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How Should Impacts Be Assessed?

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Industrial development and resource exploitation in Arctic Fennoscandia cause cascading and cumulative effects with roots that go back to mining in the late nineteenth century (Österlin et al., 2023, see Chapter 5). Mining of iron, copper, and other minerals and metals is a major industry today in northern Sweden and Finland. The increasing demand for minerals and metals to facilitate a "green transition" is a challenge for environmental management but also comes with social impacts. Indigenous and local Arctic communities are highly dependent on the natural environment for their livelihoods, which are now at risk because of the effects of resource extraction and climate change. In this chapter we discuss limitations of the current impact assessment procedures in this resource-rich region. We also present local attempts to provide additional knowledge and understanding of the full impact from multiple human activities beyond conventional corporate-led impact assessments needed for sustainable land use management.

Impact assessment (IA) is a process used to consider the implications for the environment and people of proposed human actions (International Association of Impact Assessment, 2021). The terms "impact" and "effect" are frequently used synonymously. The concept of "environment" in IA evolved from an initial focus on the biophysical components to a wider definition, including the physical-chemical, biological, cultural, and socio-economic components of the total environment. In order to predict expected future consequences of possible decisions, the practice of IA needs to rely on several tools based on both natural and social sciences. However, IAs are not assessments of impacts in the true sense of the word, as at the time of assessments there are no impacts to assess. Their ontology is more like that of a hypothesis, with estimates, models, and future scenarios presented based on selected elements of current knowledge (Suopajärvi, 2013; Olofsson, 2020). The results from the theoretical assessment approaches are

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then "tested" in the real world "living laboratories." Social impacts are, by definition, expected or unexpected (Vanclay, 2002, 2003; Vanclay et al., 2015).

The most established aspect of IA is the Environmental Impact Assessment (EIA), which is defined by the International Association of Impact Assessment as "the process of identifying, predicting, evaluating and mitigating the biophysical, social, and other relevant effects of development proposals" (IAIA, 2021). Today, EIA is the main legally based tool used to predict impacts on environment and communities of individual industrial projects, regardless of whether they are in the field of mining, infrastructure construction, or energy production (e.g., Glasson & Thierval, 2019; Euroepan Union (EU) Directive 2001/42/EC). In contrast, forestry does not require any assessment of impacts in Sweden and Finland.

The EIA directive of the (EU) is implemented by EIA Law (252/2017) and Decree (2017/277) in Finland. In Sweden, the EIA Directive is implemented by the Environmental Code (SFS 1998:808) and the Ordinance on Environmental Impact Assessments (SFS 1998:905). In general, the EIA legislation of both countries follows the wording of the EIA directive of EU with its amendments (e.g., Directive 2014/52/EU, article 3). It states that:

> The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors: (a) population and human health; (b) biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC; (c) land, soil, water, air and climate; (d) material assets, cultural heritage and the landscape; (e) the interaction between the factors referred to in points (a) to (d).

The "polluter pays" principle is applied in the EIA legislation, and the company applying for a permit for resource extraction or construction has the leading role in assessing impacts resulting from the proposed activities, typically by contracting a consultancy for assessment.

Both the EU-level EIA directive and national laws are unclear about how cumulative effects should be assessed and what should be included in assessments of social impacts (EU Directive 2001/42/EC). Cumulative effects typically refer to changes to the environment and people that are caused by the combined impact of past, present, and future human activities and natural processes (Duinker et al, 2013). Even if the EIA legislation recognizes many kinds of impacts on humans, Social Impact Assessments (SIA) have often been limited and focused on predicted, and at times even wishful, impacts on employment and economic benefits (Suopajärvi, 2013). In addition, the requirements for how cumulative effects should be assessed, especially effects on Indigenous communities, have been criticized for being unclear and even "non-existent" in Sweden (Raitio, Allard, & Lawrence, 2020: 12).

Large-scale spatial planning is primarily conducted through two planning instruments in Sweden, the "Comprehensive plans" (Planning and Building Act 2010:900) and "Areas of national importance" (Environmental Code 1998:808 chap 3 & 4). Comprehensive plans are established by municipalities to provide long-term strategic guidance on how land and water resources should be used. There are fourteen categories of "Areas of national importance," and these are appointed by twelve different governmental agencies, for example the Energy Agency, the Environmental Protection Agency, and the Sámi Parliament with the intention to safeguard access to land for particular sectorial interests. For example, areas can be appointed for nature protection, mineral resources, energy generation, and reindeer herding. When "Areas of national interest" overlap, priorities among them are made at the municipal level or in the local environmental courts.

In Finland, land use planning is controlled and reconciled mainly through a procedure complying with the Land Use and Building Act (132/1999). The act is connected to other legislation originating from the Constitution of Finland (731/1999), which sets the fundamental responsibilities and rights to participate in decision making toward one's living environment, and which is supplemented by the EIA directive of the European Union (Kokko et al., 2014: 9–17). Land use planning is conducted by public authorities such as municipalities and regional councils supervised by governmental bodies such as the Centre for Economic Development, Transport and the Environment (ELY centers), and the Ministry of the Environment (2021). There are three main levels of land use planning in Finland; (1) the Government decision on Finland's national land use guidelines, (2) the Regional plan and land use planning, which includes the regional scheme, the regional plan, and the regional development program, and (3) the land use strategies and programs within the municipality where a local master plan and a local detailed plan, land policy, and building ordinance are the most important (Ministry of the Environment of Finland, 2021).

Local Initiatives to Improve Impact Management

Accumulation of impacts over time in Arctic Fennoscandia is caused by the long-term exposure to multiple industrial cycles. The impact assessment process follows the polluter pays principle, where the developer of individual projects is responsible for including an EIA in their permit application to the regulating authorities. Thus, assessments of impacts from new industrial projects mainly focus on near future direct impacts from single projects (e.g., Atlin & Gibson, 2017) without considering the accumulation of effects over time or interaction with effects resulting from other human activities or natural processes. Next in this chapter we present examples of local initiatives (Figure 6.1) in response to the poor

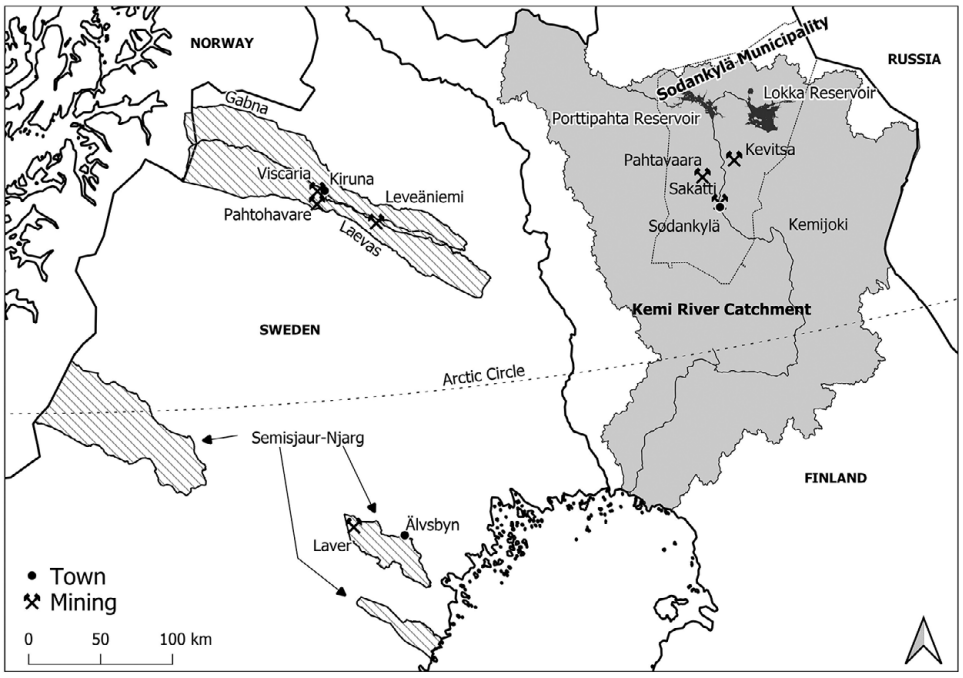

Figure 6.1 Overview of Arctic Fennoscandia and the location of sites mentioned in the text. Drawn by Carl Österlin

performance of the legally binding IA processes, especially the dissatisfactory management of cumulative effects and lack of inclusion of local knowledge in the process (Karvinen & Rantakallio, 2019).

With the aim to reveal the full range of impacts from industrial developments on their livelihood, Laevas, Gabna, and Semisjaur-Njarg Sámi reindeer herding communities (SRC) in Sweden produced their own assessment of cumulative effects based on detailed analysis of their land use needs, so-called reindeer herding analyses (Nilsson et al., 2014; Larsen, 2018; Nilsson & Blom, 2018). The need for this kind of assessment of locally accumulating land use disturbances is also a sign of poor functioning of national and regional level land use planning instruments. However, the municipal level is a very important local land use planning forum. In principle, municipalities may try to control their own economic development via, for example, local detailed plans. Our case example from Sodankylä municipality in Finland, which covers 12,415 square kilometers and has a population of 8,243 people and a population density of 0.7 inhabitants per square kilometer, will exemplify how challenging it may be to control its own fate in the real world with multiple historical and concomitant developments (Österlin et al., 2023, see Chapter 5). To fully understand and manage the multiple pressures from

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cumulative impacts by new industrial projects, Sodankylä municipality included local stakeholders, representatives from mining companies, and scientists in a participatory process with the aim to co-produce a Social Impact Management plan (SIMP), which forms our second major case (Sodankylä Municipality, 2018).

Cumulative Effects on Reindeer Herding

A particular concern for reindeer herding communities in Arctic Fennoscandia has been how mining activities interact and add on to effects from other types of resource exploitation such as forestry and energy production. To assess the impacts of mining on reindeer land use, specific reindeer herding analyses have in a few cases been included in EIAs for mining projects in northern Sweden. So far, these have been conducted on a voluntary basis as their inclusion is not mandatory. Yet, the results from these voluntary corporate assessments have so far not resulted in proper acknowledgment of cumulative effects on reindeer herding (Larsen, 2018). As a response, members of SRCs have conducted their own analyses with the aim to estimate impacts from new mining projects and the cumulative impacts from all types of land use change. Here, we present two such efforts by the SRCs Laevas, Gabna, and Semisjaur-Njarg (Figure 6.1).

The development of the mining industry and the growth of associated infrastructure and urbanization around Kiruna have resulted in a significant reduction of the grazing areas used by Laevas and Gabna SRCs (Fohringer et al., 2021), and they therefore conducted a series of community-led assessments of cumulative impacts on their pastures. They produced a handbook (LKAB, Laevas, & Gabna samebyar, 2015) on how to best assess cumulative effects on reindeer herding in collaboration with representatives from the state-owned mining company Loussavaara Kiirunavaara Aktiebolag (LKAB), which operates the majority of mines in the Kiruna area. They also conducted an impact assessment of one specific mining exploitation at Leveäniemi, forty kilometers south-east of Kiruna (Nilsson et al., 2014) and a larger assessment of cumulative impacts (Nilsson & Blom, 2018) on the lands used by both Laevas and Gabna SRCs. These assessments included mapping of previous extraction sites (mines, quarries), transport infrastructure (railroads, roads), wind turbines, power lines, and facilities for tourism, as well as disturbance zones around these activities (Skarin & Åhman, 2014).

The results show that additional encroachments from industrial activities would have serious direct and indirect environmental and social impacts (Table 6.1) and revealed a high vulnerability to further loss of winter grazing areas and interruptions of migration routes. Laevas and Gabna SRCs also raise concern over increased dependency on supplementary feeding as this may threaten animal welfare (Tryland et al., 2019; Horstkotte, Lépy, & Risvoll, 2020).

Table 6.1. *Direct and indirect environmental and social impacts on reindeer herding in Laevas SRC from a proposed mine in Leveäniemi according to Nilsson et al. (2014)*

Direct effect	Indirect effect	Economic/social/ cultural impact
Loss of grazing areas	Increased pressure on remaining winter grazing areas and winter groups. Grazing areas can then only support the herd for a shorter period of time; therefore, the mountainous grazing areas need to be used more and cause more grazing pressure there	Potential need to reduce the number of reindeers Potential need to reduce the number of reindeers
Loss of migration routes	(not stated)	(not stated)
Loss of resting pastures	(not stated)	(not stated)
Increase in number of traffic accidents	(not stated)	Reduced herd size Loss of income
Re-routing of snow mobile tracks	New tracks contribute to disperse reindeer	Increased workload to prevent dispersal and keep the herd gathered
New powerlines reduce grazing areas	Powerline clearings tend to be used as snowmobile tracks that further disperse reindeer	Increased workload to prevent dispersal and keep the herd gathered
Pollution from mineral dust	(not stated)	(not stated)

Their main conclusion is that if industrial area expansion continues, traditional reindeer herding practice, that is, freely grazing animals seasonally migrating between pastures, is impeded. A quote captures the problem at hand: "Grazing areas is a critical resource for the SRC and when grazing areas shrink and alternative pastures disappears, then the possibility to adapt disappears too" (Nilsson et al., 2014: 13). Some 350 kilometers further south, reindeer herders from Semisjaur-Njarg SRC oppose the potential opening of the, so far, largest open-pit copper mine in Sweden. Here the mining company Boliden AB has applied for a permit to develop the Laver mine, which is located close to Älvsbyn (Figure 6.1) (Avango et al., 2023, see Chapter 10). Due to the prospect of drastically negative effects on reindeer and discontent from the SRC with the assessment of effects on reindeer herding in the corporate-led EIA by Lindeström and Eriksson (2014), Semisjaur-Njarg SRC conducted a detailed reindeer herding

analysis with support from scientists specializing in impact assessments (Lawrence & Larsen, 2016). The baseline information, including the sum of existing encroachments in their winter grazing pastures, was derived through a mapping exercise. Subsequently, assessments of impacts from the mining were made for two scenarios: (1) the mining project is not realized or (2) the proposed new Laver copper mine is realized. Results show that even if pressure would continue from cumulative impacts from, for example, forestry and predators in the no-mine scenario, the SRC at least stand a chance to adapt and continue with traditional reindeer herding in the area. If the mine opens they would lose access to the fenced-off mining area (46 square kilometers) and lose connectivity between remaining grazing grounds, which in turn will lead to large areas becoming functionally unavailable (Lawrence & Larsen, 2016). New mining-associated infrastructure, for example, roads and powerlines, would add further pressure, making it impossible to practice traditional reindeer herding. Just like the herders from Gabna and Laevas SRCs, herders from Semisjaur-Njarg SRC would have to rely heavily on supplementary feeding – with a risk of ending up as "reindeer farmers" (Lawrence & Larsen, 2016). Thus their main conclusion is that the cumulative effects would hinder traditional reindeer herding if the mining project is realized, a conclusion that was strongly contested by Boliden AB, as they claimed that the analysis was "subjective and thus invalid" (Lawrence & Larsen, 2016; Lawrence & Larsen, 2017: 1175).

The main advantage with community-led impact assessments, besides being led by the actor with the most detailed knowledge, is the ability to circumvent corporate unwillingness to reveal the full impacts of a proposed project as these would risk being unfavorable. The results from the impact assessment of the Leveäniemi mining project by Laevas and Gabna SRCs (Nilsson et al., 2014) resulted in financial support from the company LKAB for mitigation measures to aid reindeer herding in the area, such as new coralls and fences. The information provided was, however, not considered important enough to hinder other mining ventures. For example, a major step toward opening a copper mine, strategically located in a key area for Laevas and Gabna SRCs, was taken when Copperstone Resources AB recently was granted a mining concession (Viscaria K. nr 7). In addition, a re-opening of the Pahtohavare mine (Lovisagruvan), which has been closed since 1997, is now being discussed (Lovisagruvan, 2021). Additional mining activities in this still "open" narrow corridor just south of the LKAB Kiruna mines would hinder reindeer migration between summer and winter pastures. For Semisjaur-Njarg it is yet too early to tell whether the community-led IA will influence land use planning as no final decision has been made regarding the Boliden AB permit application for the Laver mine. However, Boliden's fierce contestation of the community-led impact assessment suggests that it is an unwelcome initiative. This is perhaps no surprise since it portrays the potential impacts from the proposed mining site as far more severe than described in the corporate-led EIA (Lindeström & Eriksson, 2014).

The Sodankylä Social Impact Management Plan

Sodankylä municipality, which is sparsely populated and rurally located in the Kemijoki river catchment in northern Finland, is an example *par excellence* of an Arctic resource-rich region lacking control of its fate and future (Figure 6.1) (Dahl et al., 2010). Here, several large-scale mining and hydro-power projects have significantly impacted environment and people over recent decades. Forestry, pulp mills, and the paper industry were the main industrial activities in Finland after the Second World War. The large northern forests provided timber for the industry and local employment (Donner-Amnell, 1991), and forestry intensified in the Sodankylä area. Development for hydro-power also started in the Kemijoki catchment (Österlin et al., 2023, see Chapter 5). The large Lokka and Porttipahta reservoirs, and six hydro-power plants harnessing the River Kitinen, which is a tributary of Kemijoki, are located in Sodankylä municipality. From the local point of view, this period of "hyper-extractivism" (Sörlin, 2023, see Chapter 1) provided employment and opportunities for local development – the "glory days" of rising living standards and rapid transition to a modern lifestyle with all its amenities. However, due to mechanization, the importance of forestry for local employment and economy declined rapidly from the 1980s onward (Rannikko, 2010). Also, automated hydro-power production provided far fewer work opportunities for locals compared to the construction phase. As a result, unemployment was high, and population declined when the new millennium began.

The most recent "mining boom" in Arctic Fennoscandia, which began in the early 2000s, changed prospects in Sodankylä. The municipality is situated in the mineral-rich central Lapland green stone belt (Sarala, 2010), where the Canadian company First Quantum Minerals opened the Kevitsa multi-metal mine in 2012, which was sold to the Swedish company Boliden AB in 2016 (Hietala, Syväjärvi, & Mauno, 2015). In addition, AA Sakatti Mining (part of Anglo American) began their EIA procedure for mining of copper, nickel, and platinum in 2017, a process still ongoing in 2021. Activities resulting from the Sakatti mining project will most likely impact the Viiankiaapa mire, protected by the EU-wide Natura 2000 nature conservation program (Metsähallitus, 2018) and increase demands on the EIA. According to the consultant company, the mining project will increase employment and result in general positive economic development in the region during the construction and operation phases (Ramboll, 2020). Several other companies have also prospected for minerals and precious metals such as gold and copper in the Sodankylä region (Sarala, 2010).

Currently, there are several mining projects in different stages of exploration, development, and operation in Sodankylä. In contrast, the economy of the Pahtavaara gold mine, which was opened in 1996 by the Terra Mining company, is faltering (Rupert Resources, 2021). Thus, mines are wicked possibilities for many

host communities, and their prosperity depends on fluctuations on the global markets (Suopajärvi & Kantola, 2020). Adaptation to industrial development that occurs in boom-and-bust cycles is especially challenging for small communities (Lockie, 2009; Suopajärvi & Kantola, 2020). The social impacts of mining projects and their associated need of infrastructure, provision of services, and housing represented immense opportunities as well as a considerable challenge for Sodankylä municipality. For example, when First Quantum Minerals reported on economic problems and wanted to sell the Kevitsa mine, it was feared that the mine would be closed for good and the investments and hopes for future prosperity in Sodankylä lost (Hietala et al., 2015).

Using the three-pillar conception of sustainability (social, economic, and environmental) as a reference, the mining companies are responsible for economic viability of their specific businesses, and the authorities should monitor compliance with environmental standards. However, when it comes to social impacts of large-scale industrial development of one extractive sector, there is not a single actor nor mechanism in place to ensure social sustainability (Suopajärvi & Kantola, 2020). As a response, Sodankylä municipality therefore decided to develop a SIMP, which included assessment, monitoring, and managing of diverse social consequences from mining (Franks et al., 2010; Vanclay & Esteves, 2011; Franks & Vanclay, 2013). This unique initiative was funded by the Regional Innovation in the Nordic Arctic and Scotland (REGINA) project, which was in operation from 2015 to 2018 with a special focus on regions with large-scale industrial projects. Sodankylä municipality and the University of Lapland at Rovaniemi were the project's Finnish partners (Nordregio, 2015). Representatives from Sodankylä municipality led the process, and scientists conducted two surveys on the impacts of mining (Kuisma & Suopajärvi, 2017; Saariniemi, 2018).

After the baseline analyses of the socio-economic situation of the municipality (Kantola, 2016), three workshops with large stakeholder involvement were organized in 2016 and 2017. In total, forty representatives participated from the tourism industry, reindeer herding communities, different municipal sectoral units, the mineral industry, and third sector organizations, such as village associations. Several small organizations and micro-entrepreneurs, with limited resources and workforce, were not able to participate in the workshops that were organized during daytime. Participants agreed that the collaborative planning process was valuable, as such, because it provided an opportunity to hear and discuss conflicting opinions.

The explicit goal of the SIMP was to foster sustainable mining benefits to the local community: "The main principle is that Sodankylä municipality encourages and promotes cooperation with mining projects if and when in advance demonstrated by impact assessments and relevant research findings that the

project benefits the local community and that the risks can be accepted in short and long term by the local community" (Sodankylä Municipality, 2018: 4). The program included goals, action plans, and indicators for the three pillars of sustainability. For example, social sustainability goals included themes like increased welfare and local cultural development, and the action plan for social sustainability included support for new inhabitants to settle in the municipality and improved housing and accommodation. The program also included an idea of continuing the SIMP process by facilitation of a "Local Mining Forum" for impact follow-up, needed actions for problem solving as well as actions for supporting sustainable solutions on the municipality level together with stakeholders and industry (Sodankylä Municipality, 2018).

In 2021, the last year of the program period, not much happened, and problems related to mining developments remain the same. The housing stock is old, and housing is expensive, even hindering the miners and their families from settling in the municipality. Traffic safety due to mining-related transportation is still experienced as a serious problem. The idea of the "Local Mining Forum" has not been developed further. On the other hand, mining companies took the initiative at the end of 2020 to make the third follow-up study of experienced impacts (Tulilehto & Suopajärvi, 2021). However, as the range of social impacts included was very wide, for example, spanning broad themes like wellbeing or population development and more specific questions related to organization of public and private services or traffic safety, decisions may not necessarily be in the hands of either the municipality or mining companies. For example, construction of new rental housing in the area is in the hands of private investors.

There are many possible reasons for the failure to implement the SIMP. It was initiated and coordinated by the short fixed-term research and development (R&D) REGINA project. It became a challenge for the small community with restricted monetary and personnel resources to continue to run the program after the external funding had ceased. Another reason was that the private sector was not involved, for example, in providing housing. We conclude that well-established cross-sectoral collaboration and long-term resources are needed for a municipality to bend fate in its favor (Dahl et al., 2010).

What Is at Stake?

Increasing resource extraction, infrastructure development, and other human disturbances pose serious challenges for reindeer herding today, especially in Arctic Fennoscandia, where fragmentation and cumulative loss of reindeer pasture are very high (Rosqvist et al., 2020). Challenges for reindeer herding were already discussed in the Arctic Council report "Sustainable Reindeer Husbandry" (Jernsletten &

Klokov, 2002), where loss of pastures was posed as one of the most serious threats. Strangely, the accumulation of such impacts is still not acknowledged in land use planning. Also, sadly there is no formal recipient of community-led assessments of impacts on reindeer herding even if those provide a more informed perspective of negative social consequences on Sámi culture. Instead, our examples reveal significant negative consequences for local communities because corporations act out of self-interest and therefore may downplay the full impacts, especially if these venture into the project (Blowfield, 2005).

As pointed out in the Arctic Climate Impact Assessment (ACIA, 2004), the effect of global warming "could have" a large impact on reindeer husbandry. We do note that climate warming has already had a significant impact on reindeer, especially during winter, adding to the already high pressure from human disturbances (e.g., Rosqvist, Inga, & Eriksson, 2022; Rasmus et al., 2022). Still, impacts from climate change are not yet incorporated in IA in any satisfactory manner (Rosqvist et al., 2020; Nilsson, Avango, & Rosqvist, 2021), and therefore the vulnerability of the ecosystem used by reindeer is greatly underestimated.

The need for a special social impact management plan for mining in Sodankylä reflects the poor performance of the state of the art single project impact assessments. They lack a proper evaluation of impacts on humans and their socio-cultural-economic surrounding. It was disappointing that the positive local outcomes promised by the original separate impact assessments could not be fulfilled because of the lack of resources for, in particular, new housing and infrastructure. Instead of wishful predictions, the assessment procedure of social impacts needs more emphasis on follow-up studies of impacts of previous and ongoing mining activities. This would also increase local acceptance of mining and provide social license to operate, which is often emphasized by the mining industry (cf. Heikkinen et al., 2016). For example, some 80 percent of respondents in Sodankylä municipality answered that mining is locally accepted in three different surveys (Kuisma & Suopajärvi, 2017; Saariniemi, 2018). However, when looking at the open-ended answers, there were many reservations, such as "if environmental issues are taken care of" and "if the mine will bring benefits or jobs for the locality" (Tulilehto & Suopajärvi, 2021). If we take this kind of local reservation to mining seriously, it is evident that the emphasis of assessing social and environmental impacts should be more on following up the real impacts than on predicting only potential ones. Transparent follow-up studies could also be seen as an investment for a sustainably prospering mining industry. There is a dire need for strategic decisions about environmental and social development in Arctic Fennoscandia. Demand is now increasing rapidly for further extraction of minerals/metals and for production of renewable energy driven by the "green" transition.

It is clearly demonstrated that analysis of societal consequences needs to be included in assessments of impacts in the Arctic if the aim is to plan for long-term sustainability (Carson & Peterson, 2016; Wormbs and Sörlin, 2017). Nonetheless, governing authorities continue to react to development proposals rather than proactively anticipating them. EIAs are carried out too late, when strategic decisions have already been made or when there is a lack of strategic planning. Hence, only a limited range of feasible alternatives is addressed. The relative importance of a proposed project on the economy of a small municipality may be too large for considerations of alternatives, so regional planning is needed. The fact that the EIA process is corporate led means that the results most often serve the purpose of justifying and legitimizing proposed extraction or other activities. Participation in the EIA process may therefore become a moral dilemma for stakeholders who don't accept or consider the project as legitimate to start with. Such are, for example, reindeer herding communities that wish for an alternative option to be assessed than the ones that are tied to certain development projects under compulsory EIA procedures. Still, SRCs must participate in consultations to voice their opinions on pre-set options introduced by the developer for their planning purposes. This task has become overwhelming for many communities due to the large number of consultations of land use changing projects: To such an extent that they argue, for example, that they have to choose "whether they should conduct reindeer herding or go to planning meetings" (Österlin & Raitio, 2020). It is obvious that cumulative environmental and social impacts should be assessed and evaluated in the early stages of decision-making if the aim of the procedure is to meet environmental and social development goals (Fischer & Gonzales, 2015; Nilsson et al., 2021). In Fennoscandia there is a long tradition of multiple-level land use planning. Particularly, large-scale land use planning instruments, such as the "Comprehensive plans" in Sweden and "the Government decision on Finland's national land use guidelines", should be better equipped to handle multiple and temporally cumulative pressures on environment and people. They should also steer more actively on the regional and local level. As our cases show, the current systems are lacking, and environmental governance is more reactive than proactive. One development path might be enhancing the implementation of Strategic Environmental Assessment (SEA) (Noble & Nwanekezie, 2017), introduced by the European Commission for spatial planning. The use of SEA within the EU is regulated through the directive on the assessment of the effects of certain plans and programs on the environment (EU Directive 2001/42/EC), but SEAs are still poorly utilized, as they are not yet mandatory (Wretling et al., 2021). SEAs might be used to ensure that environmental and social issues are considered early, and crosscutting sectors and alternative future pathways would be explored before the planning of a certain project begins.

Thus, we conclude that in the light of our case studies the impact assessments should be deconstructed and reworked at every level of land use administration. Rethinking should start from national level land use planning instruments and proceed to practical EIA procedures with their pre-set development driving options and limited temporal and spatial scope. This notion will become even more urgent and topical when climate change adds a new layer of accumulating but hardly fully predictable impacts and threats.

It is true that many Arctic societies have shown proof of high resilience as they have adapted earlier to changing conditions. However, multiple pressures from long-term resource exploitation and effects from rapid climate change now risk pushing reindeer herding communities to their brink. Our example from Sodankylä municipality shows that planning for a sustainable future becomes an overwhelming challenge when there are not enough material and human resources allocated to adapt to the rapidly changing conditions resulting from extractivism.

Note

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