnarsson, "Vindkraftsbolagen stoppade larmrapport om rennäringen" ['The wind power companies halted the alarm report about reindeer husbandry'], 2017.

izations and research institutions to urgently decolonize knowledge production.[27] More needs to be done but efforts have been made to raise awareness amongst researchers of the need to ensure Sami involvement in the planning of research as well as its execution.

As noted above, in the EIAs we studied, economic and socio-cultural impacts received considerably less attention than direct effects on land and reindeer. Arguably, this is likely to be expected in EIAs, as opposed to, e.g., SIAs, which are not mandated in Sweden. The knowledge bias, e.g., with information on biophysical and economic impacts prevailing, could support an argument for countries such as Sweden to introduce mandatory social and human rights impact assessments. Notwithstanding, our observations in this paper relate only to a mismatch in the *types* of impacts. While the dataset used in this paper did not allow for an in-depth analysis of impacts, we are acutely aware that a discrepancy typically exists in how to interpret the *extent and implications* of impacts—in part prompted by fundamental epistemic (or even ontological) divergence between communities and industry.[28] The limitations in impact assessments driven by project proponents is one reason why some scholars argue for a need to rethink the governance of impact assessments altogether, shifting both authority and resources towards Indigenous groups so they have greater influence, via either co-management arrangements or Indigenous-led studies.[29]

The decision-making on the CRM Act, introduced in the beginning of this article, testifies to the scant interest, or ability, of European policy makers and member states, such as Sweden, to protect Sami rights in the green transition. In September 2023, the European Parliament decided on amendments to the Commission's draft of the CRM Act that aim to provide stronger social and environmental safeguards. Of greatest interest to Indigenous peoples was a proposed addition, in Annex 3 and referring to article 5.1, of a reference to the United Nations Declaration on the Rights of Indigenous Peoples and, especially, the right to give or withhold free, prior and informed consent (FPIC). Mining projects in Indigenous areas that wish to qualify as "strategic," and thus merit fast-tracking and financial support from the EU, would have to demonstrate obtained consent. While the amendment to FPIC was undoubtedly a step towards the realization of Sami rights, it was insufficient, as we have argued elsewhere,[30] due to the assumption that member state bureaucracies would consult in good faith with the Sami. It therefore ignores the shortcomings in national legislation, which in Sweden lacks effective provisions on Sami rights in mineral laws and environmental licensing procedures.[31]

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[27] Herrmann et al., *Comprehensive Policy-Brief to the EU Commission. Roadmap to Decolonial Arctic Research*, 2023.

[28] Roche et al., "Understanding why impact assessment fails. A case study of theory and practice from Wafi-Golpu, Papua New Guinea," 2021.

[29] Kløcker Larsen "Impact assessment and indigenous self-determination. A scalar framework of participation options," 2017.

[30] Raitio & Kløcker Larsen, "EU's Critical Raw Materials Act fails to protect Sámi rights. Here's how to strengthen it," 2023.

[31] Raitio et al., "Mineral extraction in Swedish Sápmi. The regulatory gap between Sami rights and Sweden's mining permitting practices," 2020.

Yet in the final trialogue negotiations to finalize the CRM Act, between the European Commission, Council, and Parliament, even this general reference to FPIC was removed and replaced with formulations about "meaningful consultations," not adding anything new to existing regulations. According to media reports,[32] this political agreement came about following pressure from, among others, the Swedish government.[33] Such processes both testify to how the EU rush for minerals is a highly contested colonial resource frontier,[34] and underline how decision-makers display limited awareness of potential impacts on people and the environment.[35]

As this paper demonstrates, our understanding of the impacts of mining on Sami communities is currently scant, and our awareness is even more limited of the risks linked to new policy proposals to fast-track licensing for new mineral extraction for the climate transition. Arguably, decision-makers who wish to speed up licensing should ensure a solid knowledge base for decision-making, focusing less on imposing time limits and more on understanding the root causes of societal resistance[36] to mineral extraction. When speaking of "our" lack of knowledge of mining impacts on the Sami, we refer to Western society, notably the EU and its member states, including Sweden. Sami communitities are knowledgeable about mining impacts, yet—as we have observed—their voices are rarely heard in corporate EIAs. Moreover, given the legal construction of Sami rights in Swedish legislation, defining herding communities as the rights-holding subjects as concerns land use, most of the Sami population finds itself without formal opportunities to contribute their knowledge.[37]

This leads us to our second main argument: there is an urgent need for both policymakers and the mining industry to consider how their actions can support epistemic justice in policy and practice around mineral extraction. Around the world, epistemic justice and violence are increasingly being linked to green grabbing, defined as "the appropriation of land and resources for environmental ends,"[38] and to green extractivism.[39] Particularly in the Global South, EIAs have been used as instruments to legitimize extraction, but this has been documented in the European North as well.[40] What could progress on epistemic justice mean in the context of policy on mineral extraction? For one, it could mean negotiating agreements with both government and industry about new modes of decision-making procedures. This could provide conditions for a funda-

[32] Raitio & Kløcker Larsen, "EU's Critical Raw Materials Act fails to protect Sámi rights. Here's how to strengthen it," 2023.

[33] Fröberg, "Här ställs kampen om samebyns framtid på sin spets" ['The battle for the future of the Sami village is coming to a head'], 2023.

[34] Normann, "Green colonialism in the Nordic context. Exploring Southern Saami representations of wind energy development," 2020; Laframboise, "Brussels looks north. The European Union's latest Arctic policy and the potential for 'green' colonialism," 2022.

[35] Össbo, "Back to square one. Green sacrifice zones in Sápmi and Swedish policy responses to energy emergencies," 2023; Zografos & Robbins, "Green sacrifice zones, or why a green new deal cannot ignore the cost shifts of just transitions," 2020.

[36] Zachrisson & Beland Lindahl, "Political opportunity and mobilization. The evolution of a Swedish mining-sceptical movement," 2019.

[37] Knobblock, "Att skriva från gränslandet. Dekoloniala berättelser från Sábme" ['Writing from the borderlands. Decolonial stories from Sápmi'], 2021.

[38] Fairhead et al., "Green grabbing. A new appropriation of nature?" 2012.

[39] See for instance Tornel, "Energy justice in the context of green extractivism. Perpetuating ontological and epistemological violence in the Yucatan Peninsula," 2023.

[40] Lassila, "An irreplaceable place. Onto-epistemological contestation in the environmental impact assessment process of the green Anglo American Sakatti mine, Arctic Finland," 2023.

mental re-conceptualization wherein Sami rights-holders have both mandates and resources to contribute to land-use planning and licensing, guided by Sami legal customs and cultural perspectives.[41] In the case of impact assessments, Sami experts could then conduct or guide their own studies, rather than integrating Sami knowledge inside assessment reports written by consultants trained in Swedish legal terminology and paid and supervised by companies.

Conclusion

European and Swedish policymaking aimed at advancing the "green transition" should no longer ignore the profound risks associated with expediting licensing for mining projects on Indigenous lands and overlooking Indigenous knowledge about mining impacts. To meet climate targets and ensure a green transition that is not only fast but also just, the scientific literature, policy discourse and impact assessments in the Nordics need to better reflect Indigenous Sami knowledge on the socio-ecological impacts of mining in Sápmi. Sami activists, but also a growing number of academic scholars, critique green transition policies, arguing that they are more correctly understood as mechanisms of green colonialism.[42] In this paper, we do not present evidence that directly supports such claims, nor do we adopt the notion of green colonialism as part of a theoretical lens. We show instead the existence of an epistemic injustice underlying European and hence Swedish minerals policy and its ambitions to fast-track licensing and exploit Sami lands in the name of the green transition.

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[41] Nilsson, *Att* bearkadidh. *Om samiskt självbestämmande och samisk självkonstituering* [*'Bearkadidh*. On Sami self-determination and Sami self-constitution'], 2021.

[42] Normann, "Green colonialism in the Nordic context. Exploring Southern Saami representations of wind energy development," 2020; Fjellheim, "Wind energy on trial in Saepmie. Epistemic controversies and strategic ignorance in Norway's green energy transition," 2023; Össbo, "Back to square one. Green sacrifice zones in Sápmi and Swedish policy responses to energy emergencies," 2023; Kuokkanen, "Is reindeer the new buffalo? Climate change, the green shift and manifest destiny in Sápmi," 2023.

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