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TONI EEROLA

Sociopolitical geology:

Environmental activism, land use, corporate conduct and geoethics in mining and mineral exploration disputes in Finland

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ABSTRACT

This doctoral study is concerned with assessing social license to operate (SLO) with respect to exploration and mining in Finland, viewed from a sociopolitical geological perspective. The thesis consists of three peer-reviewed, published papers, which provide essential background information that is synthesized and elaborated upon in this introduction. The papers examine and describe the Finnish mining-sceptical movement, mining and mineral exploration disputes (MEDs), and evaluate the corporate conduct of companies involved in mineral exploration in Finland. The study focusses particularly on recent decades that have seen the emergence, development, and adaptation of the Finnish exploration and mining industry to foreign investment and activity, and the accompanying response and rejuvenation of the Finnish environmental movement since the mid-2000s. Papers examine these topics based on the analysis of successive environmental protest waves, the concept of social license to operate, and stakeholder theory with application of mixed methods. This thesis introduction makes a new contribution to research in this area by applying the concept of sociopolitical geology to the examination of Finnish MEDs.

The thesis describes the evolution of the Finnish mining-sceptical movement in three stages, from the earlier focus on uranium, through a

phase of debating mining in general, to the current concerns relating to the energy transition. It is proposed here that the culmination of this evolutionary progression forms the 6th Finnish environmental protest wave, together the climate-change debate.

One of the main findings of the study is that the MEDs in Finland occur in sensitive land use contexts, accompanied by poor corporate conduct (lack of communication and stakeholder engagement), and poor reputation of exploration and mining companies. Sensitive contexts include Sámi homelands, tourism destinations, and areas of second homes, reindeer herding, groundwater and nature conservation and deposits associated to uranium. Operation in or close to tourism destinations and second home areas may lead to resistance by tourism entrepreneurs, tourists, and second homeowners towards mining and mineral exploration. This is recognized as an important and influential phenomenon in Finland, where it is referred to as NIMLA, 'not in my leisure area', representing opposition to exploration and mining activities in areas that are considered to have high recreational value.

Research undertaken during the present study has also found that corporate online communication about SLO and new low impact mineral exploration technologies (NLIMET) by companies practicing mineral exploration coincides with operation in sensitive contexts and involvement in MEDs. Therefore, adoption, use, and communication of NLIMET does not necessarily contribute to granting of SLO. Instead, these efforts are mainly seen as a strategy to improve corporate image.

The introduction of the thesis complements the findings of the published papers by applying the precepts of sociopolitical geology and geoethics to Finnish social science research into mining activities. The aim of the thesis is to present new information concerning MEDs and the mining-sceptical movement and thereby contribute to multidisciplinary research into mining-related debates in Finland.

Keywords: Finland, minerals, metals, mining, mineral exploration, dispute, green energy transition, uranium, technology, non-governmental organizations, social movements, social license to operate.

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TIIVISTELMÄ

Tämä väitöskirja tarkastelee sosiaalisen toimiluvan arviointia Suomen malminetsinnän ja kaivostoiminnan yhteydessä sosiopoliittisen geologian näkökulmasta. Väitöskirja koostuu kolmesta vertaisarvioidusta julkaistusta artikkelista, jotka tarjoavat tutkimuksen kannalta keskeisen taustatiedon ja joita käsillä oleva johdanto syventää ja kokoaa yhteen. Artikkeleissa analysoidaan ja kuvataan kaivoskriittistä liikettä, kaivos- ja malminetsintäkiistoja sekä arvioidaan Suomessa toimivien malminetsintäyritysten yrityskäyttäytymistä.

Tutkimus keskittyy erityisesti viime vuosikymmeniin, jolloin suomalainen malminetsintä- ja kaivosala on koostunut ulkomaisista investoinneista ja toimijoista. Samanaikaisesti Suomessa on nähty ympäristöliikkeen uudelleenaktivoituminen 2000-luvun puolivälistä alkaen. Artikkelit tarkastelevat näitä teemoja ympäristöprotestiaaltojen analyysin, sosiaalisen toimiluvan käsitteen sekä sidosryhmäteorian kautta hyödyntäen monimenetelmäistä tutkimusotetta. Johdanto tuo uutta tieteellistä näkökulmaa soveltamalla sosiopoliittisen geologian käsitettä suomalaisten kaivoskiistojen tarkasteluun.

Väitöskirja käsittelee myös suomalaisen kaivoskriittisen liikkeen kehittymistä kolmessa vaiheessa: varhaisesta uraanipainotteisesta vastustuksesta laajempaan kaivoskeskusteluun ja edelleen nykyiseen energiasiirtymän herättämiin huoliin. Tutkimuksessa esitetään, että tämän kehityspolun

huipentuma muodostaa kuudennen suomalaisen ympäristöprotestiaallon ilmastokeskustelun rinnalla.

Yksi tutkimuksen keskeisistä havainnoista on, että suomalaiset kaivoskiistat sijoittuvat herkkiin maankäyttökonteksteihin, joita seuraavat heikko yritysviestintä ja puutteellinen sidosryhmäyhteistyö sekä malminetsintä- ja kaivosyritysten heikko maine. Herkkiä kontekseja ovat erityisesti saamelaisten kotiseutualueet, matkailukohteet, vapaa-ajan asutus-, poronhoito-, pohjavesi-, ja luonnonsuojelualueet sekä malmiesiintymiin liittyvä uraani. Toiminta matkailukohteissa tai niiden läheisyydessä sekä vapaa-ajan asutuksen alueilla voi synnyttää vastarintaa matkailuyrittäjien, turistien ja vapaa-ajan asukkaiden keskuudessa. Tätä ilmiötä kuvataan nimellä NIMLA (“not in my leisure area”), joka viittaa malminetsinnän ja kaivostoiminnan vastustukseen korkean virkistysarvon alueilla.

Tutkimuksessa havaittiin myös, että yritykset viestivät verkossa sosiaaliseen toimilupaan liittyvistä asioista ja uusista vähävaikutteisista malminetsintäteknologioista niiden toimiessa sensitiivisissä konteksteissa ja osallistuessaan kaivoskiistoihin. Tämän perusteella uusien vähävaikutteisten teknologioiden käyttöönotto, hyödyntäminen ja niistä viestiminen eivät itsessään edistä sosiaalisen toimiluvan saamista, vaan näyttäytyvät pikemminkin yrityskuvan parantamisstrategioina.

Väitöskirjan johdanto täydentää artikkelien tuloksia soveltamalla sosiopoliittisen geologian ja geoetiikan periaatteita suomalaiseen yhteiskuntatieteelliseen kaivostutkimukseen. Tavoitteena on tuottaa uutta tietoa kaivoskiistoista, kaivoskriittisestä liikkeestä sekä edistää kaivoskeskustelun monitieteistä tarkastelua Suomessa.

Avainsanat: Suomi, mineraalit, metallit, kaivostoiminta, malminetsintä, kiista, vihreä siirtymä, uraani, teknologia, kansalaisjärjestöt, yhteiskunnalliset liikkeet, sosiaalinen toimilupa.

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It is never too late and better late than never! When submitting a thesis at a mature and advanced stage in a research career, there are clearly positive and negative aspects when a PhD thesis is completed at a more advanced age. Although the subject matter and title might have no bearing on career advancement, decades of extensive practical experience dealing with these issues provide different perspectives, and advantages that enable integration of insights into sociopolitical issues related to geology and the environment, society, and natural resources, and the ensuing complex issues such as mining-related disputes, and social license to operate.

The formulation of these research concepts into a doctoral study took quite some time. Over ten years ago, discussions over potential thesis topics with Dr. Pekka Nurmi, at that time Research Director of the Geological Survey of Finland (GTK), led to the suggestion that further study into the social license to operate and mining disputes would be a worthwhile endeavor as I was working and interested on those topics. Although progress seemed slow, and a number of years elapsed, it seemed by early 2022, after having published two related papers, and submitted another one through the auspices of the European Union's (EU) Horizon projects Mining and Metallurgical Regions of Europe (MIREU, grant agreement Nr. 776811 - H2020-SC5-2017) and New Exploration Technologies (NEXT, grant agreement Nr. 776804 - H2020-SC5-2017), that there was sufficient material to form a coherent whole; those three articles and projects accordingly formed the backbone of this thesis.

Therefore, I am extremely grateful for the opportunity to participate in those projects and their innovative and multidisciplinary teams. I would particularly like to thank the respective work package coordinators Drs. Pamela Lesser, and Karin Beland Lindahl and the coordinator of both projects, Mr. Juha Kaija (Geological Survey of Finland, GTK). More recently, the AIMEX project (Artificial Intelligence in Mineral Exploration) funded by Business Finland, ERA-MIN 3 financed SEEMS DEEP (Seismic and Electromagnetic methods for deep mineral exploration), and the EU Horizon project EXCEED (Cost-effective, sustainable and responsible extraction routes for recovering distinct critical metals and

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I am deeply indebted to University Researcher Tuija Mononen from the University of Eastern Finland (UEF) and Professor Tapio Litmanen from the University of Jyväskylä who agreed to supervise my thesis research. The project provided an excellent opportunity to establish and deepen scientific cross-disciplinary collaboration between GTK and those universities. Both supervisors are acknowledged for their patience and dedication shown to my work. While Tuija provided the initial stimulus for the project, University Lecturer Juha Kotilainen, also from UEF, later took on the role of supervisor, due to his familiarity with the subject. Tapio Litmanen recommended the book by Bobbette and Donovan (2019b) about political geology, which introduced a new dimension for the thesis beyond social geology. I also acknowledge the PhD program on environmental policy (Time, Space, and Society) of the Department of Geography and History, Faculty of Social Sciences and Business Studies of UEF, for showing an unprejudiced attitude in having opened the possibility to undertake this study despite my rather different background.

This thesis would not have been possible without the constant support of my lovely wife Evelyse Eerola and my dear sons Sami and Erik Eerola. Unfortunately, my parents were no longer among us to witness the thesis defense and official doctoral ceremony, but I am certain that they were present in spirit. Fortunately, however, my brothers Kai and Kim Eerola were present at this very important time, and I express my thanks to them for their support during the project as well. This thesis would also not be possible without my stepmother, Marianne Udelius-Eerola.

I would like to thank all people and colleagues whom I have met and worked with during years in the mining industry, GTK, industry, EU projects, academy, and the mining-sceptical movement. GTK is acknowledged for its unconditional support during the whole process of developing the thesis topic and related research concepts. An open-minded attitude demonstrated by GTK management with respect to this relatively new and multidisciplinary analysis

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As this thesis is also related to environmental activism and opposition to mining, I would like to acknowledge discussions along the years with Tapani Veistola and Sisli Piisi from the Finnish Association for Nature Conservation (FANC), Mika Flöjt from the Kitkan viisaat ry, Leo Stranius, CEO of Third Rock Finland, Prof. Vesa Puuronen from the Limits to Mines in Lapland and Miisa Mink from the Saimaa Without Mines movement. Events and demonstrations organized throughout the years by academia, the mining-sceptical movement, and the mining industry have been also inspiring and enlightening. Interest shown on my work and MIREU and NEXT projects by Susanna Myllylä and Nik Völker together with several European mining-sceptical movements provided extra fuel for my enthusiasm and inspiration to develop the subjects and thesis. A critical review published by journalist Outi Salovaara on my work and the above-mentioned projects showed that I was on the right track. The reviews by profs. Veli-Pekka Tynkkynen and Julia H. Haggerty are greatly appreciated.

I am very happy to have had experience as a geologist, publish geoscience papers during my career and to complete a PhD thesis on environmental politics at the UEF. The thesis has provided a wonderful opportunity to link both my interests and passions: geology and social sciences.

Joensuu, 20 November 2026
Toni Eerola

“The world is not a simple place, nor is it black and white. It is tempting to make life easier by attaching simplistic labels to people and organizations without truly understanding them, or by sorting the world into neat, airtight compartments. Yet in the long run, things cannot end well if our politicians, and the rest of us, increasingly take the easiest way out whenever we can. You may end up with your belly scraped bloody and your navel full of dirt, but that is only the opening act of what is to come.”

Risto Isomäki (2023) Maailmanparantajan muistelmat (in Finnish).
Helsinki: Into-kustannus.

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ABBREVIATIONS

CRM = Critical Raw Materials
CRMA = Critical Raw Materials Act
CSR = Corporate Social Responsibility
EIA = Environmental impact assessment
ENGO = Environmental non-governmental organization
ESG = Environmental, social and governance
EU = European Union
FANC = Finnish Association of Nature Conservation
FNSM = Finnish Network for Sustainable Mining
FPIC = Free, Prior and Informed Consent
GTK = Geological Survey of Finland
MED = Mining and mineral exploration dispute
MIREU = Mining and Metallurgical Regions of Europe
NEXT = New Exploration Technologies
NLIMET = New low impact mineral exploration technologies
PEA = Protest Event Analysis
REE = Rare Earth Elements
SLE = Social license to explore
SLO = Social license to operate
SM = Social movement
UEF = University of Eastern Finland

1 INTRODUCTION

1.1 Background and rationale of the thesis

Finland forms a part of the ancient crustal region known as the Fennoscandian Shield (Lehtinen et al. 2005). Being one of the most richly endowed countries in Europe with respect to mineral deposits and mineral potential, it has had a long history of exploration, mining and metals processing (Haapala and Papunen 2015). Mining clearly refers to the process of extraction of minerals from mineral deposits, whereas mineral exploration is related to searching and locating mineral resources, and where possible determining whether mining is feasible (see Eerola 2017).

Until the late 1980's, the mining industry in Finland was essentially closed to foreign participation and almost entirely state-owned. However, during the early 1990's, there was a steady decline in mining activity that almost ceased for more than a decade. From 1995, when Finland entered in the European Union (EU), foreign companies were allowed to operate in the country although exploration and mining activity only intensified in the middle of the 2000's. Since that time, opposition to mining and mineral exploration has arisen in various parts of the country (Eerola 2022a, 2024b). This can be attributed to a general increase in environmental awareness in Finland since the 1980's (Puohiniemi 2011) as well as a sense of resource nationalism precipitated by the presence of foreign companies (Eerola 2008, Jartti et al. 2020). Shifting values, changing livelihoods and competing land uses have led to a number of mining and exploration disputes (MEDs) throughout the country (Eerola 2008, 2022a, Litmanen 2008, Koivurova et al. 2015, Sairinen et al. 2017, Lassila 2024, Leino and Miettinen 2020). The social license to operate (SLO; Thomson and Boutilier 2011) for foreign-owned mining activities has been challenged; SLO means acceptance or approval of activities by a local community or to a larger extent, by society as a whole (Thomson and Boutilier 2011).

Following Eerola (2015, 2022a) and Lesser et al. (2021), the word **dispute** is used here instead of **conflict** to describe the Finnish and European struggles

related to mining and mineral exploration. However, Finnish mining struggles have been traditionally referred to as conflicts (e.g., Lyytimäki and Peltonen 2016, Pettersson et al. 2017, Sairinen et al. 2017, Leino and Miettinen 2020), in accordance with the Finnish social science tradition (Peltonen and Villanen 2004). Nevertheless, because of their relatively low intensity, occurring mostly at the level of public debate and legal challenges (Badera 2014, Eerola 2015, 2022a, Kivinen et al. 2020, Lesser et al. 2021), the term conflict seems overly dramatic for describing Finnish and European MEDs (Eerola 2015, 2022a, Lesser et al. 2021). The same applies to the term "war" which has been widely used by researchers and journalists to describe forest and mining disputes in Finland. This overdramatization inflates the real meaning of such terms. The use of such terminology seems to be a tactic to call attention to or even exacerbate such disputes by overemphasizing their intensity.

According to ICMM (2015), a dispute is defined as a disagreement between companies and local communities because of differences in interests and priorities:

"Disputes arise when two or more parties believe their interests are incompatible. Non-violent disputes can be essential to social progress and development and are often a feature of the interactions between mining companies, host communities and host governments. However, in some instances disputes or related protests can escalate towards conflict that weaken or damage relationships between companies and communities. When conflict does occur, demonstrations or protest may result in physical violence." (ICMM, 2015).

Because of the societal importance, the security of resource supply chains, the import dependency of mineral raw materials, and commitments to a sustainable energy transition (European Commission 2023a), it is important to understand why these MEDs occur and to determine what can be done to mitigate social and environmental impacts and to improve public acceptance of mining and mineral exploration?

As geologists work with mineral exploration and mining, among other topics, they have an important contribution to make to the above-mentioned topics (Nature Geoscience 2024). However, geologists typically have their hearts and minds in deep time, crust, bedrock, minerals, and soils on ground, or even

underground (Fig. 1). Basic geological research on bedrock (e.g., petrology) formed billions of years ago may seem quite remote from the day-to-day life of common people or immediate societal interest. Fundamental geoscientific research is generally focused on deciphering the ages and genetic processes by which rocks formed and their role in regional geological evolution in distant past. While societal values and historical events shape prevailing scientific concepts and thinking, ideologies do not necessarily significantly influence geological research and theories. There is no Marxist magma petrology, nor neoliberal geotectonics; In general, the passions and emotions involved are mainly about geological phenomena, processes, models, theories and their schools of thought and not about societal or political issues. Maybe for this reason, in general, geologists, and other natural scientists can be quite alienated from sociopolitical issues and mostly avoid participation in public debate even on issues concerning their own field.

Although living organisms (including humans) are also a geological force, geological processes are basically ruled by chemistry and physics according to natural laws that apply equally to everybody independent of opinions, values and ideologies. In this sense, geological research differs fundamentally from that of human sciences with their entirely anthropocentric reflexivity derived from multiple perspectives, perceptions and interpretations of human affairs. Even though nature is currently being shaped by humanity, geological processes have occurred without human intervention for billions of years and will presumably continue to do so into the distant future. As philosopher Will Durant (1964) said, “civilization exists by geological consent, subject to change without notice”; humanity is a quite recent phenomenon on the Earth and as a species, it characterizes a certain geological period in its evolutionary history.

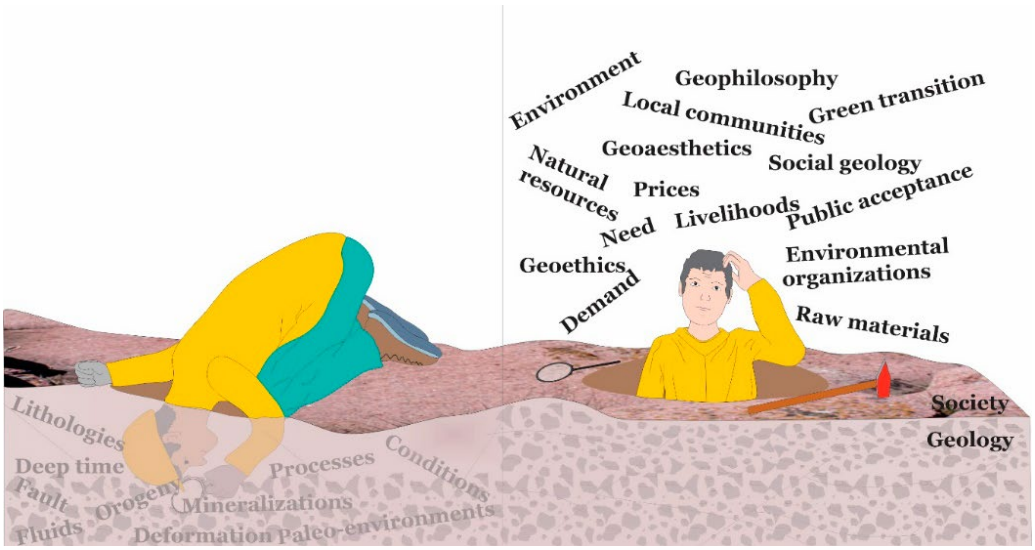


Figure 1. A cartoon depicting a geologist engaged in two different situations; Left: Geologist focused on basic geological research. Right: Geologist considering implications for society (natural resources, and related social, and environmental issues). After Eerola (2024a).

Obviously, however, human action and interest are inevitably introduced into geological research when a rock is investigated by a geoscientist. Moreover, the object of study might be a prominent and geoaesthetic feature in the landscape, have nature protection or geoheritage value, potential for natural stone production or be suitable for underground construction. Eventually, it might also be demonstrated as having a relationship with ore forming processes and people might live in the area, with diverse occupations, land uses, and livelihoods. From this point of view, the Earth, or particular rock formations can be seen as representing and providing a **geosystem service**, which is the abiotic counterpart to ecosystem service (Gray 2004, Van Ree et al. 2017). Geosystem services refer to the benefits produced by geological elements for society (e.g., rocks, minerals, soils and landscape). Therefore, when investigated, rocks and other geological objects are not isolated from human influence, and indeed, might well influence human activities and be the subject of diverse, and sometimes competing societal interests. This is especially true regarding the relationships between natural resources, the

environment, and society, and the interface between them is at times tense (Fig. 1). For this reason, even when conducting geological field work of a purely scientific nature, respect and transparency towards people in the local community in explaining the research and its aims is highly recommended, in the form of stakeholder engagement and geoscience communication (Eerola 1994, 2001, 2017, 2025); it can also benefit research as permission may be obtained for making bedrock observations in residential properties and courtyards as well as granting access to private land in general. Personal experience has indeed shown that such courtyard exposures may represent key outcrops that reveal important geological phenomena (Eerola 2001). This kind of geoscience communication falls within the field of geoethics, which is an important part of geoscientists' professional practice (Peppoloni and DiCapua 2012). **Geoethics** is a critical reflection on how geologists, industry, and citizens act and respond in issues related to geosciences (DiCapua et al. 2021, Eerola 2024a, Peppoloni and DiCapua 2024).

Applied and economic geology deals with the environment, construction, groundwater, geohazards (volcanic eruptions, earthquakes, landslides, floods, tsunamis, subsidence), soils, rocks, and minerals for diverse societal needs (e.g., Shackleton 1986, Evans 1997). Within the scope of those disciplines and because of their economic interest and environmental and social impacts, they also share social and political dimensions. It is inevitable then, in these situations, that values and ideologies are intimately attached to such geological issues. For example, the ways in which climate change, geohazards and increasing demand for raw materials affect local communities, are deeply social and political issues. For this reason, Mata-Perelló et al. (2012), Stewart and Gill (2017), Jebrak (2017), and Erb et al. (2021), have referred to that relationship as **"social geology"**, whereas Bobbette and Donovan (2019c) have defined the interaction of geology and politics as **"political geology"**. Politics here is not necessarily related to ideologies or specific political parties but deals with power relationships and their influences.

As social and political issues are related to geology, it is quite natural that geologists also have something to say about such matters in their roles as citizens, professionals and researchers. However, in such a cross-disciplinary field, for geologist to focus on MEDs and SLO, it is necessary to take their "eyes

off the ground" and pay more attention to the society around and above the Earth's surface (Fig. 1). As illustrated in Fig. 1, among other issues, this also involves geoethics, and social geology. Considering the current challenges around raw materials, climate change and sustainability, geologists should become more involved with ethical, social and political issues related to their field (Stewart and Gill 2017, Eerola 2024a, Peppoloni and DiCapua 2024). In relation to geology, mining, and mineral exploration, this has indeed happened to some extent in recent years (e.g., Thomson and Boutilier 2011, Mata-Perelló et al. 2012, Franks et al. 2014, Jebrak 2017, Stewart and Gill 2017, Erb et al. 2021, Hitch and Barakos 2021). However, research into these issues has naturally been dominated by social scientists (Karakaya and Nuur 2018). This field of social science research into mining-related issues is designated here as **mining research***,* which is a direct translation of the Finnish term and research area known as "kaivostutkimus". Despite the name however, it also includes mineral exploration.

As sustainability issues and challenges are complex, trans- and cross-disciplinary topics (Karakaya and Nuur 2018), this thesis represents a cross-disciplinary contribution applied more specifically to mining research. As part of it, the Finnish MEDs were mapped and the history of the mining-sceptical movement was described (Eerola 2022a, 2024b). Mining-sceptical movements are critical towards the mining industry and demand reforms in regulatory and policy areas in particular (Eerola 2024b). There can be also anti-mining movements which oppose mining in certain places or more often, everywhere. In fact, in the literature, anti-mining is the most frequently used term to characterize organized opposition against mining, especially by political ecology authors (e.g., Arce and Nieto-Matiz 2024). For instance, Zachrisson and Beland Lindahl (2019) used the term mining-sceptical to describe social movement (SM) related to mining in Sweden; this term was subsequently adopted in Finland by Eerola (2024b) and is used here as well.

SMs are loose, horizontal collectives and networks of people that act towards a common purpose that can be motivated by social, environmental, political concerns or a mixture of these (e.g., Devlin 2020). A mining-sceptical movement can be composed of individuals, SMs and environmental non-governmental organizations (ENGOs) which demand reforms in mineral

governance (Eerola 2024b). For instance, ENGOs are structured and officially registered associations dedicated to environmental protection. A mining-sceptical movement is part of the environmental movement which represents, for instance, a wide network of individuals, groups, SMs, ENGOs and political parties that works towards a common objective focused on environmental protection. Environmental activism refers to individual or collective action aimed at environmental protection and is an essential part of the environmental movement (Eerola 2024b). Because of the environmental impacts of the activity, mining-related disputes and conflicts can be considered as environmental struggles, and anti-mining/mining-sceptical activism has played an important role in these issues (Conde 2017). However, such activity can also include concerns about impacts on indigenous people and livelihoods (e.g., reindeer herding, agriculture, tourism), and/or real estate values, i.e., socioeconomic issues (Eerola 2024b). These are attached to values, worldviews, and perspectives on local sustainability that may differ from those of the extractive industry (e.g., Beland Lindahl et al., 2018; 2023; Leino et al., 2023; Eerola 2024b). However, Eerola (2024b) noted that although many of the Finnish MEDs have also been associated with livelihood issues, the Sámi homeland, and second homes (Eerola, 2022a), these are nevertheless intimately related to the environment because of the importance of nature-based activities, natural resources, the environmental impacts of resource exploitation and the involvement of ENGOs (Eerola 2024b).

The main objectives of this thesis are to present a national and historical overview of MEDs and the mining-sceptical movement in Finland, to emphasize the importance of project location related to sensitive land use contexts prone to generate MEDs and to examine them from a sociopolitical geology perspective. Therefore, the thesis aims to fill the gap that had previously existed in Finnish mining research.

The energy transition requires huge amounts of cobalt, graphite, lithium, nickel, copper, and rare-earth elements (REE) which inevitably causes a significant increase in global demand for these commodities (IEA 2021, Michaux 2024). Security of supply has been an additional issue of concern in recent years, especially due to strong import dependence (in EU), the COVID-19 pandemic, the war in Ukraine, Chinese dominance of raw materials

production and further geopolitical tensions (Eerola et al. 2026). In an effort to assess and deal with this challenge, a list of critical raw materials (CRM) was established (European Commision 2023; Table 1), and the critical raw materials act (CRMA) was recently proposed by the European Commission (2023a) and approved by the European Parliament (2024). The CRMA envisages a more accelerated permitting process for European CRM projects considered strategic.

Geology clearly has a central place in relation to the above-mentioned topics, not only because geology determines the location of mineral deposits but also due to geological controls on other geosystem services that may attract diverse and even opposing societal interests, potentially resulting in MEDs. For these reasons, this thesis introduction emphasizes the importance of understanding local geological factors and their role in defining the nature of MEDs development, and their potential resolution towards granting SLO. This geographical dimension is crucial for a more comprehensive understanding of MEDs. According to Nicholls et al. (2013), spatiality is an important element in contention and SM studies. Therefore, spatiality and geology represent an important additional layer when analyzing the socio-geographical complexity of MEDs because social and political space is fundamentally geological in nature (Stewart and Gill 2017, Jebrak 2017, Bobbette and Donovan 2019a, Erb et al. 292). In other words, geology both sets the stage for human activities and influences them. In the thesis, the term **geology** is understood as both a scientific discipline and also in referring to the geological characteristics of an area (rocks, soils, minerals, water, landscape).

The perspectives presented in this thesis derive in large measure from previous personal and practical experience connected with activism, mineral exploration, geology, MEDs, stakeholder engagement and communication in related topics (see section 4.2). The thesis thus summarizes insights from this journey and complements another recent Finnish PhD thesis on the subject (Harju 2019, Komu 2020, Hast 2021, Jartti 2022, Lassila 2024, Kotilainen 2024, Leino 2025). The timing is seen as quite opportune: because of increasing risks and disputes, SLO and environmental and social governance (ESG) are among the current top priorities of the mining industry (Mitchell 2024).

1.2 Research approach, task, and questions

This doctoral thesis presents a synthesis of research into SLO, corporate conduct, MEDs, and the role, evolution and impacts of the mining-sceptical movement in Finland. In addition to this synopsis, it comprises three peer-reviewed and previously published papers (I-III). The thesis affords an ideal opportunity to review the subjects discussed in each paper and to show how they provide insights into a larger picture. In the following section I summarize their main findings, applying new concepts from the interface between geosciences and society in addressing this multidisciplinary debate on natural resources. This then leads to the main focus of thesis, namely sociopolitical geology, which is introduced and defined in section 3.

The primary aim of the thesis is to contribute to research into SLO dynamics, as well as on the role of land use, environmental activism, corporate conduct, and geoethics in SLO. Although the focus is on issues related to the ongoing **mining debate** in Finland, which first rose to prominence from the environmental problems at the Talvivaara mine in 2010-2012 (Eerola 2015, 2024b, Sairinen et al. 2017), the thesis covers the entire period from 2005 to the present, starting from the **uranium debate**. The uranium debate began when a foreign company applied for an exploration license for uranium in a large area in southern Finland, which soon generated opposition (Litmanen 2008, Sarpo 2008). The main concerns were related to energy, sustainability and mineral governance and the timing coincided with a major influx of foreign mining and mineral exploration companies into the country. The ensuing mining debate soon spread from uranium exploration to include mining and exploration of other commodities (Eerola 2015, 2024b). This was caused by MEDs surrounding mining projects where uranium was present but was not the primary commodity, as for example at Talvivaara.

The research questions and their results are listed in Table 1. Based on the data presented in each paper, **sociopolitical geology** is explored in this introduction by means of specific examples and case studies. Due to the overlap in social and political geology concepts, these two fields are merged here, introducing the concept of sociopolitical geology. Sociopolitical geology involves examination of diverse actors and their roles in MEDs but is primarily

concerned with relationships between geosystem services related to land use which, because of diverse and competing human interests and priorities, are a common source of MEDs. In most cases, MEDs have produced emergence of local mining-sceptical movements which evolved into a national movement. This is illustrated by the progression exhibited in the accompanying published papers, which research questions helped to navigate through the evolution of the Finnish mining-sceptical movement (Paper I), MEDs and the importance of sensitive land use contexts (Paper II) and corporate conduct regarding **social license to explore** (SLE) (Paper III). The SLE concept derived from SLO, and refers to acceptance, or approval of mineral exploration by a local community (Suopajärvi et al. 2019b, Eerola 2021). Corporate conduct is measured to a large extent by communication, stakeholder engagement, and target selection for mining and mineral exploration, which are related to geoethics.

Table 1. The research questions and responses. FANC = Finnish Association for Nature Conservation; MED = Mining and mineral exploration dispute; NNLIMET = New low impact mineral exploration technologies SLE = Social license to explore; SLO = Social license to operate;

Paper	Research questions	Results
Introduction	How to interpret the generation of Finnish MEDs and the associated evolution of the Finnish mining-sceptical movement from the sociopolitical geology perspective?	Geology is intimately related to the MEDs because of project location and associated land use in sensitive contexts. Geosystem services and their spatiality influence diverse human interests, when they assume the role of political actors with agency which interact with each other and generate MEDs. Such MEDs generated and promoted the evolution of the Finnish mining-sceptical movement.

Paper	Research questions	Results
I	**1.** How mining-sceptical attitudes and movement have evolved in Finland, **2.** Why the Uranium Debate and Mining Debate were initiated, **3.** What have their impacts been, and **4.** Do they form the sixth Finnish environmental protest wave?	**1.** From uranium-specific to general mining debate with expansion of the mining-sceptical movement (~20 years of evolution); **2.** Because of resource nationalism, uranium, Talvivaara, and energy transition; **3.** Changes in mineral governance: legislation, and mineral policy **4.** Yes, together with the climate change debate;
II	**1.** How many mineral exploration and mining disputes (MEDs) were found in Finland? **2.** Where are they located? **3.** What are their causes, characteristics, and actors? **4.** What implications do Finnish MEDs have for the SLO debate?	**1.** 20 (17 companies involved – 23%); **2.** Northern and southeastern Finland; **3.** Sensitive contexts + corporate conduct and reputation, low to medium intensity, local movements, FANC, companies; **4.** Importance of project location and its associated land use as a fundamental issue for achieving SLO;
III	**1.** Which are the companies that communicate online about NLIMET and SLE? **2.** Which are the NLIMET they communicate, **3.** How do they understand the SLE? **4.** Which are their operational contexts and are they involved in disputes? **5.** What does this mean for SLE?	**1.** 20 companies communicated about SLE/SLO, 9 about NLIMET, and SLE/SLO issues; **2.** Drones, remote sensing, closed loop drilling, plant, snow and surface soil sampling; **3.** Company-community relationship, stakeholder engagement **4.** Sensitive land use contexts and the case companies communicating about SLO/SLE and NLIMET were involved in disputes; **5.** Corporate online communication on SLE and NLIMET was motivated by a challenging situation, showing corporate conduct by which companies intended to adapt to it.

1.3 Thesis structure

The three published articles that comprise the thesis are:

Paper I: Eerola, T. 2024. The origin, evolution and impacts of the mining-sceptical movement in Finland. Extractive Industries and Society 19, 101486. https://doi.org/10.1016/j.exis.2024.101486

Paper II: Eerola, T. 2022. Corporate conduct, commodity, and place. Ongoing mining and mineral exploration disputes in Finland and their implications for the social license to operate. Resources Policy 76, 102568. https://doi.org/10.1016/j.resourpol.2022.102568

Paper III: Eerola, T. 2021. New low impact mineral exploration technologies and the social license to *explore*. Insights from corporate websites in Finland. Cleaner Environmental Systems, 3, 100059. https://doi.org/10.1016/j.cesys.2021.100059.

The papers, their backgrounds, aims, methods, results and conclusions were summarized in Table 2.

Table 2. Summary of the thesis' papers. EPW = Environmental protest wave; NLIMET = New low impact mineral exploration technologies; MED = Mining and mineral exploration dispute; SLO = Social license to operate; SLE = Social license to explore;

Topic	**Paper I** (Eerola 2024a)	**Paper II** (Eerola 2022a)	**Paper III** (Eerola 2021)
Back-ground	The Finnish mining-sceptical movement has had an important role in mining-related public debate. However, there was no previous study on the subject.	There has been a number of MEDs in Finland, but their comprehensive overview was lacking.	There was no overall picture about which NLIMETs companies are using and communicating, and which are their perception of SLO/SLE.
Aims	To identify and describe the formation, development, and influence of the Finnish mining-sceptical movement and to locate it within the context of Finnish EPWs.	To identify, locate, and quantify MEDs in Finland, and to reveal their geography, and causes.	To study corporate online communication of NLIMET and SLE, their operational contexts, involvement in MEDs and reasons of such practice.
Methods	The protest cycle theory was applied to define the space and place of the mining-sceptical movement within the continuum of the EPWs in Finland in a retrospective and longitudinal manner. The characteristics of the EPWs were compared to those of the uranium and mining debates as a comparative case study.	Protest event analysis with application of Retriever media analysis software and literature review.	Websites of companies holding or applying for mining and mineral exploration permits were examined by content analysis about their communication on the NLIMET and SLO/SLE. The focus was on companies communicating both topics. Operational contexts and involvement in MEDs were also examined.

Topic	**Paper I** (Eerola 2024a)	**Paper II** (Eerola 2022a)	**Paper III** (Eerola 2021)
Results	The Finnish mining-sceptical movement and its evolution were described, in terms of social movements and environmental non-governmental organizations (ENGO). The uranium debate instigated the movement after which it has grown further, initially due to the Talvivaara mine environmental problems, then through the mining debate until the energy transition. It has caused a burst of local but highly networked mining-sceptical movements.	Twenty MEDs were found in which seventeen companies were involved. The MEDs were concentrated in northern and southeastern Finland. The main causes were related to land use issues, and sensitive contexts prone to disputes, poor corporate conduct and reputation.	Twenty companies communicated about SLE and nine about new NLIMET. Those nine companies also mentioned SLE/SLO issues. They operated in sensitive contexts and were involved in MEDs. The SLO/SLE issues were related to stakeholder engagement, and company-community relationships.
Conclusion	The Finnish mining-sceptical movement has evolved since the middle 2000s through uranium and mining debate until the green energy transition with impacts on mining governance. Due to its importance in the continuum of the EPWs, this development was suggested to form the Finnish 6th EPW.	Only a minority of companies are involved in MEDs. MEDs were generated in sensitive contexts with poor corporate conduct and reputation. To avoid MEDs, careful target selection and proper corporate conduct were recommended.	The main reason for corporate online communication is an attempt to improve public image in a situation in which their SLE was challenged. They do not improve SLE.

The order of Papers I-III was structured so as to progress, in a funnel-like fashion of successive lenses, from a broad geographical and chronological perspective to more detailed local aspects, eventually focusing on analysis at individual project, MED, and company and SM/ENGO level (Fig. 2). Thus,

Paper I provides an overview and chronological perspective on MEDs and evolution of mining-sceptical movement in Finland from the uranium debate until the ongoing energy transition. The paper mentions many of the MEDs, which are described in more detail in Paper II. Paper III focusses on corporate online communication of new low impact mineral exploration technologies (NLIMET) and SLE of companies practicing mineral exploration in Finland and looks for reasons for this practice in the form of corporate conduct. Paper III also deals with the operational contexts of some of the companies which are also involved in many of the MEDs described in Paper II.

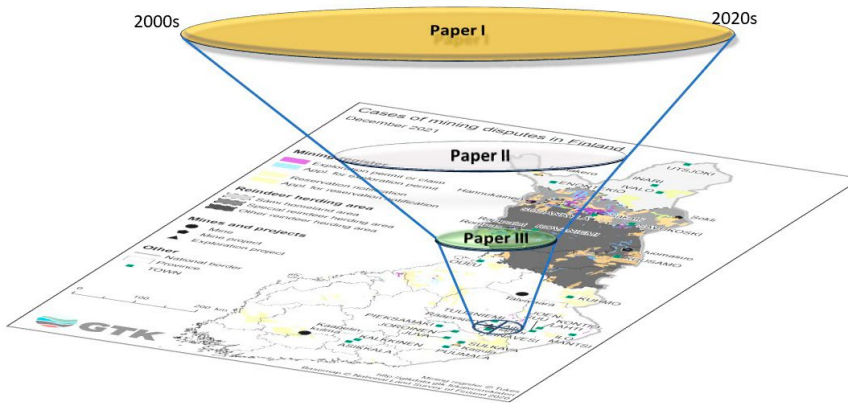


Figure 2. Papers I-III form a funnel-like lens system through which cases are examined in progressively more specific detail. The Paper I covers the time span from the early 2000's to the 2020's, while Papers II and III deal with contemporary events.

Papers II and III are mainly related to the ongoing mining debate, whereas Paper I also covers the uranium debate and previous environmental protest waves (EPWs) in Finland. The papers thus form a network connecting various issues and interactions between MEDs, related projects, exploration and mining companies and associated ENGOs and SMs. This thesis introduction emerged from reflecting upon and evaluating the interactions between the published those papers (Fig. 3).

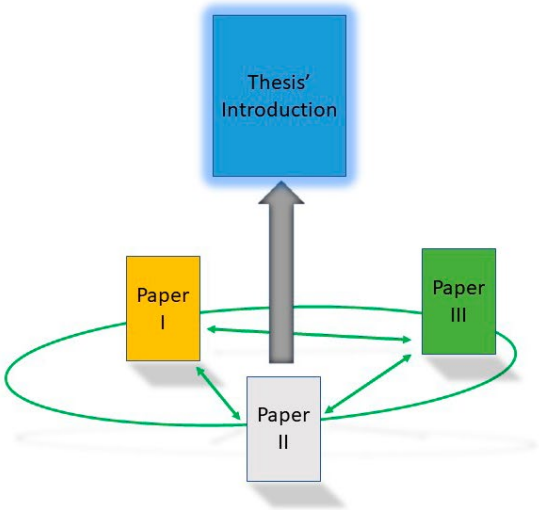


Figure 3. Connections and interaction between Papers I-III which form the basis for the thesis' introduction.

As with the papers, this introduction is also an exercise of progressive zooming. It begins with a more generalized overview of MEDs, SLO, and mining-sceptical movement and proceeds towards analysis at the level of individual companies, projects, SMs, and ENGOs. The case studies are based on those companies from Paper III which communicated SLO/SLE issues and NLIMET on their corporate websites, operate in sensitive contexts and are involved in MEDs. As their MEDs have been described in Paper II, but without respective maps, in this introduction, their spatial attributes and implications are examined with maps, adopting a sociopolitical geology perspective.

The time span covered by this thesis coincides with the period since the establishment of foreign and privately owned mining activities in Finland in 1995. This new mining industry is still in a process of adaptation within the Finnish societal context and vice versa.

2 MINING AND MINERAL EXPLORATION IN FINLAND – CONTEXT AND CONSTRAINTS

As this thesis deals with geology and society, an explanation of the importance of mineral deposits, their economic constraints and implications is desirable and is given briefly below. Principles of economic geology are explored here as a geoscientific background for the discussion on the societal importance of mineral raw materials, and within related MEDs. This is accompanied by a description of some of the main actors related to mining and mineral exploration in Finland, each of which have participated in the national mining debate and made important contributions to natural resource governance. These include the national and municipal authorities, industry and academia. The role of SMs and ENGOs will be described further with regard to the Finnish mining-sceptical movement. Other important stakeholders of the mining industry in Finland were described by Eerola et al. (2015), and Eerola (2017).

Almost all mineral deposits in Finland were formed billions of years ago (Fig. 4), as a result of diverse geological and mineralizing processes, some of which were peculiar to a particular period in Earth history. Mineral deposits, within their mineral system context (Groves et al. 2022) are also an integral component of geosystem services (e.g., Van Ree and Beukering 2016, Van Ree et al. 2017).

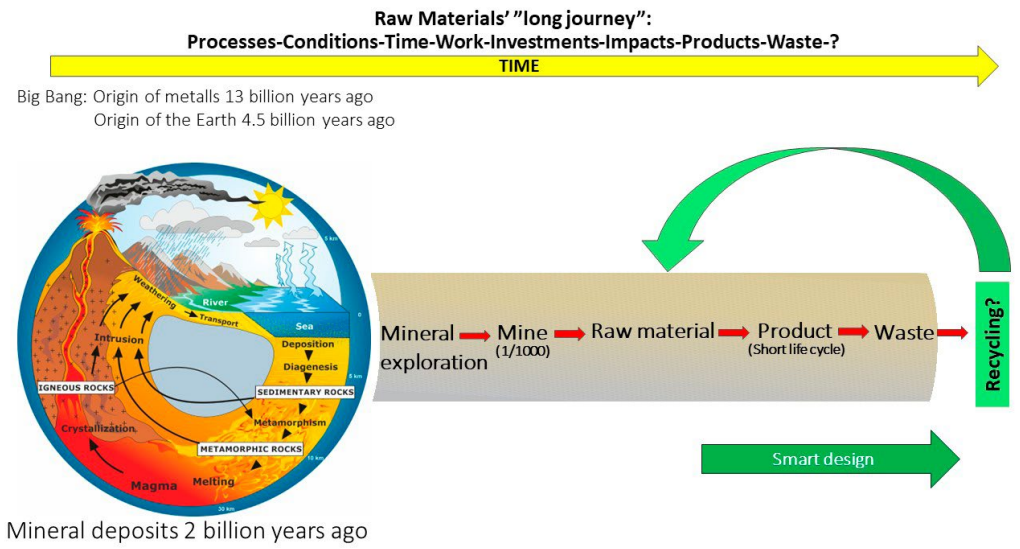


Figure 4. The long and complex journey from mineral deposit formation to mine production and ultimately a processed or manufactured product. 1/1000 refers to the average success rate of mineral exploration projects that eventually lead to discovery of mineral deposit, that is feasible for mining (Roscoe 1971). Smart design refers to extension of the use life of a product by improving its durability, repairability, and recyclability, as an underlying principle of the circular economy concept.

Ore-forming processes often occur at great depths and substantial periods of time and erosion are needed to bring them to or near the surface (Evans 1997). As a result, economically exploitable mineral deposits are sparsely and unevenly distributed throughout the Earth (Evans 1997), tending to occur in restricted regions where appropriate geological history and conditions led to their generation (Moon and Evans 2006, Groves et al. 2022).

Modern life demands and consumes significant amounts of a wide range of minerals and mineral products (Eerola et al. 2021). For this reason, geologists search for mineral deposits all over the world, working in very diverse contexts and conditions and facing diverse challenges, determined not only by geology, geography, and climate, but also by the social, economic, and

political environments in which they operate (Eerola et al. 2021). However, due to geological constraints, often, exploration geologists can spend their entire careers without finding significant or economically exploitable mineral deposits, as most metal and mineral concentrations (showings) are not economically recoverable ore deposits. Consequently, on average only 0.001% of mineral exploration projects are successful and eventually lead to a mining project (Roscoe 1971, Thomson and Joyce 1997, Moon and Evans 2006, Fig. 4). Thorough investigation of mineral deposit typically takes from five years to decades to complete, and involves huge investments, lengthy permitting processes, and considerable amount of effort if a mine is to be established. Overall, in a market economy, ore is an economic concept which is constrained by demand, supply and with price also determined by technological factors (Moon and Evans 2006). By definition, it can be stated that an ore exists only when it can be economically exploited. When the price is high, ore deposit reserves can expand and conversely, when the price is low, reserves can effectively disappear when extraction is no longer economically feasible (Evans 1997, Moon and Evans 2006). In other words, for a mining project to be economically viable the volume of ore and metal concentration should be sufficiently high, the deposit should be accessible, and processing should be technically feasible. Even an initially very promising mineral deposit may not meet the requirements for a mineable deposit due to its complex structure, remote location, the lack of infrastructure and access, unfavorable commodity prices, insufficient funding, other competing land uses, incompatible local livelihoods, and values, and a lack of acceptance by the local community (Thomson and Joyce 1997, Eerola et al. 2021). Mining of a mineral deposit needs to be economically justified, by demonstrating that it contains sufficient mineral reserves that are both accurately quantified and amenable to extraction (Moon and Evans 2006). It also needs to be able to produce profit for its owners, and to be extracted with the least possible adverse impact on the surrounding environment and local communities (Evans 1997). Until production commences, a company effectively operates with economic loss. Because the location of a mineral deposit is determined by its geological context, the areas in which exploration and mining cannot be changed according to economic circumstances and clearly, ore cannot

be transferred to other, more favorable locations (Eerola 2022b); This differentiates the mining industry from most other business activities.

Because knowledge of the entire mineral endowment and potential of a given area is usually incomplete, discovery of new resources requires significant investment in mineral exploration. The precise location of mineral deposits can rarely be predicted but geophysical and geochemical surveys provide information that allow focusing on certain areas for mere detailed exploration targeting. For this reason, surveys over large areas are commonly needed, and such tasks are typically undertaken by national geological surveys, which are publicly funded organizations dedicated to geological investigation, the collection and dissemination of data and policy advice relating to raw materials management. In this sense, the Geological Survey of Finland (GTK), as a public research institution, has an important role in mining-related issues in Finland. Since its foundation in 1885, the GTK has collected and produced geological data to meet the needs of industry and society. However, its role has changed from a mere mapping and mineral exploration organization. Nowadays, it promotes sustainable use of geological natural resources and provides various types of information and expert services in Finland, EU, and globally (Nurmi 2019). Based on the EU's INSPIRE directive, GTK's geological data is publicly available online. According to a national poll by Jartti et al. (2014), GTK was considered as the most trusted actor in mining issues in Finland. In this sense, Nation States use their respective national institutional powers in mapping and managing their natural resources (Adger et al. 2001, Lassila 2018, Hast 2021, Kama and Kuchler 2019) because such information is of public and national interest. Due to their expertise, geoscientists and geoscientific institutions, such as national geological surveys and especially, the mining authorities, which manage mineral exploration and exploitation, have the capability and expertise to produce authoritative data and maps to guide the exploration process (Kröger 2016, Lassila 2018, Hast 2021, Kama and Kuchler 2019).

More locally focussed mineral exploration and mining is undertaken by exploration companies. In Finland, during the late 1980's and early 1990's, the state-owned national mining industry was in decline, mainly because of long-standing low commodity prices, severe recession, and the prevailing

neoliberal policy of that time (Haapala and Papunen 2015). The state-owned national mining companies terminated their mineral exploration programmes and sold most of their mines, the notable exception being the Kemi chrome mine in Lapland, which was retained by Outokumpu Oyj.

In 1995, Finland entered the EU, after which the Finnish economy became open for foreign companies to explore or engage in mining activities. During the 1990's, no disputes were reported, although controversies between the mining and environmental acts, uncertainties among local people and recognition of the need for communication and stakeholder engagement were already observed at the time (Eerola 1996).

Since the end of the 1990s, the Finnish mining industry has been dominated by foreign companies. During the 2000s, increased demand for mineral raw materials caused by China's economic growth created a rush of foreign mining and mineral exploration companies to Finland. Since then, Finland has consistently been among the preferred global destinations for mining and mineral exploration investments (e.g., Mejía and Aliakbari 2024). This has been due to various factors, including its mineral potential, legislation, economic and political stability, infrastructure, service and technology providers, skilled labour, and international promotion (Eerola 2008, Kröger 2016, Majía and Aliakbari 2024). Although Finland is among the top twenty countries in mineral exploration investments, in practice, at the global scale, the Finnish share of such investments has been only 0.6% with its sixty-two projects compared to Canada's and Australia's over four thousand and two thousand, respectively (Costmine Intelligence 2024).

The foreign companies that comprise most of the current Finnish mining industry are of different sizes and origin, the major players being multinational enterprises, such as the British-Australian Rio Tinto, Australian-Chinese Dragon Mining, British Anglo American, Canadian Agnico-Eagle, and Swedish Boliden, all of which are engaged in mineral exploration or operate mines in Finland. Finnish mining companies include Outokumpu, which manages the Kemi mine, and Nordkalk, which produces limestone. However, most of the foreign companies operating in Finland are smaller and could be described as juniors, active in both mineral exploration and developing mining projects. Examples of such companies are the Canadian Mawson Gold, and Australian

Latitude 66 Cobalt. According to current legislation, all foreign companies need to establish a subsidiary that is registered in Finland.

Despite the foreign dominance, there are nevertheless a number of Finnish companies, such as the private Hannukainen Mining Oy owned by Tapojärvi Oy, and the state-owned Finnish Minerals Group, and Terrafame Oy. These companies are respectively engaged in developing mine projects at Hannukainen and Sokli and operating the Talvivaara mine. There are also small Finnish mineral exploration and consultancy companies such as Geopool Oy, Magnus Minerals Oy, and Suomen malmitutkimus Oy, which commonly form joint ventures with major companies.

Access to land is a crucial pre-requisite for mining and mineral exploration (Eerola 2022b). Usually, this is granted with a permit issued by a mining authority. In Finland, the Parliament enacts the regulations, while the state authorities license mining and mineral exploration and monitor such activities. Mining and environmental licensing is carried out by the Finnish Supervisory Agency (FSA), which handles mining permit applications, including environmental permits for such activities in protected areas. Mineral exploration permits are managed by the Finnish Safety and Chemicals Agency (Tukes). The Finnish state has also an important role in financing mining and mineral exploration projects, being quite mining-friendly. The various types of permits for mining and mineral exploration are given in Table 3.

Table 3. The various types of mining and mineral exploration permits in Finland, according to the new mining act (after Eerola 2017).

Permit	Activity	Rights	Validity	Duties
Claim reservation/ reservation notification (*)	Reconnaissance, preliminary surveying	A pre-emptive right to apply for an exploration permit. The freedom to roam gives the right to survey and take small-scale samples	One year	Notification of landowners on sampling, recompensation for landowner
Claim (mineral exploration permit)	Mineral exploration	Mechanical mineral exploration activities: trenching and deep drilling.	Four to 15 years (after that, only by landowners' agreement)	Arranging a hearing, reporting of activities to the mining authority, recompensation for landowner
Landowner's permit	Mineral exploration	Mechanical mineral exploration activities: trenching and deep drilling.	To be agreed with landowner	To be agreed with landowner
Mine permit	Mining	Exploitation	So far	Royalties for landowners, Mining tax

(*) Claim reservation has been erroneously referred as "mine reservation" (kaivosvaraus) in mining-sceptical discourse (Sarpo 2008), public debate, media (e.g., Keskinen 2022), and even research (e.g., Sorvali et al. 2023).

The granting of a license for mineral exploration and mining explicitly requires compulsory reporting of activities to the authority responsible for granting approval (Table 3). Company geological data and reports, and representative drill cores material are submitted to and archived by GTK and are integrated into the national geological database.

However, as shown in Table 3, landowners can also grant a permit for mineral exploration on their lands. This is based on a mutual agreement between the

landowner and the exploration company and predicates a good relationship between them. In such cases, there is no requirement for reporting, and this procedure can also accelerate mineral exploration. An agreed level of compensation is usually paid to the landowner for the use of land.

Municipal councils have also been important local stakeholders for mining and mineral exploration in Finland (Eerola et al. 2015, Eerola 2017). Mononen et al. (2023) presented five cases in which Finnish municipalities played an important role in mining governance, with most of these having avoided MED involvement. Recently, the importance of municipal authorities has increased: as a result of the revision of the Mining Act in 2023, municipalities have now the right to decide about the future of mining in their territories in conjunction with overall land-use planning. As a result of the uranium debate, the previous revision of the Mining Act in 2011 had already made provision for municipal authorities and communities to veto (or approve) uranium mining in areas under their jurisdiction. The current revision of the Mining Act has extended right to other commodities as well. Although Finnish regulations concerning the environment and natural resources have been steadily evolving in recent decades, these legislative changes appear to have been largely influenced by societal pressure towards devolution of decision-making to local government levels but also attest to the impact of the mining-sceptical movement on natural resource governance in Finland (Eerola 2024b). As result, there are examples of both pro-mining municipalities and those inherently opposed to mining (under any circumstances). Recently, eighteen municipalities from the Saimaa Lake area declared themselves as being opposed to mining in any form (Kokkonen 2023), whereas the municipalities of Kaustinen, Polvijärvi, Sodankylä, Ilomantsi, Pyhäsalmi and Kittilä have been pro-mining (Mononen et al. 2023). Kittilä, in Lapland, has long been an example of harmonious co-existence between mining and tourism activities (Suopajärvi et al. 2019b, Tuulentie et al. 2019). However, such positions may also change depending on the balance of political interests in local councils. Kuusamo, in northeastern Finland, has been one of the more prominent anti-mining municipalities because of the importance of nature-based tourism, which is seen as being incompatible with mining (Lyytimäki and Peltonen 2016, Eerola 2022a, b). The Kuusamo city council tried to exclude mining from its territory through recourse to land use planning legislation, but

this attempt was considered illegal and overturned by a Supreme Court decision (see Eerola 2022a, b). Now, under the terms of the current 2023 Mining Act, it would in principle be possible to present new mining proposals. However, the recognition that decisions relating to raw materials policy may be made at a local level was indeed one of the underlying motives for revision of the Mining Act.

However, beyond the official act of granting formal approval, the acceptance of mining-related activities by a local community may also be essential. Often, other forms of land use may be associated with a promising mineral deposit; Durán et al. (2013), Lèbre et al. (2020), Sonter et al. (2020), Owen et al. (2022), and Lawley et al. (2024) identified that a considerable number of mines and prospective areas for CRM, including those needed for the energy transition, are associated with protected areas, or in areas where indigenous communities and peasant have traditional activities. In such contexts, the interests of the mining industry and those of the local communities and/or ENGOs may diverge (Eerola 2022b).

MEDs and SLO have also attracted the attention of academia in Finland. The Finnish mining research on SLO issues began during the uranium debate in the middle 2000's. That initial study focused on opposition to uranium exploration at Kouvervaara in Kuusamo (Hyytinen and Nikkola 2008, Karasti 2008), and at Askola in Eastern Uusimaa (Sarpo 2008). Litmanen (2008) presented an overall picture of the uranium debate, while Eerola (2008, 2009b) contributed to that from the perspective of a geologist engaged in uranium exploration.

After the cessation of uranium exploration in Finland, papers based on surveys of public attitudes towards uranium were published by researchers from University of Jyväskylä (JYU; Jartti ja Litmanen 2011, Jartti et al. 2014, Litmanen et al. 2016), while Eerola (2010, 2012, 2014) examined the various discourses generated by the anti-uranium movement. Generally, uranium is related to geology, although Kainulainen (2011) considered the implications from an eco-theological perspective. More recently, uranium also inspired a doctoral thesis on the subject by Jartti (2022), who described past surveys on public opinion regarding uranium mining and their results, concluding that opposition towards uranium has not been so widespread as sometimes thought.

The environmental impacts of the Talvivaara mine in 2010-2012 (see Sairinen et al. 2017, Fig. 5) resulted in an unprecedented national funding of research projects on responsible mining (see Eerola 2017), under the auspices of the Green Mining concept and programme (see Nurmi 2017). Since then, the research into the impacts of mining has mostly been concentrated in undertaken at the universities of Lapland, Eastern Finland (UEF), Oulu and JYU. Beyond them, the national state research institutes such as the Environmental Institute (SYKE), GTK, and Natural Resources Institute (LUKE) have also contributed to such research. Consortias between all of these institutes have also been established for many multidisciplinary projects in national and EU-funded programs.

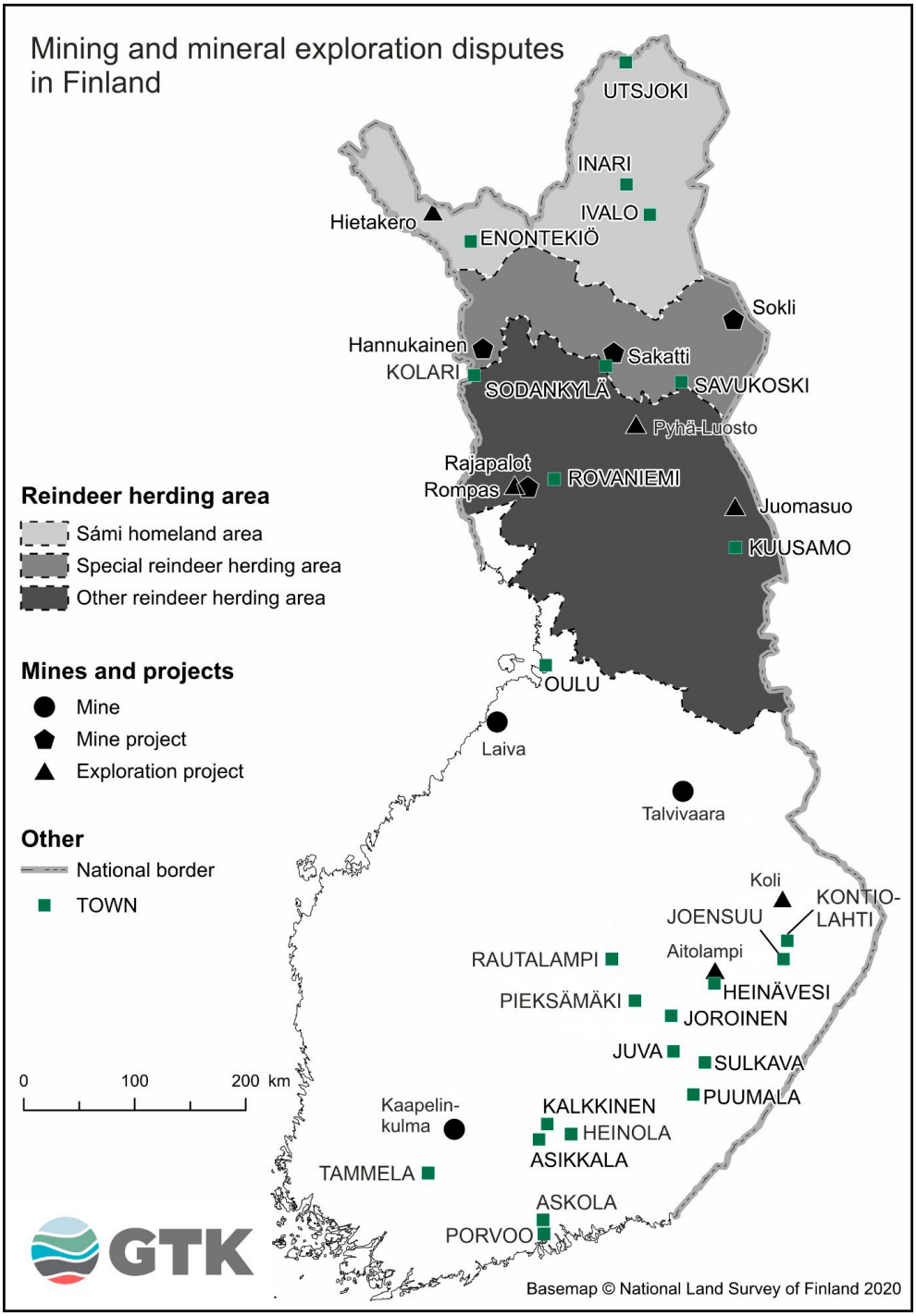


Figure 5. Localities and mining and mineral exploration projects involved in disputes in Finland (after Eerola 2022a).

The Universities of Lapland, Oulu and Helsinki have mainly focused on cases in northern Finland, whereas the University of Eastern Finland (UEF) has concentrated on Eastern Finland. Investigations have been conducted mostly on local MEDs (Table 4). Over the years, the Hannukainen mine project in Kolari, northern Finland, has been the most investigated MED, largely due to its close association with tourism and reindeer herding (e.g., Koivurova et al. 2015, Lesser et al. 2017, Similä and Jokinen 2018, Hast 2021, Komu 2020, Fig. 5).

Table 4. Examples of peer-reviewed literature in English on social license to operate and mining and mineral exploration disputes in Finland. LUKE = Natural Resources Institute of Finland, UEF = University of Eastern Finland, SYKE = Finnish Environmental Institute.

Project	Article	Issues and topics	Institution(s)
Hannukainen	Koivurova et al. (2015), Lesser et al. (2017), Similä and Jokinen (2018)	Tourism and reindeer herding vs mining	LUKE, University of Lapland
Heinävesi	Leino and Miettinen (2020)	Tourism and second homes vs. mineral exploration	UEF
Juomasuo	Lyytimäki and Peltonen (2016)	Uranium, tourism vs mining	SYKE
Kevo Natural Park	Lassila (2018)	Sámi resistance against mineral exploration	Helsinki University
Rompas-Rajapalot	Beland Lindahl et al. (2023)	Uranium, Natura 2000, opposition towards mineral exploration	University of Lapland, GTK
Sakatti	Lassila (2020)	Natura 2000, reindeer herding vs mining	Helsinki University
Talvivaara	Sairinen et al. (2017)	Uranium, water pollution and opposition	UEF

Other local studies have been on Juomasuo in the Kuusamo municipality (Lyytimäki and Peltonen 2016, Sorvali et al. 2023), Talvivaara in the municipality of Sotkamo (Sairinen et al. 2017), Kevo Natural Park in the Utsjoki municipality (Lassila 2018), Heinävesi in southeastern Finland (Leino and Miettinen 2020), Sakatti in the municipality of Sodankylä (Tuulentie et al. 2019, Suopajärvi et al. 2019a, Lassila 2020), and Rompas-Rajapalot in the Ylitornio municipality (Beland Lindahl et al. 2023, Table 4, Fig. 5). Most of the studied MEDs are related to important mining and mineral exploration projects in Finland and have been reviewed by Eerola (2022a, b), with MEDs being discussed further here. However, some attention has been also given for to examples of positive company-community relationship, such as the Kaustinen lithium mine project in western Finland, the Kittilä and Pampalo gold mines, in Lapland and eastern Finland respectively, and the Kylylahti, and Pyhäsalmi copper-zinc mines (Tuulentie et al. 2019, Suopajärvi et al. 2019b, Mononen and Sairinen 2021, Leino et al. 2023, Mononen et al. 2023, Eerola and Komnitsas 2025).

Recently, in addition to the study by Jartti (2022) mentioned above, several other doctoral theses related to this topic have been completed: Harju (2019) investigated media coverage of the Kevitsa and Talvivaara mines, Komu (2020) and Hast (2021) focused on the Hannukainen mine project and related dispute, whereas Lassila (2024) described Sámi resistance towards mineral exploration in the Kevo Natural Park in the municipality of Utsjoki and the dispute over the Sakatti mining project in the Sodankylä area, also in Lapland. Kotilainen (2024) concentrated on community contracts and collaboration and Leino (2025) focused on environmental justice issues related to the energy transition. This thesis contributes to those issues from a geologist's perspective.

3 THEORETICAL FRAMEWORKS

Beyond the theories applied in the papers described below, this thesis introduction also considers other relevant theories, and concepts not previously discussed. Those concepts arise from the interface of geosciences and society and are described below and listed in Table 5.

Table 5. Theories, concepts and their application in the thesis introduction and accompanying published papers. NLIMET = Low impact mineral exploration technologies; MED = Mining and mineral exploration dispute; SLO = Social license to operate; SLE = Social license to explore; CSR = Corporate Social Responsibility.

Thesis part	Theory/concept	Application
Introduction	**Social and political geology** (Mata-Perelló et al. 2012, Erb et al. 2017, Bobbette and Donovan 2019); **Geosystem services** (e.g. Gray 2004) **Geoethics** (Peppoloni and DiCapua 2012)	Examination of MEDs and their actors and the role of geology in them and SLO/SLE; Corporate and activist conducts.
Paper I (Eerola 2024b)	**Protest cycle** (Tarrow 1994)	Evolution of the Finnish mining-sceptical movement and its position within the context of Finnish environmental protest waves
Paper II (Eerola 2022a)	**Social license to operate** (SLO; Thomson and Boutilier 2011)	Mapping of mining disputes in Finland and its implications
Paper III (Eerola 2021)	**Social license to *explore*** (**SLE**; Suopajärvi et al. 2019a) **Stakeholder** (Freeman 1964) **Situational** (Grunig1989) **Resource dependency** (Pfeffer and Salancik 1978) — **CSR**	Company-community relationship in mineral exploration; Corporate motivation to communicate about new NLIMET and SLE

3.1 Social and political dimensions of geology in mining-related disputes

Following the publications by Jebrak (2017), Erb et al. (2021), and Eerola (2024a), this thesis introduction deals with social geology, which is an intermediate cross-disciplinary field between geology and social sciences (Fig. 6).

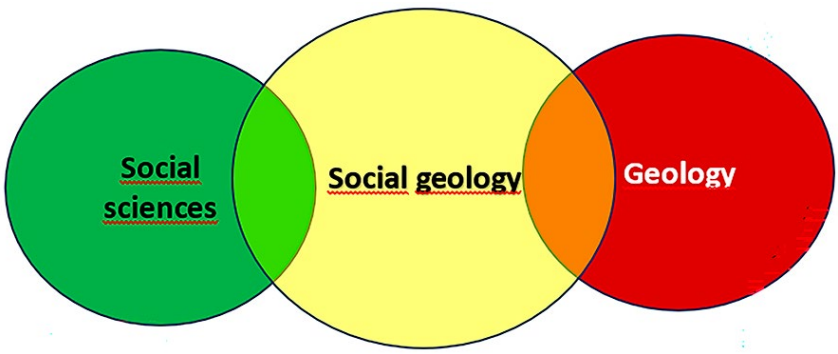


Figure 6. Social geology is a cross-disciplinary and multidisciplinary field between geology and social sciences.

Social geology refers to the study of social aspects associated with geological topics such as geohazards, environment, sustainability, geoheritage, geoconservation, geoscience communication, and raising public awareness of the geosciences (Mata-Perelló et al. 2012, Stewart and Gill 2017, Eerola 2025c). The concept of social geology has also previously been applied to mining issues by Jebrak (2017), Erb et al. (2021), and Eerola (2024a). Erb et al. (2021) observed the relationship between local geology, mineral deposits, and the nature of local community responses to mining in Indonesia. Local geology and the type of mineralization influenced mining technologies, mineral governance and local attitudes. For those reasons, conflicts were generated in some places, whereas mining was accepted in others. Erb et al. (2021) termed those geodiversity issues "mining territories". **Geodiversity** refers to the natural variation of rocks, minerals, lithologies, geological units, soils, and their responses to weathering and erosion expressed in landscapes and the role of geological factors in sustaining biodiversity and agriculture

(e.g., Gray 2004, Eerola 2022a). According to Erb et al. (2017), within the social geology, material and social are being mutually constituted.

Stewart and Gill (2017), Jebrak (2017), Erb et al. (2021) and Eerola (2024a) extended the scope of social geology to include the study of SLO and MEDs, corporate conduct of the mining industry, mining-sceptical movements and the practice and development of stakeholder engagement in mining and mineral exploration.

For instance, Clark (2019) and Kama and Kuchler (2019) also examined political issues related to geology regarding natural resource exploration and extraction (gas and geothermal energy) and sources of opposition. Indeed, political geology examines the influence of power relationships in the interaction between humans and geology (Bobbette and Donovan 2019c). The concept of political geology emerged from the debate over the concept of the Anthropocene, i.e., a period of major observable human impact on Earth (Crutzen and Stoermer 2000) and political geology has been a topic of interest for geographers, anthropologists, artists and theologians, but not yet for geologists (see Bobbette and Donovan 2019b).

Beyond other topics, political geology rejects western scientific views on geology and includes indigenous beliefs and cultural representations of geological elements such as volcanoes (e.g., Bobbette and Donovan 2019b, Bobbette 2023). It also considers geology as a colonial science because its birth and development occurred during the culmination of European colonial expansion, allowing rapid global dissemination and application of geological concepts (e.g., geological timescale). Development of geology as a science was also useful for a colonial economy because it facilitated discovery, mapping and exploitation of mineral raw materials from colonies, which underpinned the Industrial Revolution. Therefore, the objective of political geology has been to "decolonize geology" as a science. However, most of the scientific disciplines that originated and developed in Europe at that time can also be considered "colonial" regarding their respective contributions and reputations (e.g., geography and anthropology). Indeed, this quite critical and simplistic view proposed for geology by non-geologists can be interpreted as scientific misappropriation, and simplification of geology as a science and seems to be symptomatic of the commonly observed tension between

the humanities and natural sciences. Even though geologists were part of the colonial raw materials value chain, as were other western scientists, geologists have not simply been motivated only by colonial and economic issues; there has been a significant element of pure scientific curiosity, seeking to find explanations for geological phenomena and to understand Earth's dynamics with contributions also for social, environmental and sustainability issues (Mata-Perelló et al. 2012, Stewart and Gill 2017). Moreover, geology, emerging at the time as a scientific discipline, played a fundamental role in separating rational, evidence-based inquiry from the religious doctrines that had dominated since the Middle Ages. Prior to this, religion served as the primary framework for explaining nature, its origins, and the phenomena observed within it. This separation of science from religion, promoted by geology, marked a historical turning point that enabled a more accurate understanding of humanity's origins, position, and role on Earth.

Accordingly, Bobbette and Donovan (2019c) recognize that, because of its novelty, political geology is not yet theoretically and methodologically established and well-structured. For that reason, it is open to further contributions, applications and theorization.

One of the topics common to both social and political geology are MEDs and the way in which they are influenced by geological factors (Jebrak 2017, Clark 2019, Kama and Kuchler 2019, Erb et al. 2021, Eerola 2024a, 2025a). Therefore, both concepts are used here to examine MEDs. Because of their interrelation and overlap, the concepts are referred to here by the combined term sociopolitical geology, which studies human interaction with geology and examines its social issues, power relationships, influence, and politics (Eerola 2025a, b, Eerola et al. 2026). As shown by Bobbette and Donovan (2019c), in such context, and because of human interests and activities, even rocks and minerals can be understood as political actors with agency because they influence interests, decision making, behavior, activities and livelihoods, as will be demonstrated through this thesis. Therefore, sociopolitical geology is applied here in the sense of examining how mineral deposits, surrounding geology, and mining and mineral exploration companies and projects interact with geosystem services, local communities, mining-sceptical movement and diverse human interests. As pointed out by Stewart and Gill (2017), Jebrak

(2017) and Erb et al. (2021), this is needed, because geology has been neglected by social scientists in their studies on SLO. Indeed, curiously, Bobbette and Donovan (2019b) do not mention social geology in their book on political geology. This is also the case with the materiality and actor-network theories, which share some similarities with social geology and political geology as they consider the agency of non-living things regarding human actions and interests (e.g., Balmaceda et al. 2019). In it somewhat holistic approach, social and political geology, materiality and actor-network theories also show some similarities with indigenous people's spirituality in which nature is considered as an actor with agency (e.g., Lassila 2018, Bobbette 2023, Maher and Loncopán 2024).

The concept of sociopolitical geology has already been applied to examine the MED of Juomasuo in Kuusamo, Finland, and paradoxes and challenges of the energy transition (Eerola 2025a, b, Eerola et al. 2026).

3.2 Geosystem services, and geoethics

The concept of geosystem services arose from debates on geoheritage and geoconservation in the 1990's (Gray 2004). Groundwater, agriculture, mineral raw materials, construction, energy, and even tourism, and recreation are dependent on geology in the form of geosystem services which are part of the larger concept of geodiversity (Gray 2004, 2021), which embraces soils, rocks, minerals, groundwater, water bodies, and landscapes. This means that a given region might provide a variety of geosystem services for diverse purposes and uses. Therefore, according to Eerola (2022b), the geosystem service concept is also useful in examining spatial aspects of exploration and mining activities in relation to MEDs. This is because geosystem services in a single area may be reflected in diverse human interests and priorities, which can lead to conflicting views on how the area should be managed, preserved or exploited. For example, the diverse responses of rocks to weathering and erosion have generated landscapes that have geoaesthetic value and can be used for arts, sports, recreation, tourism and related activities (Gray 2021, Eerola 2022b). In Finland, such places have been developed into nature-based

tourism resorts such as the Ylläs ski resort in the Kolari municipality (Fig. 7). Nature-based tourism is defined as any tourism that uses natural attractions (Fallon and Kriwoken, 2003). Disputes may arise, for example where mineral deposit is found in the vicinity of a resort, as is the case in Kolari, with respect to the Hannukainen deposit (Fig. 7). The Hannukainen mining project is located about 10 km from the Ylläs resort, which is on the top of a quartzite and metaconglomerate hill, representing a geosystem service location for tourism, recreation and sports. Quartzites are metamorphosed quartz-bearing sandstones, and metaconglomerates are metamorphosed ancient gravel and pebble deposits (Winter 2001). Quartzite is more resistant to weathering and erosion and emerges from the surroundings as prominent hills in the landscape forming a geosystem service for tourism, sports and recreation as remnants of an ancient mountain belt (Eerola 2022b). The Hannukainen-Ylläs region contains a total of four different geosystem services (mineral deposit, quartzite hill, national park on volcanic rocks, and the Äkäsjoki river flowing along a fault line) that compete with regard to diverse economic and ecological interests, and which resulted in the Hannukainen mining dispute (Fig. 7).

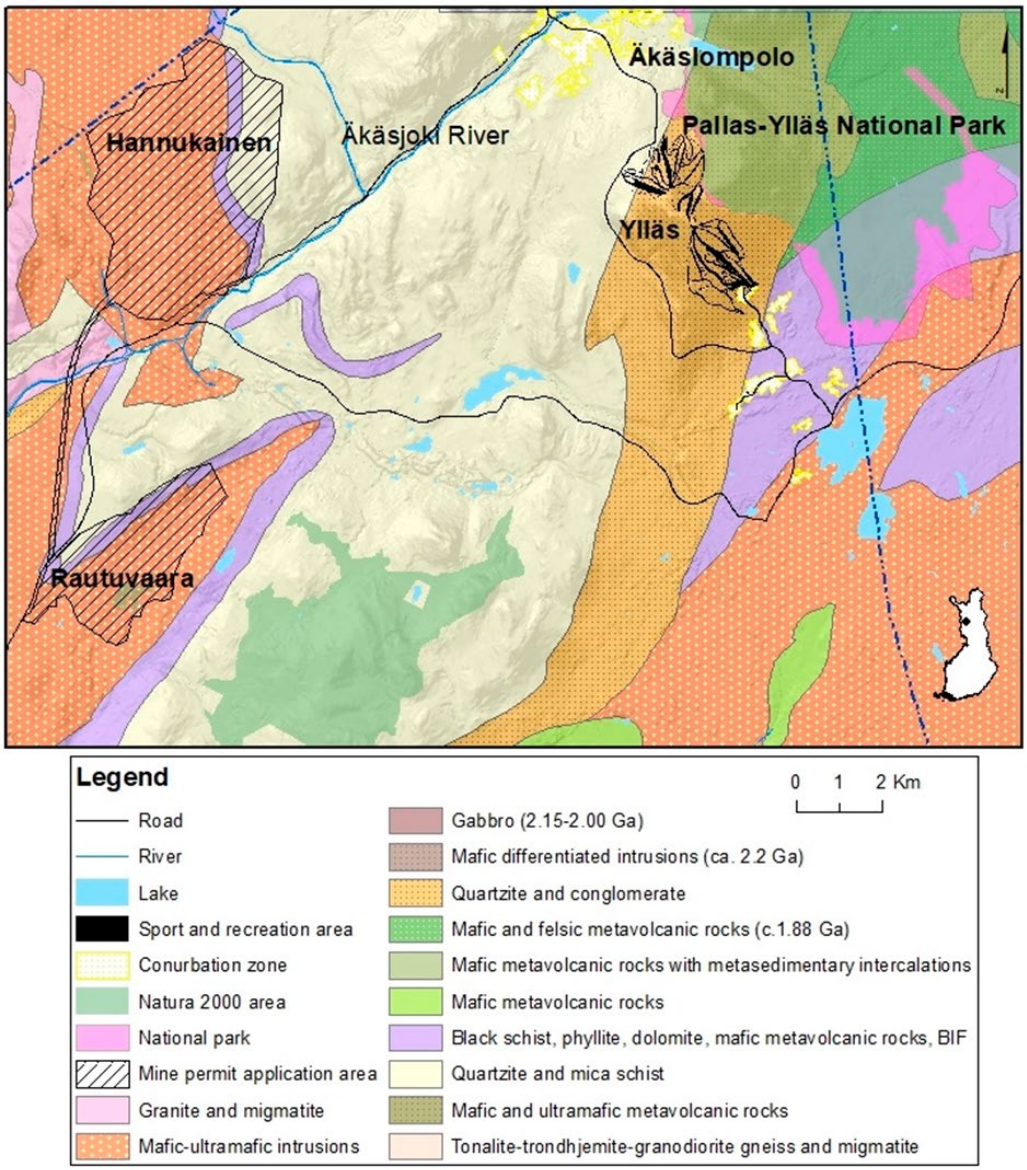


Figure 7. Geological map of the region around the Hannukainen mining project in the municipality of Kolari, northwestern Finland. Background maps: modified bedrock of Finland 1:200,000, GTK open licence CC BY 4.0, data of the National Land Survey of Finland 09/2025, hill shade, shaded relief 8 m, mining register (Tukes).

Therefore, analysis of geosystem services also aligns well with sociopolitical geology. From this perspective, geosystem services can be understood as political actors with agency: because of their usefulness, they influence diverse human activities and interests that can be contradictory and, for this reason, may generate MEDs. Geosystem services are not specifically mentioned in the papers comprising this thesis, but the concept is implicit in Papers II and III.

Because of the potential for environmental, social, and economic impacts, land use conflicts have been common in the mining industry (Hilson 2002, Bridge 2004, Andrews et al. 2017, Conde 2017, Eerola 2022a, b). The location and possible overlap of potentially controversial land use activities with each other and associated interests (e.g., geosystem services) can be spatially examined in maps (e.g., Brown et al. 2017, Kangas et al. 2022, Eerola 2022b). Maps are essential tools for geologists, and they present symbolic representations and interpretations of terrain, nature, and land use. However, maps and information which they present may also be restrictive in the limited types of information that they portray, as exemplified by thematic maps (e.g., geological, geophysical, geochemical, mineral deposit, and mineral potential maps; Lassila 2018, Hast 2021). Geoscientists produce regional maps based on their lithologies and soils, and geophysical and geochemical properties, known mineral deposits and areas of mineral potential. Nature is thus controlled and constrained by presentation of selected attributes in thematic maps detached from the surroundings and ongoing social reality. However, such thematic maps, beyond their role in geological investigations, mineral exploration, and mining, can also be used to assign and categorize areas of importance and thereby provide a basis for analysis in terms of political geology (Clark 2019, Kama and Kuchler 2019). However, natural resources may also be mapped and characterized independently, without reference to associated land use and local communities, but based on their inherent properties and values (Lassila 2018). For instance, the mining industry typically makes use of these data when it is selecting targets for mining and mineral exploration investments and in applying for permits (Clark 2019). For such purposes, companies usually also need to consult other more general maps that display all aspects of land use aspects, locations of communities

and dwellings, as well as areas available for permit applications. However, it seems that information on land use aspects is relatively seldom considered by companies when applying for permits (Eerola 2022a). Moreover, these maps can also be used to examine relationships between diverse geosystem services and ecosystem services, their potential overlap and to identify the presence of sensitive contexts, as will be demonstrated later in this thesis. In fact, such maps are essential tools of sociopolitical geology, bringing geology, spatiality and geography into the research of SLO and MEDs.

As shown by Lassila (2018, 2024), Knuth et al. (2023), van Teijlingen (2023), and Maher and Loncopán (2024), maps can also be created by a "**countermapping**" process, which can highlight relevant environmental and social issues that are valuable in providing indigenous peoples, local communities and ENGOs with evidence that demands consideration and a response from companies and authorities. Such information is commonly used by activists and researchers engaged in environmental disputes to stall or block projects by creating potential obstacles during the licensing process. Indeed, on the other hand, mapping sociopolitical geology and considering associated land use and geosystem services can assist companies in avoiding MEDs by anticipating them in advance and taking such issues into consideration in their planning and target selection.

According to Eerola (2024a), research and communication on mining, SLO and MEDs fall within the field of geoethics, a concept introduced by Peppoloni and DiCapua (2012). Geoethics is a field that deals with ethical, social, and cultural dimensions of human relationships with the Earth system. Geoethics is also related to the professional practice of geoscientists (geologists, metallurgists, geophysicists and geographers) and geoscientific research (geological, geophysical and physical geography studies), and deals with geohazard research, prevention, and related geoscience communication, geoconservation and raising public awareness of the geosciences (Peppoloni and DiCapua 2012, Wyss and Peppoloni 2015, Peppoloni and DiCapua 2021, 2024). Within geoethics, humankind is understood as a geological force that causes environmental impacts which should be minimized and mitigated. The relationship of society to raw materials, their exploration, and extraction, and the circular economy are also topics examined by geoethics (e.g., Boon 2020,

Ribeiro et al. 2021, Eerola 2024a, Peppoloni and DiCapua 2024). Therefore, geoethics can also be extended to deal with the activities of mining and mineral exploration companies and discourses within the mining-sceptical movement and to examine their reliability, ethics, responsibility, conduct, SLO, and social impacts in MEDs (Eerola 2024a). Although the term geoethics is not mentioned specifically, Papers I-III can be considered as representative of the concept as they examine corporate and activist conducts from an ethical perspective.

3.3 Theories applied in the papers

Theories related to the topics discussed in the papers come from many fields, such as sociology, psychology, and anthropology, but also from business, management and communication studies and even from the mining industry. Their application depends on the perspective and focus on a specific topic and, as in the papers comprising this thesis, these theories are also clearly interrelated, forming lenses through which each topic is examined (Fig. 2). An explanation of these theories and their applications is given below.

3.3.1 Protest cycle theory

Tarrow (1994) observed that protests may accumulate over time to form heightened or condensed moments called protest cycles. Protests can be social, environmental, political, or mixtures of these. A protest cycle is formed when several groups composed of SMs, ENGOs, and individuals join in a protest around a common issue and goal. However, there is frequently a diversity of issues and goals such as in the Global Justice Movement (GJM) at the turn of the millennium (Mertes 2004, Lindholm 2005, Della Porta 2006). This protest cycle included critics of neoliberal politics, international trade policy, globalization, environmental, social and political issues, defense of human rights, and indigenous people. Because of that universalism, Mertes (2004) defined the GJM as a "movement of movements".

During protest cycles, demands for change are urgently expressed by intense public debate, protests, and demonstrations. Sometimes, such

protests involve violence, such as those of the GJM in Prague, Gothenburg and Seattle at the turn of the millennium (Lindholm 2005).

In Finland, protest cycles have also been referred to as Environmental Protest Waves (EPWs) (Rannikko 1994, Konttinen 1999, Konttinen and Peltokoski 2004, Lindholm 2005). In this sense, the protest cycle theory was initially applied in Finland by Rannikko (1994), who identified three Finnish EPWs:

1) the 1960's-1970's environmental awakening,
2) the 1970's-1980's anti-nuclear, alternative life, and green movements and the Koijärvi environmental protest,
3) forest disputes in 1980's.

After that, two further EPW's have been identified:

4) animal and radical activism of the 1990's (Konttinen 1999, Konttinen and Peltokoski 2004)
5) the GJM at the turn of the millenium (Lindholm 2005, Ylä-Anttila 2010).

The protest cycle theory was applied in Paper I to identify and explain the source, location and extent of the uranium and mining debates within the continuum of Finnish EPW's and the evolution of the Finnish environmental movement (Eerola 2024b). The characteristics of Finnish EPWs were compared to those of uranium and mining debates in the form of a comparative case study and similarities were observed between them (Eerola 2024b). Therefore, as the Finnish mining-sceptical movement developed through these debates, with its consequent impact on national mineral governance, and within the overall continuum of the Finnish environmental movement and EPWs, it was proposed in Paper I, that this process constituted the 6th Finnish EPW.

Within this context, the interconnectedness of the protest cycle and SM theories became clearly evident. The SM theory explains how SMs are generated, evolve and end (e.g., Stekelenburg and Klandermans 2008). For example, Lyra (2021) applied the SM theory to explain the genesis of the Brazilian anti-mining movement. However, the protest cycle theory also provides an effective explanation of the emergence of the Finnish

mining-sceptical movement within the context of Finnish EPWs (Eerola 2024b). Indeed, the protest cycle theory includes elements of the SM theory (framing, collective action, identity, resource mobilization and political opportunity, e.g., Stekelenburg and Klandermans 2008, da Costa et al. 2023). However, as discussion of the relationship between the two theories was beyond the scope of Paper I, this will be elaborated below.

The characteristics of protest waves, according to Tarrow (1994), are:

- quick dissemination of collective action and mobilization, when SMs create
- political opportunities for others to act upon or participate in;
- innovation in protests;
- creation of or a major change in collective action frames, and discourses;
- the coexistence of organized and unorganized activists; and
- major intensity in interaction between the challengers and authorities.

The elements of the SM theory found in protest cycle theory are underlined above. Curiously, the protest cycle theory also resembles the SM action framework (SMAF) proposed by Grinspun et al. (2020, 2022; Table 6). The SMAF concept explains how individuals, groups, or voluntarily and intrinsically motivated organizations mobilize for a common cause, aimed at improving a situation through knowledge uptake and sustainability (Grinspun et al. 2020, 2022). Like the protest wave theory, SMAF also has preconditions, characteristics, and outcomes which coincidently, are also represented as a wave by Grinspun et al. (2020, 2022, Fig. 8). Obviously, there are preconditions that preclude a wave, and each wave has its own characteristics and an aftermath defined by outcomes (Fig. 8). Each of these alternatives are included in Table 6 as characteristics of SMAF and are also explained below.

Table 6. Characteristics of the protest wave theory (Tarrow 1994), and social movement action framework (Grinspun et al. 2020, 2022). SM = Social movement

Characteristics	**Protest wave theory**	**Social movement action framework**
Mobilization	Rapid dissemination of collective action and mobilization	Urgent need for action, collective identity, individual and collective action
Pre-conditions	Existing SMs create political opportunities for others to join in	Collective identity, examples of SMs are recognized, intrinsic motivation, momentum
Interpretation and representation	Major change in collective action frames, discourse, and frames of meaning	Framing
Actors	Coexistence of organized and unorganized activists	Network of people and SMs, individual and collective action
Trigger/Catalyst	Key event	Momentum
Opportunity window	Political opportunity	Change is valued and necessary, receptivity to change
Publicity	Media attention	Public visibility
Innovation	Innovation in the forms of protest	-
Authorities	Increased interaction between activists and authorities	-
Leadership	-	Emerging leadership
	-	Leadership structures

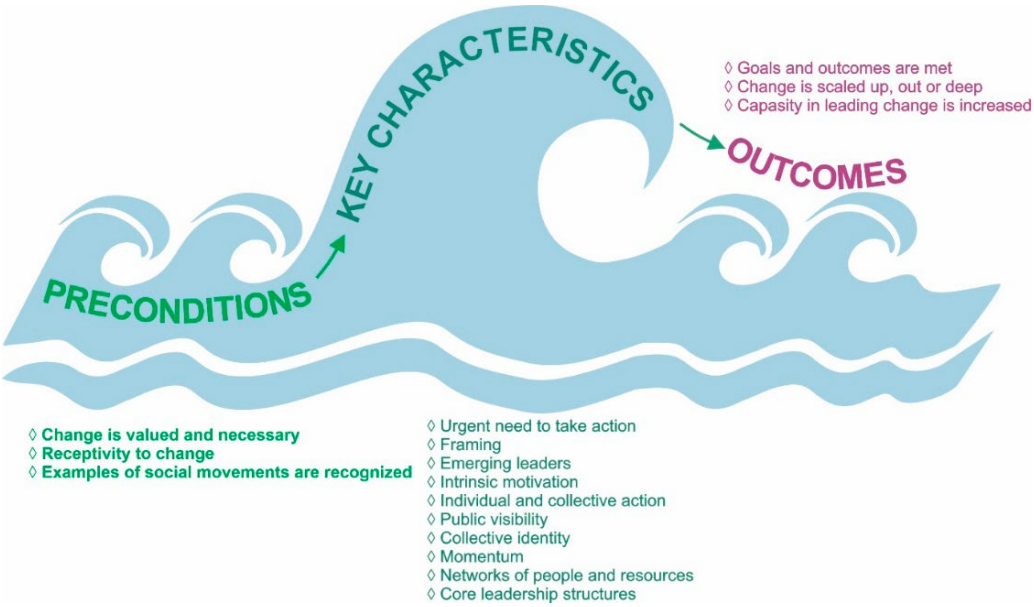


Figure 8. Characterisation of the social movement action framework (after Grinspun et al. 2020, 2022).

The antecedents of SM actions are that change is valued and seen as necessary, there is receptivity for a change, and examples of SMs are recognised (political opportunity, Tarrow 1994). For instance, the key characteristics (Table 6, Fig. 8) indicate that there is both an urgent need for change and a political opportunity for creating such change (Tarrow 1994). According to Grinspun et al. (2020, 2022), framing is applied to understand and communicate a common concern, or the demand for change and to the values and beliefs which motivate action (Benford 1997). Whenever individuals, groups, and organizations involved in an SM initiate individual and collective action, leadership inevitably emerges. Activities, communication, and outcomes are spread by several channels and media to emerge and maintain public visibility. This combined individual and collective action, and its public dissemination supports the momentum. As groups, organizations and individuals act together for a change, a collective identity is established (e.g., Vestergren et al. 2017), reflecting a common goal and commitment to the issue and creating and strengthening social ties. This process is also supported by networks of people and resources with a

similar focus and action (identity)(Grinspun et al. 2020, 2022). Finally, as an SM develops, leadership is needed to orient and support the SM.

However, there are also differences between the SMAF and the protest cycle theory (Table 6), the most notable exceptions being that unlike SMAF, protest waves do not necessarily lead to the emergence of leaders and core leadership structures. Apparently, as they were not mentioned by Tarrow (1994), these features are not essential to protest waves, especially when they are represented by new, structureless, and horizontal SMs and informal networks. Conversely, protest cycle theory highlights interaction between activists and authorities, which is not the case with SMAF. Furthermore, SMAF does not include innovation in the form of protest of the protest cycle theory.

Nevertheless, this coincidence of characteristics and representation between a protest wave and SM theories seems to be significant and meaningful and worthy of further attention. It is argued here that while the SM theory adequately explains the generation of an SM, the protest cycle theory explains how a network of individuals, SMs and ENGOs is formed for a common cause and in strengthening and expanding protests. Thus, the question is mainly about the scale at which such processes occur. The SM theory can describe the origin, evolution, and outcomes of a single local SM on a small scale or, alternatively, describe a nation-wide SM on a wider scale. Considering the similarities between the SMAF, SM, and protest wave theories, this larger-scale perspective resembles that of the protest cycle. In that sense, a protest cycle can be formed by a network of individuals, SMs, and ENGOs. Therefore, a protest cycle can be considered as an umbrella under which the generation of local and nation-wide SMs is explained according to the social movement theory and SMAF (Fig. 9). The mechanism that generates an SM is the same as that which explains the formation of a protest cycle on a larger scale (Fig. 9). This means that, together with the climate change debate, the Finnish mining-sceptical movement generated the 6th Finnish EPW, and vice versa, as proposed by Eerola (2024b). In this case, they are inter-related and inter-dependent.

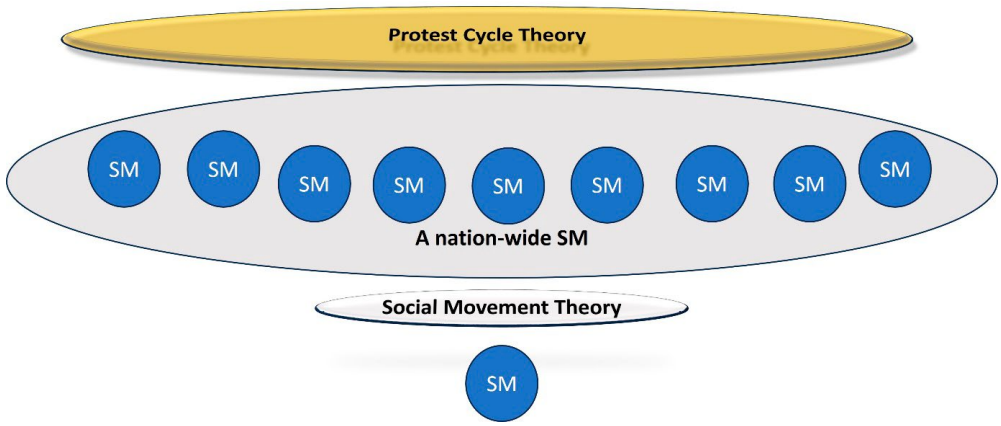


Figure 9. The scalar relationship between the social movement (SM) theory and the protest cycle theory.

3.3.2 Social license to operate

A contemporary, and popular theory and concept used to explain a company-community relationship is the SLO (Thomson and Boutilier 2011). As described by Thomson and Joyce (1997), Hilson (2002), Ballard and Banks (2003), and Bridge (2004), the expansion of economic globalization during the 1980's and 1990's led to a global increase in mining conflicts, when both multinational mining and mineral exploration companies migrated from the Global North to the Global South. Largely because of financing issues related to foreign debt, the economies of many Global South countries were pressured for structural reforms that focussed on export of mineral raw materials. Due to coincident social, health, and environmental issues, NGOs from the Global North also migrated to the Global South where they, local communities, and mining companies confronted one other in social and environmental issues. Because of increasing conflicts, the term SLO was adopted from the forest industry by mining industry executive Jim Cooney in 1997 (Thomson and Boutilier 2011). At the same time, the mining industry reacted to resistance by creating associations such as the International Council of Mining and Metals (ICMM 2002), and corporate social responsibility (CSR) programmes to improve its performance and to enable its operations to continue (see Bridge 2004, Dolan and Rajak 2016). CSR means voluntary actions to mitigate impacts of its activity by a company beyond the minimum requirements for

compliance with established legislation (Garriga and Melé 2004). CSR relies on evaluation of performance with respect to three pillars: economic, social, and environmental (Elkington 1997). Nowadays, CSR has been largely replaced by the concept of ESG (environmental, and social governance), which is (increasingly) demanded by investors (e.g., Lawley et al. 2024).

At the beginning of the 2000's, the focus of mining research activities on the Global South and indigenous issues was mainly related to conflict situations that arose in the 1980's-1990's (e.g., Martinez-Alier 2001, Hilson 2002, Kapelus 2002, Ballard and Banks 2003, Bridge 2004). However, soon after, China's economic growth precipitated a global resource rush, which expanded mining and mineral exploration and related conflicts all over the world (Andrews et al. 2017, Conde 2017). Evidently, the CSR programmes introduced by the mining industry were inadequate in preventing such episodes because their adoption and implementation by companies were not carried out in an effective manner and time (Eerola 2017).

As observed by Karakaya and Nuur (2018), the SLO has been the most frequent topic of international mining research. Apparently, this interest was caused by the above-mentioned context.

Usually, a mining conflict is generated when there is no SLO, or it is challenged (Thomson and Boutilier 2011). SLO is not an official license granted by authorities, but an informal consent based on local attitudes towards an activity (Thomson and Boutilier 2011). Perception and attitudes of local community members about any given activity determines the stance which community representatives will take. In this sense, to obtain SLO, trust is essential, and this can be achieved by establishing a good company-community relationship through dialogue, mutual respect and collaboration (Prno 2013, Moffat and Zhang 2014, Parsons et al. 2014). Communication, engaging with a wide number of stakeholders, and sharing of benefits with the local community have been seen as crucial to achieve this (Prno and Slocombe 2012, Prno 2013, Moffat and Zhang 2014, Parsons et al. 2014, Mercer Mapstone et al. 2018). Stakeholders are all those affected by a proposed activity and who also have the ability to influence this (Freeman 1964). Communication and stakeholder engagement are considered as forms of procedural fairness, whereas sharing the benefits from the activity amongst

the local community is an aspect of distributional fairness (Parsons et al. 2014, Moffat and Zhang 2014, Mercer Mapstone et al. 2018). Benefit sharing means job creation, taxation revenue streams, use of local services and purchase of local products, sponsoring cultural and sport events and associations or even construction of infrastructure, such as hospitals, schools, and roads which is common in the Global South. In such a situation, companies may in practice replace the role that the state would normally be expected to play at the local government level, and which may cause a strong dependence of communities on the company. All of this can also be included within the scope of CSR, ESG, corporate conduct, geoethics, and sociopolitical geology. In this sense, SLO has a strong relationship with the stakeholder theory.

Communication and stakeholder engagement are essential for effective sharing of information about a project, its corporate background, activities and aims, and to meet people in order to establish a dialogue (e.g., Mercer Mapstone et al. 2018). For a project owner, a personal sharing of information at a very early stage is crucial in avoiding any prejudices, rumors, and suspicion (Eerola 2008, 2017, Hyytinen ja Nikkola 2008, Karasti 2008). On the contrary, lack of information creates a void that may be easily filled by information from third parties which might not favor the proposed activity (Hyytinen and Nikkola 2008, Eerola 2017, Ribeiro et al. 2021, Fig. 10). Therefore, a company should be the first to share information on it, and its activities and projects to establish dialogue with the local community. This may be of crucial importance in influencing local opinions towards mineral exploration (Eerola 2017, Ribeiro et al. 2021, Poluektova et al. 2024). It is also a polite and respectful approach towards local people. They have the right to know what is happening on their lands and in the surrounding environment (Eerola 2017). In the same way, beyond sharing information, listening to the locals is also important, being an essential pre-requisite for meaningful dialogue.

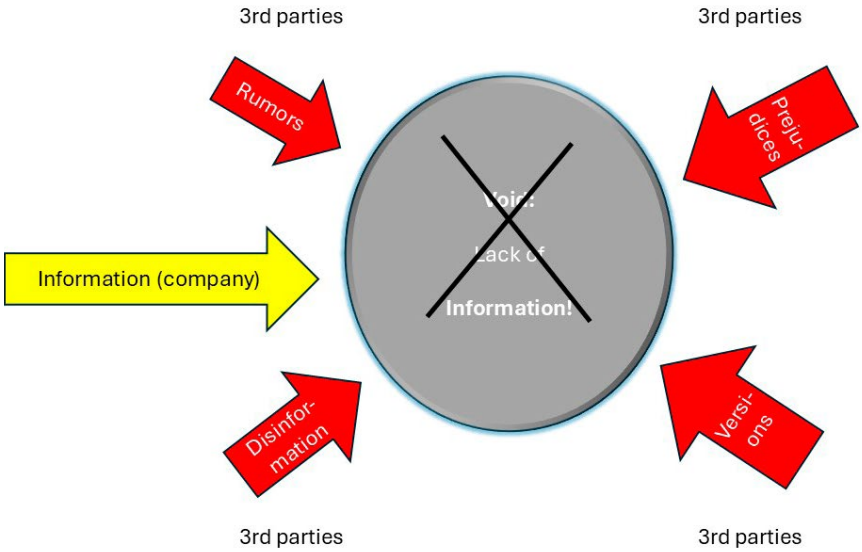


Figure 10. A void formed by lack of information can be easily filled by 3rd parties with their various versions of proposed activities. Therefore, a project owner needs to provide information in the first place.

Although third parties might disseminate rumors and disinformation concerning a proposed, or existing project, the possibility that exploration or mining company might engage in such practices ought not to be excluded. However, nowadays, publicly listed companies are governed by strict rules on their communication which should prevent them from behaving in this way. Nevertheless, sometimes it seems that companies and activists compete on who can belittle and exaggerate the social and environmental impacts of mining and mineral exploration (e.g., case of the Talvivaara mine, Sairinen et al. 2017).

Suopajärvi et al. (2019b) developed an additional concept known as SLE. This was because mineral exploration differs fundamentally from mining (Table 7). Mineral exploration is typically done in large areas whereas mining is attached to a site in which an economically exploitable mineral deposit has already been located. Mineral exploration can also be an ephemeral

activity of short duration if no promising mineral deposit indications are found, whereas a mining operation can have a duration of years, decades or even centuries. In all cases however, mineral exploration is the first point of contact with a local community, and this moment may shape the company-community relationship further on if the project advances towards mine status (Thomson and Boutilier 2011, Eerola 2017, Beland Lindahl et al. 2023, Suopajärvi et al. 2023). This may also influence forthcoming projects, as MEDs can be inherited from former project owners (Eerola 2017). Each of the above factors leads to differences in stakeholder community engagement which, in the case of mineral exploration, need to consider wide range of stakeholders across a large area that may cover several municipalities. Another issue that differentiates mineral exploration from mining in SLO-related issues, is that of the three conventional CSR and ESG pillars (social, economic and environmental) the social pillar predominates in mineral exploration due to the importance of stakeholder engagement and communication, when as all three should be considered in mining projects (Eerola 2017). This is because the environmental impact of mineral exploration is small, and the activity is usually practiced by small junior companies which commonly obtain high-risk financing from the financial market and do not necessarily have the prerequisite conditions for any benefit sharing (Table 7).

The SLE concept was specifically used in Paper III (Eerola 2021).

Table 7. The main differences between mining and mineral exploration (after Eerola 2021).

CRITERIA	MINERAL EXPLORATION	MINING
Activity	R&D	Production
Time	Years to decades	Decades to centuries
Company	Junior, may change	Mid-tier to major
Location	Wide areas	Defined site
Financing	Financial market	Revenue from production
Impacts	Low	High
Risks: Economic Social Environmental	 High Low Low	 Medium High High
Conflict potential	Low	High

Although SLO is a popular concept, it has also been criticized (e.g., Owen and Kemp 2013, Dunlap and Riquito 2023); SLO has been seen as a way to achieve local acceptance by "social engineering", "social warfare", "counterinsurgency", in other words, manipulation of local opinion. However, on the other hand, SLO has also empowered and brought visibility to local communities, SMs, and ENGOs and enabled a voice for demanding more respect and proper corporate conduct from companies and the industry in general (Thomson and Boutilier 2011).

Although land use has been recognized as one of the more important causes of mining conflicts (e.g., Hilson 2002, Kapelus 2002, Bridge 2004), project location with regard to land use has not received adequate attention in the very influential SLO literature. Emphasis has traditionally been on the above-mentioned procedural and distributional fairness, i.e., corporate conduct (e.g., Prno 2013, Prno and Slocombe 2012, Moffat and Zhang 2014, Parsons et al. 2014, Zhang et al. 2015, Mercer Mapstone et al. 2018). This viewpoint, which developed in Australia and Canada has been very influential even in the recent literature (e.g., Jartti et al. 2020, Komnitsas 2020, Mononen and Sairinen 2021, Lesser et al. 2021). However, among other issues, such as attitudes towards mining (Jartti et al. 2014, Zhang et al. 2015, Litmanen et al.

2016, Jartti et al. 2020), spatial analysis of associated forms of land use may also be a precondition for granting SLO, where the local context needs to be carefully considered by a company during target selection (Eerola 2017, 2022a, b, Suopajärvi et al. 2023, Beland Lindahl et al. 2023). If a project is in the "wrong place", i.e., in a sensitive context prone to MED, there is an inherent difficulty in creating trust towards the project owner, which may prove to be the main barrier to obtaining SLO.

According to Conde (2017), Eerola (2022a), and Eerola and Komnitsas (2025), mining conflicts are caused where the location of a project coincides with sensitive land use contexts, social and environmental impacts, a lack of voice in decision making, weak community trust in mining companies and authorities, and negligence or lack of compensation for grievances suffered. However, Conde and Billon (2017) and Eerola and Komnitsas (2025) noted that not all communities resist mining. Those more prone to oppose perceive a threat to their safety or way of living, which may depend on the activity, when it was first identified, the local context, project location, the commodity, corporate conduct, reputation, access to information, organization, and alliances (Conde 2017, Eerola 2022a).

Increasing demand and rising commodity prices cause exploration and mining booms, when the number of mining conflicts also expands (Andrews et al. 2017, Conde 2017, Eerola 2022a). Apparently, this is based on a situation in which companies compete for the same areas and the tendency for permits to be applied for in haste, without due preparation (Eerola 2022a). In such situations, it seems that junior companies may lack the resources, will and time to thoroughly examine potential conflicts in land use, nor to engage and communicate with local stakeholders. In fact, some assessments have shown that the sustainability performance of mineral exploration companies has been traditionally poorer than that of big mining companies (Lyons et al. 2016). This lack of communication and stakeholder engagement could be interpreted as showing a lack of respect for the locals (Eerola 2017, 2022a), which may understandably create frustration and suspicion and ignite resistance among the local people. Unfortunately, the situation may be very difficult to rectify afterwards. For this reason, a lack of stakeholder engagement, characterized by poor communication and negligent target selection can be

seen as poor corporate conduct, the avoidance of CSR and as a geoethical problem. Together, these have generated MEDs and contributed to the growth of the mining-sceptical movement. Due to these constraints, small junior companies also face more challenges when dealing with SMs, ENGOs, indigenous people and local communities. In most cases, juniors have few or only one employee (geologist) in the field dealing with mineral exploration, geological mapping, permitting, stakeholder engagement, communication, and eventual opposition. Such small companies are commonly unable to provide concrete support for employees at the "frontline" of a dispute, beyond legal assistance if something untoward happens.

The state is also of importance in relation to SLO, through its critical role in the governance of mineral resources. The state sets the mineral policy and influences how disagreements in mining and mineral exploration are initiated and resolved (Conde 2017, Zachrisson and Beland Lindahl 2019). If the state is proactive in guaranteeing the basic rights of citizens and in the provision of welfare state services, as in the Nordic countries, citizens generally tend to trust the state and its authorities (e.g., Lesser et al. 2020, Suopajärvi et al. 2023). Indeed, the existence of robust and independent institutions based on the rule of law can in itself have a positive influence national economic development (Acemoglu & Robinson 2013). This institutional dimension has a strong influence on SLO and the nature of MEDs (Eerola 2017, Jartti et al. 2020, Lesser et al. 2021). When trust in government and authorities is low, disagreements concerning mining are usually more intense, as is frequently the case in the Global South (Conde 2017). This contrasts with the Global North where disputes are usually less intensive and violence is rare (e.g., Eerola 2015, 2017, 2024b, Kivinen et al. 2020, Lesser et al. 2021).

Governments can also respond to opposition in diverse ways, depending on the importance of mining for the national economy, its economic situation, and the nature of civil society (Conde, 2017, Zachrisson and Beland Lindahl 2019, Eerola 2022a). Adoption of demands from society through changes in policy and legislation are the most common responses to social pressure, but governments can also react by repressing protests, which effectively means that the state becomes a part of the conflict, as has commonly occurred in the Global South (e.g., Paredes, 2016, Arce and Nieto-Matiz, 2024). In the

Global South, MEDs may escalate to violent conflicts in which the otherwise absent state may become involved by using police, or even the army, to repress demonstrations (e.g., Arce and Nieto-Matíz 2023). On the other hand, opposition groups may also resort to the use of violence in its protests as the only way for its message to be heard. Usually, these situations also involve frustration related to general political, economic, and social issues (e.g., corruption, inequality and lack of participation). For example, general dissatisfaction with the government may actually exacerbate such protests, as an example of sociopolitical geology. Usually, European MEDs have been focused on the mine planning and production stages and are mostly of low to medium intensity, at the level of local public debate with demonstrations being relatively rare (Badera 2014, Kivinen et al. 2021, Lesser et al. 2021). However, the case of the Barroso lithium mine project in Portugal has involved vandalism (Dunlap and Riquito 2023), while protests at Jadar in Serbia have even led to violence and external political interference (Vivoda and Loginova 2025). Similarly, differences in economic development across Europe may shape the way how resistance towards mining takes place in different countries (Lazarević 2024). Such differences within Europe show the importance of trust in the government and authorities in shaping the nature of such disagreements (Eerola and Komnitsas 2025).

Policymaking in Finland has traditionally been quite consensual and deliberative, which has also permeated natural resource governance (Konttinen 1999). Police interventions and violence are, consequently, also unusual in the Finnish setting. According to Tammikko (2019), the equity and reliability of the authorities and the whole social system potentially reduce the anger of individuals towards other people and society. People aim to influence decision making by legal means instead of violence. In fact, the Finnish protest culture is generally peaceful, calm and law abiding, and political violence practiced by extremist and protest movements has been rare (Konttinen 1999, Tammikko 2019). This applies to the mining-sceptical movement as well (Eerola 2024b).

According to Konttinen (1999) and Tammikko (2019), the rare examples where protests in Finland have erupted into political violence have usually reflected the economic situation. Increasing income inequality and weakening

of the welfare state may reduce the legitimacy of the state as a provider of security and well-being. This may produce distrust, frustration and anger towards the state and its representatives, promoting extreme ideologies and actions (Tammikko 2019). In fact, following the 2008 financial crisis, there were more agitated demonstrations by anarchists and an expansion of the populist right wing when Finland was in recession (Koivulaakso et al. 2012, Eerola 2015, Monti and Purokuru 2018, Malkki and Sallamaa 2018, Tammikko 2019). Therefore, the ability of the state to maintain the well-being of its population, open participation in political, environmental, and natural resource debates, and the accommodation of civil society demands exert a major influence on how mining struggles evolve (Conde 2017, Eerola 2017, 2024b, Zachrisson and Beland Lindahl 2018). However, according to Zachrisson and Beland Lindahl (2019), while the activities and expansion of a mining-sceptical movement are affected by political opportunities, they are ultimately influenced by corporate conduct and the emergence of contested local projects. This in fact, is what happened in Finland with the generation of a nation-wide mining sceptical movement (Eerola 2024b).

3.3.3 Corporate conduct: Stakeholder, situational and resource dependency theories

Companies can be defined as commercial and social entities composed and led by groups of people and influenced by their shareholders, customers and society in general. Their individual and collective attitudes, decisions, and actions shape their corporate culture, strategies, conduct, and activities. They may also have a crucial role in their corporate image and reputation, including mining and mineral exploration activities, and this may in turn also reflect upon the image of the whole industry.

The way in which a company behaves and approaches local communities may determine what kind of attitudes local people have towards it. In the case of mining and mineral exploration, this is a social process primarily related to access to land to explore and/or to mine a mineral deposit. As an integral aspect of sound corporate conduct, stakeholder engagement and communication have an important role in the SLO of mining and mineral exploration, through developing mutual trust and company-community

relationship (Parsons et al. 2014, Moffat and Zhang 2015, Eerola 2017, Boon 2020).

Through these activities, local communities become aware and informed about the company, its activities and aims in a given region. This is important because it shows community respect and, based on the author's own experience, it is also much appreciated by locals (Eerola 2009b, 2017). Adopting this approach, a company and its geologists demonstrate transparency which can be the first step in establishing fruitful dialogue and potential collaboration between the company and the local community. This again illustrates the close relationship with SLO and geoethics.

Organizational theories, namely stakeholder, situational, and resource dependency theories are useful in explaining corporate conduct (Freeman 1964, Pfeffer and Salancik 1978, Grunig 1989). These theories are all closely interrelated, and Kent et al. (2003) applied them further to explain online communication by ENGOs. These theories were also applied in Paper III to explain corporate communication of companies practicing mineral exploration in Finland, within the context of SLO-related issues and the use of NLIMET. Each of these theories is explained in more detail below.

According to Freeman (1994), the stakeholder theory explains why a company is influenced by its stakeholders. To succeed, a company needs to satisfy criteria relating to its conduct, as defined according to the values of its stakeholders. This also implicitly requires achieving and maintaining a good relationship, or SLO with the stakeholders. In the case of the mining industry, the situation is complex, especially in the case of multinational companies which have multiple stakeholders from local to global levels. The mining industry also differs somewhat in that it does not sell its products directly to consumers, but they are hidden within electronics, for example (Eerola et al. 2021).

A company's corporate conduct also has broader external dimensions, which are not limited to the local environment. At broader global and national levels, international organizations, the EU, state, government, authorities, political parties, decision makers, labor unions, ENGOs, investors, and financing institutions are all potential stakeholders (Eerola et al. 2015). For instance, local stakeholders may include media, residents, indigenous

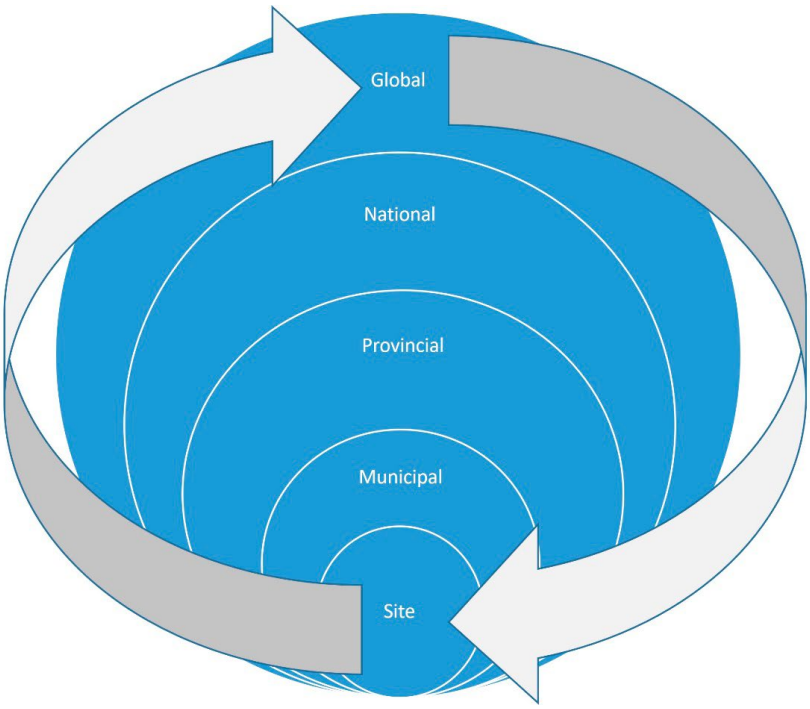


Figure 11. Constant interaction of different regional levels regarding the corporate conduct and activities of the mining industry (after Eerola 2017).

Beyond the reputation of an individual company and local impacts, any negative mining incident, regardless of location, has the potential to affect both the global and local public image of the entire industry in a negative way. Therefore, there is a need to improve the internal governance of mining industry to prevent such misconduct and to mitigate its environmental impacts (Eerola 2017). In fact, industrial associations, such as the Finnish Mining Association (FinMin), request that their members follow their guidelines, good practices, and standards (e.g., Finnish Mining Association 2023).

Such emphasis on the importance of external public influence on an organization is the basis of situational theory (Grunig 1989). Because of the social and environmental impacts of mining, stakeholders exert pressure on mining industry to behave in a responsible manner (Thomson and Boutilier 2011, Parsons et al. 2014). Those stakeholders also demand information and transparency from companies. The response of the companies has been to

provide information through their annual sustainability reports, websites, and social media (Badaracco 1998, Cullen-Knox et al. 2016), and direct stakeholder engagement (Prno 2013, Moffat and Zhang 2014). Therefore, appropriate corporate communication is important because the resultant public image and reputation may influence stakeholder attitudes and perceptions. From this perspective, resource dependency theory explains dependency of an organization on its stakeholders (Kent et al. 2003). This means that corporations are extremely dependent on their operating environment, within which they need to adapt (Pfeffer and Salancik 1978, Cullen-Knox et al. 2016). In this sense, according to Emerson (1962) there is a mutual dependency between corporations and their stakeholders. While the mining industry produces raw materials for society, society demands that this should be managed in a responsible way, and this may influence its access to land by means of local acceptance. This again has a direct relationship with SLO and geoethics.

Regarding corporate communication, Ranängen and Lindman (2018) included all the above-mentioned theories under the broad umbrella of CSR. Communication of new NLIMET and the SLO/SLE were seen from this perspective in Paper III (Eerola 2021); NLIMET reduces environmental impacts of mineral exploration in sensitive areas, and SLO/SLE issues are related to the company-community relationship. Corporate communication on those issues expresses environmental and social concerns, which are considered important for stakeholders (Eerola 2021).

In this sense, the types of technologies used by the mining industry may play an important role. Industrial scale mining and mineral exploration are not possible without appropriate technology. While technologies make those activities possible, they may also influence public attitudes towards them (Lacey et al. 2019). For example, an open pit presents a different perception of mining than an underground mine. In this case, location of the deposit, its geology, associated land use and feasibility of exploitation determine whether mining could commence and which kind of mine would be established (Erb et al. 2021). Nevertheless, technologies used in mineral exploration may also influence public acceptance of the activity. Although the environmental impact of mineral exploration is negligible when compared

to that of mining, NLIMETs have been designed to still further minimise environmental impact of the activity in sensitive arctic environments (Sarala 2015). Such technologies include drones, portable XRF (X-ray fluorescence) measurement devices, closed loop drilling, plant, soil and snow sampling and analysis, remote sensing, machine learning, artificial intelligence, and hyperspectral imaging (Sarala 2015). Therefore, the adoption of NLIMET and communication about them with the general public may be a positive way of influencing public opinion and achieving SLE.

In Papers II and III the corporate conduct of the mining industry is documented. In Paper II it was observed that in general companies have not considered associated land use during target selection, and many have not communicated with, or otherwise engaged with stakeholders. Recommendations were also given for improving their performance regarding public acceptance. For instance, Paper III explores the corporate communication practices of companies involved with MED's in sensitive contexts. In turn, Papers I and II also investigate mining-sceptical activism, which can also be viewed from the perspective of geoethics and sociopolitical geology.

3.4 Relationships between the theories

Reflecting the diverse nature of subjects discussed in the thesis, the theories dealing with them are also numerous. However, as the topics are interrelated, the theories also relate to and complement each other; their relationships are explained below. Sociopolitical geology is introduced to this set of theories here in the introduction as a means of integrating the various concepts. As noted above, sociopolitical geology is understood here as studying the relationships between geosystem services, land use, and mineral deposits and their effect on local communities, mining-sceptical movements and, consequently, on SLO. It also includes sociopolitical issues related to geology, especially in the case of natural resources and the environment.

The theories used in the papers were protest cycle, SLO and CSR as a wider umbrella for stakeholder, situational and resource dependency theories. The

SLO theory explains why companies may not achieve or alternatively, might lose good company-community relationships and face opposition, ultimately leading to the generation of MEDs. In the case of Finland, this can happen if a company applies for permits and operates in areas that are sensitive with respect to land use and/or do not engage and communicate with local communities (Eerola 2022a, b). In practice, this means that if a company ignores associated land use issues during target selection or fails to show due respect and transparency towards local communities, as a clear example of poor corporate conduct, geoethics and sociopolitical geology. Building, or regaining trust, essential for SLO/SLE, is challenging in such a situation. If a company seems to have neither the will nor resources to inform and please local stakeholders and to adapt to their environment, it operates contrary to CSR and geoethical principles. This can precipitate MEDs with associated local mining-sceptical movements, which, through their networking, can grow into form of a national mining-sceptical movement (Zachrissen and Beland Lindahl 2019) within a protest cycle (Eerola 2024b). Just as with the SM theory, the protest cycle theory explains the development of such a movement within the context of an evolving and expanding protest with its preconditions, and outcomes. Afterwards, companies that are already operating in sensitive contexts and challenging situations, characterized by contrasting geosystem services and involvement in MEDs, may try to adapt to the situation by communicating about their SLE/SLO-related issues and NLIMET. However, in practice such a situation rarely improves, the situation especially when an MED is inherited from a previous project owner (Eerola 2022a, b). Nevertheless, if proper target selection is undertaken, applying appropriate corporate conduct according to CSR principles, it may be that the SLO is not challenged, local mining-sceptical movements do not develop or proliferate, and there is less likelihood of generating a national mining-sceptical movement. However, this still does not eliminate the potential for principle-based or ideologically oriented anti-mining opposition, irrespective of corporate conduct and target selection. This is because of the environmental impacts of mining.

The relationships between the theories applied in the papers and introduction are illustrated in Fig. 12. For instance, in this introduction,

sociopolitical geology embraces this entire context (Fig. 12). With the help of the geosystem services concept, it also provides a spatial explanation as to why MEDs were generated.

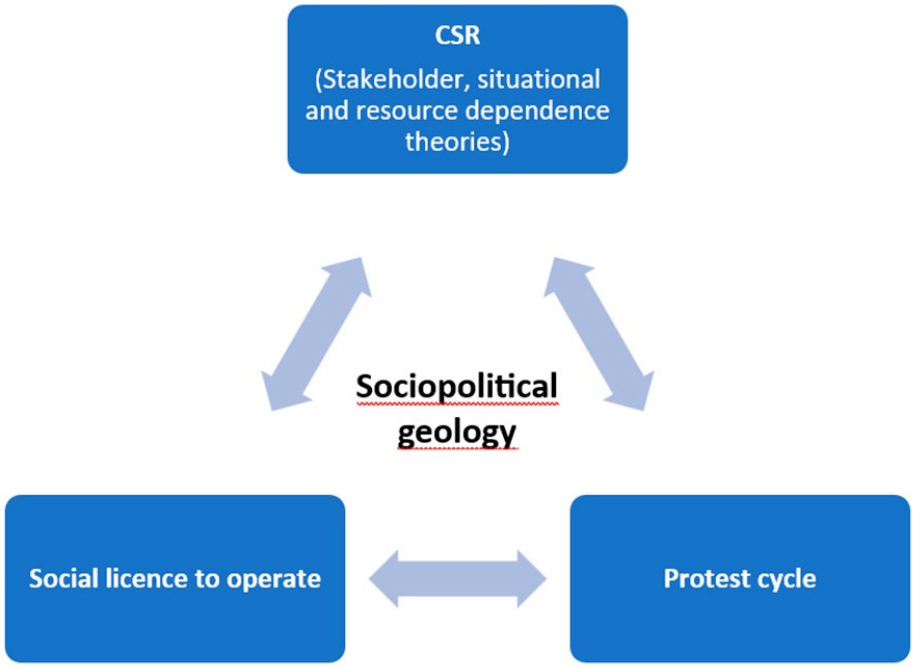


Figure 12. The relationship between the theories applied in the papers and synopsis comprising this thesis. CSR = Corporate Social Responsibility.

4 MATERIALS AND METHODS

4.1 Research methods

Diverse research methodologies were used to produce the published papers; these are explained below for each paper and summarized in Table 8 with their objectives and applications.

Table 8. Research methods applied in the publications included in this thesis.

Paper	Topic and author	Method(s)	Application
I	The origin, evolution, and impacts of the mining-sceptical movement in Finland (Eerola 2024b)	Participative observation, autoethnography, retrospective and longitudinal study, literature review, comparative case study	Following the evolution of mining-sceptical movement in its events and protests and investigations into it through time. Description of environmental protest waves and mining dispute cases and identification of their similarities with uranium and mining debates.
II	Finnish mining and mineral exploration disputes (Eerola 2022a)	Mixed methods: Protest event analysis Quantification Literature review	Identification, quantification, and description of disputes and their evolution
III	New mineral exploration technologies and social license to **explore** (Eerola 2021)	Mixed methods: Document analysis Quantification Content analysis Literature review	Qualitative and quantitative data collection, website analysis for certain concepts and terms Identification of project contexts and disputes

Paper I (Eerola 2024b) is based on a literature review of environmental protest cycles/waves with a special emphasis on Finnish EPWs, as well as those concerning MEDs and related contentious movements in Finland. The stimulus for the application of wave theory of Tarrow (1994) to examine the uranium and mining debates came already in 2010-2011, when I was reading a book on the 4th Finnish EPW (Konttinen and Peltokoski 2004). This book also reviewed the five Finnish EPWs, and I noticed that there were similarities between them, and uranium and mining debates (see Eerola 2015, 2024b).

Literature related to both topics was read during the years and information was collected concerning the main characteristics of Finnish EPWs, MEDs and the involvement of the mining-sceptical movement in the uranium and mining debates. Such literature reviews are usually essential in any study, whether qualitative or quantitative, in providing a background on what has been previously investigated.

However, my personal and active involvement in the uranium debate, and participative observation (e.g., Gold 1958, Patton 2002) in the Finnish mining debate, through events organized by the mining-sceptical movement, academia, and industry and social media groups were also important in reporting and interpreting the evolution and impacts of the Finnish mining-sceptical movement. In this sense, the personal and subjective approach of autoethnography (e.g., Ellis et al. 2011) was also involved, through reflecting on my own background, experience, memory, perceptions and interpretations of the evolution of the mining-sceptical movement and uranium debate (see section 4.2). Autoethnography is a form of qualitative research that is based on reflection of researcher's own personal experience and perception (Ellis et al. 2011, Flick 2014). Autoethnography has been applied to research in natural resource and conflict issues by Sanz (2019), Maher and Loncopán (2024), and Yeo (2025).

During the uranium debate, autoethnography was not applied as an organized and conscious research strategy because I was not aware of the method. I only realized and reflected the importance of my own experience and perspective during the elaboration of Paper I and this thesis introduction. Their recognition and utilization in Paper I were suggested by my former supervisor (Tuija Mononen, pers. comm 2023). My approach to

autoethnography was thus related to personal memories of my participation, and experience, especially in the uranium debate, perceptions and reflections as a representative of a company involved in related disputes, as well as subsequently later on during my tenure as a researcher at GTK. However, that experience and my background allowed a close and personal observation and reflection of the phenomenon studied. Many of my personal observations and perception on MEDs, SLO, stakeholder engagement and communication come already from that time. My own activist background and perspective from "both sides of the barricade", and previous experience with stakeholder engagement and communication (see section 4.2) have also been beneficial because it enabled me to establish contact and dialogue with the mining-sceptical movement, to participate in its events, and to have an interest in its evolution. Geological background and practical experience in a mineral exploration dispute, stakeholder engagement and communication have also permitted a deeper understanding of the field studied and to examine reliability and geoethics of related activist and corporate discourses and conducts.

In Finland, autoethnographic studies have been undertaken by Rannikko (2009) who described his experience in community mobilization, Eerola (2025c) who reviewed his geoscience communication experiences and Tynkkynen (2025) who reported his involvement with the energy policy research and debate on Russia.

My earliest review of the mining-sceptical movement, written in Finnish (Eerola 2015), did not identify the uranium and mining debates as the sixth Finnish EPW. However, as predicted in that review, further analysis would need to wait until a sufficient period of time had elapsed. Accordingly, Paper I (Eerola 2024b) was published almost a decade later, in English, with updated information and a wider perspective. Tables and chronograms were prepared and organized to better illustrate the evolution of the Finnish mining-sceptical movement. The onset of the uranium debate and the subsequent mining debate were distinct with regard to both timing and characteristics, although as they subsequently interacted with one another, they were distinguished as evolutionary stages of the same phenomenon. The characteristics of each stage and their impacts were described and compared with those of Finnish

EPWs. To facilitate this, a comparative framework was built, and a comparative case study approach (Yin 2009) was applied. This analysis showed that uranium and mining debates have similarities with the characteristics of the previous Finnish EPWs and, as a result, it was proposed that together with the climate change debate, form the sixth Finnish EPW. At the same time, the Paper I also describes the growth of local mining-sceptical groups and their networking to form the Finnish mining-sceptical movement.

As diverse source types, data, and research methods were used, analysis included both mixed methods and triangulation. Mixed methods mean using both qualitative and quantitative approaches whereas triangulation involves diverse qualitative methods and data to examine a topic from different perspectives and to reinforce its interpretation (e.g., Flick, 2014, Yin 2016).

The study was also retrospective and longitudinal; it looked back in time to examine the Finnish EPWs and the origin and evolution of the mining-sceptical movement. As well as reviewing other literature, this was also based on my four published papers covering the entire time span from the uranium debate to the energy transition (Eerola 2008, 2015, 2022a, 2024b, Fig. 13). Of those, Eerola (2022a, 2024b) are integrated into this thesis as Papers I and II.

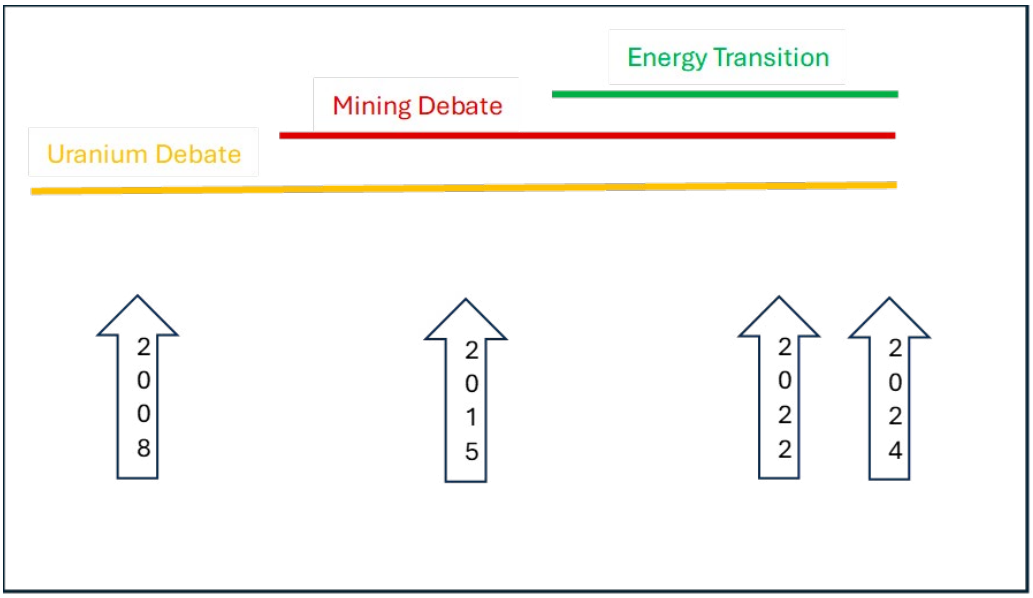


Figure 13. The stages of evolution of the Finnish mining-sceptical movement and papers published at various stages by Eerola (2008, 2015, 2022a, 2024b, white arrows).

From a historical sociology perspective, longitudinal and retrospective studies are carried out to understand the long-term evolution of a social phenomenon (e.g., Flick 2014). A longitudinal study follows a subject along the time, while a retrospective study examined its history backwards in time. Examples of such studies are Zachrisson and Beland Lindahl (2018) and Lyra (2021) regarding the evolution of the Swedish and Brazilian anti-mining and mining-sceptical movements, respectively.

Paper II (Eerola 2022a) is based on protest-event analysis (PEA; Koopmans and Rucht 1999). PEA has been applied to natural resource conflicts for different commodities and geographic scales (Bengston and Fan 1999, Haslam and Tanimoune 2015, Eerola 2022a). PEA relies on online media report records of contentious events. Protest movements need publicity for their campaigns and demands and for that reason, they appear in various media (Earl et al. 2004). Therefore, in addition to academic literature, online media reports are a readily available and useful source for investigation of disputes (Earl et al. 2004). Haslam and Tanimoune (2015) applied the PEA to

map out mining-related conflicts in Latin America. However, regarding PEA, it should be admitted that data based on media sources can be problematic because media may have an inherent bias (Fillieule and Jímenez 2003). In fact, Harju (2019) and Lyytimäki et al. (2021) have observed that media have the ability to either increase or reduce the importance of any dispute in Finland. Therefore, the record of MEDs might not be complete.

In order to investigate MEDs in Finland, a list of companies holding or applying for mining and mineral exploration licenses was obtained from the national permitting authority TUKES. From that list, those companies mining or exploring metals were selected because the MEDs are focused on those particular commodities. Since the year 2000, most of the metal mines and mining and exploration projects in Finland have been started by foreign companies whereas industrial mineral projects are mainly operated by Finnish companies, some of which have had hundreds of years of activity and less environmental impact. The analysis resulted in the selection of 73 companies whose online media records were searched using the Retriever media analysis software with company name as a keyword. The media records were examined with a focus on contentious articles, i.e., those related to opposition and indicative of an MED. Data was presented for a number of companies covering the time period from 2007 to 2020. The literature and contentious media records cases were reviewed, and descriptions of each of the cases were compiled and summarized, with their main characteristics tabulated based on respective projects, issues, context, dispute indicators and actors. The MEDs were also classified according to their intensity by applying the Environmental Justice Atlas categories (EJAtlas, Temper et al. 2015), which apply rankings from the lowest to the highest intensity (Temper et al. 2015). The highest intensity was considered as a conflict by Eerola (2022a, Table 9).

Table 9. Conflict intensity levels of the Environmental Justice Atlas (Temper et al. 2015), and classification as disputes and conflict by Eerola (2022a).

Intensity	Characteristics	Classification
High	Violence, mass mobilizations, mass arrests	Conflict
Medium	Demonstrations	Dispute
Low	Some organizing	
Latent/inexistent	No visible organization	-

The definition of Finnish mining and mineral exploration struggles as disputes by Eerola (2015, 2022a, Table 9) and Lesser et al. (2021) has been followed in Papers I-III and also in this synopsis because opposition in Europe is rarely violent but rather occurs in the form of public debate, referendums, petitions, complaints, and occasional demonstrations (Badera 2014, Kivinen et al. 2020, Lesser et al. 2021). For this reason, conflict better describes escalated cases, especially in the Global South, where the struggle is more intense and frequently involves violence (e.g., Paredes 2016, Arce and Nieto-Matiz, 2024).

Paper III (Eerola 2021) also used the list of companies holding or applying for mining and mineral exploration licenses obtained from TUKES, the Finnish authority responsible for granting permits. Their corporate websites were searched by Google queries using the company name as a keyword. Companies with websites were selected for an investigation into their online references to SLE/SLO issues and NLIMET. The websites and appended corporate responsibility reports were reviewed regarding these issues by applying content analysis to search for certain concepts appearing in a text (Holsti 1969).

Therefore, terms significant for the relevant topics were searched from the websites by using their own search engines, or when not available, manually. The key words related to SLE/SLO, such as social license to operate, acceptance, stakeholder engagement, benefit sharing, and community were used. For instance, search for NLIMET was based on technology as a key word. Both Finnish and English were used to detect these terms in bilingual websites.

The involvement of many of the companies mentioning NLIMET and SLE/SLO issues in MEDs was already known before the survey. It was also noticed that many of those companies were operating in sensitive contexts. To summarize such issues, they were organized and listed in tables.

Papers II and III described cases where poor corporate conduct was evident in the form of lack of stakeholder engagement and communication, and target selection without consideration of associated land use and operation in sensitive contexts. This generated MEDs with emergence of local or national SMs and ENGOs to oppose the projects, which are described in Papers I and II. National networking amongst these groups resulted in the Finnish mining-sceptical movement, which was identified as the 6th Finnish EPW, as described in Paper I. Therefore, Paper II was of fundamental importance to the thesis due to the generation of data on MEDs and related contentious actors, elaborating on issues dealt with in Paper I.

4.2 My personal path and background to the thesis and its topics

As I am geologist, mining and mineral exploration are important to me as part of my profession and because of their societal role. For this reason, an explanation on my research path towards this PhD thesis in environmental politics may be necessary.

Since I was an undergraduate student, I have been interested in social, political, and environmental issues and particularly those related to my field of study, namely geology. My first experiences of local people, communities, stakeholder engagement and communication related to geosciences date from the 1980's, when I was a geology student in Brazil. At that time, I was already interested in mining conflicts, which were common in Latin America at the time. In my geological field work as a trainee, I learned the importance of personal contacts and informing local people, and especially landowners, about what I was doing in their land and why. It was a polite strategy to avoid any misunderstandings and conflicts and a healthy and smart self-defense policy. If an unknown person roams across private land in Brazil, a geologist can

be easily confused with a landless rural worker who is coming to occupy land or with a criminal. Without an introduction and explanation on background and intentions, there is a risk of being even shot without previous warning. Therefore, in such context, it was highly advisable to engage with local people from the beginning and visit them from door to door and to communicate via local media (Eerola 1994). Those encounters with local people were also opportunities to talk about geology, and the profession of geologist as a practical way and an opportunity to raise public awareness of geosciences. At the same time, when Brazil was in a process of re-democratization, I was also a human rights activist and participated in student protest movements. Therefore, I decided and wished to expand this view to observe what was happening at the interface of my field of geology, the environment and in society "above the Earth's surface" (Fig. 1). Local communities, and ENGOs thus became important topics to me.

My long-standing interest in social issues related to geoscience has been expressed in several papers published throughout my career. Those papers have been mainly focused on geoscience communication and education, geodiversity, geoconservation, geoheritage, geotourism, and raising public awareness of geoscience (i.e., social geology; Eerola 1994, 2001, 2025c and references therein). However, already in the period from 1990's-2000's, I also wrote about MED's, local communities, stakeholder engagement, and mining-sceptical activism (Eerola 1996, 2001, 2003).

My personal involvement in uranium exploration in Finland in 2006-2008 brought the concept of SLO very close to my own work and thoughts in a very practical and intimate manner. Uranium exploration was opposed in several localities at the time (Litmanen 2008), and I faced it also personally. It was a great opportunity to actively participate in an environmental dispute related to mineral exploration and to face and observe it closely from a professional perspective. Later, it became an important part of my experience, background and research in the form of an autoethnographic component, as described above. Therefore, I became an **expert by experience** on the issue. Furthermore, I started to reflect on and publish papers about the uranium debate and how geologists should deal with it by stakeholder engagement, communication and dialogue (Eerola 2008, 2009b). After participating in

uranium exploration, I also examined the action and discourses of anti-uranium movement and associated research (e.g., Eerola 2009a, 2010, 2012, 2014). This was possible because one of my responsibilities was to read, examine, and reply to opinions expressed by the anti-uranium activists in hearings and appeals related to company's license applications. Those opinions and associated public discourses included many poorly founded and argued allegations on the social and environmental impacts of uranium exploration. Although most of the encounters with anti-uranium activists and movement were quite positive, there were also some unpleasant and strongly emotional ones. In this sense, the uranium debate was a crucial experience for me to give attention to environmental activist discourse and action.

Although I already had practiced stakeholder engagement and communication in my field work in Brazil and in Finland (Eerola 1994, 2001), it was ultimately the uranium debate that led me to recognize the importance and need of these activities in mineral exploration (Eerola 2008, 2009b). However, at that time, I did not predict how important that moment would be for me in defining my future career years later. Indeed, the uranium debate is examined in Paper I of this thesis (Eerola 2024b). After uranium exploration, I continued to apply stakeholder engagement and communication in mineral exploration for other commodities in a private company and mentored my student trainees in these activities.

In 2012, I commenced work at GTK, where I focused on SLO, CSR and ESG in the mining industry, the circular economy and MEDs in addition to other duties. I actually joined GTK just before the environmental problems at the Talvivaara nickel mine, where leakage from the gypsum pond occurred in October 2012. This became the key event of the ongoing mining debate (Eerola 2015, 2024b, Sairinen et al. 2017). The Talvivaara mining operation highlighted the need for more research into mining activities and coincided with the availability of generous national funding. Several projects on mining environmental and social issues emerged and were carried out by universities and research institutes (see section 2 and Eerola 2017). After having participated in some national projects investigating and promoting SLO and CSR (MiningAcademia and Sustainable Acceptable Mining – SAM) and

collaborated with the Finnish Network for Sustainable Mining (FNSM), I went abroad to supervise mineral exploration in a project assigned to GTK. When I returned from that mission, I started to participate in EU projects financed by the Horizon 2020 program of the European Commission. Among the first of these were the New Exploration Technologies (NEXT) project and Mining and Metallurgical Regions of Europe (MIREU). Within those projects, it was possible to focus on SLO issues at a broader European level and investigate, collect data, write, and publish peer-reviewed papers on the subject (Eerola 2021, 2022a, 2024b, Suopajärvi et al. 2023, Beland Lindahl et al. 2023). These projects provided excellent multi-disciplinary experiences and opportunities with a very memorable collaboration with international colleagues.

During the NEXT project, I made a survey on the use and online communication of NLIMET and SLE by companies performing mineral exploration in Finland (Eerola 2021, Paper III). Already at the beginning of the survey, I noticed that the companies communicating online about their NLIMET and SLE were also involved in MEDs and were operating in sensitive contexts from which those disputes emerged.

Coincidently, at the same time, I was also mapping Finnish MEDs within the MIREU project (Eerola 2022a, Paper II). Curiously, both of those concomitant EU projects were overlapping and complementing one another because many of the same mining or mineral exploration projects and companies were studied in both projects. Some of the same companies and projects identified by Eerola (2021, 2022a) also reappeared in important roles in other peer-reviewed papers published by the NEXT project (Beland Lindahl et al. 2023, Suopajärvi et al. 2023). They are also studied as selected cases within this introduction.

For instance, within the MIREU project, it was also possible to update and adapt the results of Eerola (2015) in relation to the origin, evolution and impacts of the Finnish mining-sceptical movement. Its place and space within the context of Finnish EPWs was suggested (Eerola 2024b – Paper I).

Research on EU and other projects has continued and have been involved with several of them which have been especially useful to this thesis as they have reinforced the importance of land use and associated sociopolitical geology in MEDs (see Acknowledgement). In some of them it has also been

possible to practice stakeholder engagement and communication in the field. This shows the importance of the EU Horizon program and other projects in promoting interconnected mining research and participation of the GTK in them.

4.3 Research ethics

Ethics is an integral part of any research and researchers may face ethical issues in every stage of the research process (Flick 2014, Yin 2016). As qualitative research deals with people, groups, values, ideologies, conflicts and delicate personal issues, ethics assumes a prominent role in social sciences, alongside consistent application of sound research methods and quantitative analysis of data (Flick 2014). It is important to protect the identity and interests of participants of a study, as well as to avoid manipulation of data and consequent impacts on participants, including the risk of scandals that may damage the reputation and image of research and science in general (Yin 2016). For this reason, various codes and committees of ethics have been developed. Thus, research ethics also goes hand in hand with the quality of research, which has been also one of the major concerns relating to qualitative research (e.g., Flick 2014). Concerns about the ethics and quality of research emerged from several scandals involving misconduct and due to the paradigm war of 1990s, which was a scientific struggle between qualitative and quantitative researchers (Yin 2016). Because of that, it has been necessary to develop sound and transparent qualitative research methods that show how data were collected, and how the results were derived (Yin 2016).

It is essential to pursue objectivity in research although in reality, this may be virtually impossible to attain (Flick 2014). A researcher is always influenced by his/her background, and this may also introduce bias into research, its results and interpretation, especially when values, interests and ideologies are involved. Actually, for this reason, the contribution of an autoethnographic component in research is possibly much more common than is usually publicly admitted. Every researcher is influenced by background, personal experiences, motivation, and related perceptions

regarding an investigated topic. However, Sparkes (2024) recognized that the use of autoethnographical approach may also involve ethical questions but as he and Yeo (2025) concluded, such ethical issues might limit its application, especially in conflict studies, and considerable freedom is required for it to be used effectively. Indeed, most of the ethical issues identified by Sparkes (2025) are not applicable here because they deal with qualitative studies involving other people. While my research was mainly based on secondary sources, my approach with autoethnography was related to my own memory, experiences, encounters and perception during the uranium debate as a representative of a small junior company of foreign origin. Nevertheless, Sparkes' (2025) item 6 "**Do no harm to self"** is something beyond my own control: people interpret texts in their own ways and sometimes this can lead to psychic or even physical risks for a researcher's integrity by being targeted by official complaints or in social media and events. However, nowadays, this may take place even in the absence of an autoethnogaphic component (Väliverronen and Saikkonen 2020, Saikkonen and Väliverronen 2022, Conversi et al. 2026).

In all cases, the experience in the uranium debate was of utmost importance in having been personally involved and immersed in the phenomenon and as I became deeply and genuinely interested in mining-sceptical activism, corporate conduct and MEDs. Contributing to those topics from a geologist's perspective is quite unusual but is also needed. If then, (geo)ethical problems are related to objectivity and positioning, reflexivity is of great importance in qualitative research and in human sciences, in particular. Personal perspectives and how a topic is framed by both individuals and groups are of paramount interest in such research. Therefore, for the sake of transparency, it is recommended that a researcher reveals his/her background, especially when a stance has been taken towards the studied subject. This helps others to evaluate the objectivity of the research in an appropriate context (Flick 2014, Yin 2016).

Despite my background and experience, as outlined above, the attempt here is to remain objective, and to approach the topics from the outside, and to avoid taking any particular stance on the issues being debated. Even though I consider mining and mineral exploration important activities

for society and I am passionate about research in this field, I do not hold any particular commitments or opinions favoring either companies or the mining-sceptical movement. However, some may also question my position as a researcher at GTK. GTK is a public organization with, among other tasks, a duty to promote responsible mining and mineral exploration, and to perform neutral and reliable research on related topics. These are also the aims of this thesis, which is intended report, and examine issues in an objective way, avoiding the expression of ungrounded personal opinions. For the sake of balance, just as companies may be critically but constructively examined, it is appropriate that the same scrutiny is also applied to the SMs and ENGOs of the mining-sceptical movement. However, such a research-based approach towards environmental activism has been uncommon and in Finland seems to be surrounded by some kind of taboo. As the goal of environmental activism is nature conservation and protection of indigenous peoples and local communities, it seems to be idealized, i.e., considered as something absolutely positive and beyond academic scrutiny. For that reason, its critical examination has been considered by some as "invalidation" and "understatement" of activism (Harju 2019, Salovaara 2021). However, this is not the case as activism has a fundamental societal role as an important driver and advocate for sustainability. Nevertheless, as one of the actors of the environmental debate, activist actions and discourses ought also to be critically explored and even challenged. If responsibility is required from companies, this should also be requested and expected from their guardians or opponents (Weidenbaum 2009). In this way, it is possible to present diverse and balanced perspectives on the subject and contribute constructively to the mining debate. There is also always an ongoing need for more dialogue and collaboration between activists and researchers.

Throughout this study companies, SMs, and ENGOs, being public entities are mentioned by their respective names, always in a neutral and respectful way. The data concerning these entities has been obtained from public secondary sources.

Some may criticize my lack of positioning on the subject. However, taking a uniform stance by favoring some particular party is considered here as a geoethically questionable practice, even though it may be seen as an easier

path to take. In fact, taking a stance may be a quite biassed and over-simplified approach that potentially distorts research and may even lead to adverse social impacts. In this case, a neutral position is an advantage, because there is no need to defend or exclude any particular party, nor focus on defects in another and thus permits a clearer overview of the topic. Therefore, I support both responsible mining and mineral exploration as well as related activism with research interests in both. They have important roles to play in an open, democratic society.

Because of my background I apparently have more freedom to explore this field of research and examine some issues that have previously been neglected in mining research. This can also be done from a less prejudiced perspective without being burdened by particular schools of thought ("research tradition") of social sciences. In this sense, appropriately grounded diverse views are usually, and ideally beneficial to the development of science and may revitalize research on a topic even when they are against the prevailing paradigms. Therefore, the purpose of this thesis is simple and humble: to create new knowledge and contribute to the debate and research on the topic from a cross-disciplinary perspective. Additionally, recommendations as to how to improve responsible performance are also given for both the mining industry and mining-sceptical movement, with reference to the concept of geoethics.

As I am the only author in all the published papers included within this thesis, as well as this introduction, I am solely responsible for their results, interpretation, and conclusions. I have also attempted to follow good and transparent scientific practices throughout.

5 RESULTS

The results of the thesis are summarized below, according to the main topics covered in each of the three published papers: the Finnish mining-sceptical movement (Paper I), MEDs (Paper II) and corporate conduct (Papers II and III). However, as the papers and topics are interrelated, so also are the results. Along with the results, some case histories of the MEDs described in Papers I-III are also presented as examples and summarized in Table 10. These MEDs are related to those companies referred to in Paper III (Eerola 2021) which communicated both SLE/SLO and NLIMET in their websites and which were involved in MEDs in sensitive contexts, as described in Paper II (Eerola 2022a). As the published papers did not include maps related to the case histories, maps have been added here to illustrate their spatial and geographic dimensions and geological relationships. The sociopolitical geology and geoethics of the cases are analyzed in the discussion section.

Table 10. Example case studies listing companies, major projects and their location, explored commodities, new low impact mineral exploration technologies (NLIMET), issues/context, contentious actors, and Environmental Justice Atlas dispute intensity (Temper et al. 2015). PGE = platinum group elements; FANC = Finnish Association for Nature Conservation; EM = Electro-magnetic; XRF = X-ray frequency; all data are from Eerola (2021, 2022a, 2024b).

Company	Project(s) and /or location	Commoities	New NLIMET	Issue/context	Contentious actors	Dispute intensity
AA Sakatti Mining Oy	Sakatti (Sodankylä)	nickel, copper, cobalt, PGE	Closed loop drilling	Natura 2000, mire conservation, reindeer herding, recreation	FANC, Save Viiankiaapa movement, reindeer herders, Friends of the Sompio Nature, Extinction Rebellion	Medium
Boliden Finnex Oy/ Boliden Kevitsa Mining Oy	Vekseli/ Pieksämäki-Joroinen	gold, copper	Deep penetrating EM survey	Groundwater Natura 2000	Landowners, residents, and municipalities, Pro Pieksämäki, Pro Joroinen	Low
Latitude 66 Cobalt Oy	Juomasuo (Kuusamo)	cobalt, gold (uranium)	Drones, remote sensing	Tourism, uranium, reindeer herding	Pro Kuusamo, Kitkan viisaat association	Low
Mawson Gold Oy	Rompas-Rajapalot (Yli-Tornio-Rovaniemi)	cobalt, gold (uranium)	Drones, plant, soil and snow sampling, portable drill rig	Natura 2000, uranium	FANC, Limits to Mines in Lapland association, environmental authorities	Low
Grafintec Oy	Heinävesi	graphite	Drones	Saimaa Lake region, second homes, summer tourism, eputation, corporate conduct	Pro Heinävesi	Low

5.1 The Finnish mining-sceptical movement

The origin, evolution, and impacts of the mining-sceptical movement in Finland, from the earlier uranium debate until the ongoing mining debate and energy transition, were reported in Paper I (Eerola 2024b). This was done from the perspective of protest cycle theory and Finnish EPWs. Together with a literature review, my active participation in the uranium and mining debate and participative observation in related activist, academic, and industry events over the years assisted in drawing a picture of this development, which also involved an autoethnographic component. Beyond protest cycle theory, the study can be also seen from the perspective of sociopolitical geology, as it examined the social and political dimensions of uranium and mining debates, related struggles, its contentious actors and impacts on mineral governance. The study was also a historical review of the topic. As it involved my own observations and articles covering the subject over time, it was also a longitudinal and retrospective study.

The uranium debate followed the Global Justice Movement (GJM), which was the last (fifth) recognized EPW in Finland at the turn of the millennium. In the countryside, the uranium debate interrupted the post-GJM latency/ swell of the Finnish environmental movement identified by Konttinen and Peltokoski (2004). The uranium debate began when a foreign company applied for extensive exploration permit areas in densely populated regions in southern Finland. This was the key event, with the outdated mining act, and lack of preparedness of the Finnish mining authorities and mining industry in dealing with growing opposition providing a political opportunity for anti-uranium movement to emerge. The uranium debate generated related disputes in Lapland, Kuusamo, and the provinces of North Karelia and Uusimaa. Although in the beginning the state was ill-prepared in dealing with the challenge, it finally acted quite quickly: because of the uranium debate, a consultancy procedure for mineral exploration permit processing was introduced in 2007 and a national mineral policy was launched in 2010. The debate also accelerated the renewal of the Mining Act which took place in 2011. It can be said that while the uranium debate disturbed the otherwise rather harmonious re-establishment of the mining industry by foreign

companies, it also helped to push for the renewal of mineral governance in Finland.

Even though uranium exploration ended in Finland in 2008, owing primarily to external factors such as the global financial crisis, it provided the stimulus for ongoing concerns towards mining and mineral exploration projects in which uranium was present, even as an accessory component or co-product. Of these, the Talvivaara polymetallic mine was particularly important, and subsequent environmental problems at Talvivaara became the key event of the mining debate. Although the uranium debate introduced significant changes in mineral legislation and policy, it was ultimately the environmental problems at Talvivaara which required the Finnish government to improve its mining and environmental governance: a program for sustainable mining was launched and public funding was provided for mining-related research (see section 2); it also contributed to the establishment of the FNSM. The FNSM was a multi-stakeholder network intended to improve sustainability in mining and mineral exploration with the participation of ENGOs and mining industry (see Eerola 2017, Lesser 2021). The expansion of MEDs and the formation of influential local ENGOs and SMs due to the demands of the energy transition provoked a further revision of the Mining Act, which came into force on 1.6.2023. Therefore, while the Finnish state has been quite pro-mining, it has also reacted to the uranium and mining debates. However, the rather rapid response can be in part be attributed to accepting and absorbing many of the mining-sceptical movement's demands. However, most importantly, the Finnish state has reacted to protests in a restrained and peaceful manner, promoting dialogue between the mining-sceptical movement and industry and addressing the mining-sceptical demands in the form of legislative reforms.

Finnish research into EPWs has emphasized the importance of horizontal and unstructured movements, i.e., SMs (Rannikko 1994, Konttinen and Peltokoski 2004). Even though locally based SMs and ENGOs have played a significant role in the uranium and mining debates in Finland, they are mostly related to the very traditional FANC through its local member ENGOs and representations at provincial level, as it has traditionally been the case with previous Finnish EPWs (Konttinen 1999, 2012), such as the climate, forest, peat,

uranium, and mining debates (Eerola 2015, 2022b, 2024b). This traditional and well-structured umbrella ENGO, founded in 1938, has had a significant role in supporting local voluntary action groups and organizations (Konttinen 1999, 2012). Furthermore, Konttinen (2012) referred to the FANC as "the solid foundation of the Finnish environmental movement," which regulates and underpins a considerable part of the Finnish environmental movement due to its widespread articulation. FANC does not oppose mining, except in protected and environmentally sensitive areas, but it continues to demand for its better monitoring, and reforms in regulation and governance (Suomen luonnonsuojeluliitto 2015). For this reason, Eerola (2024b) considered the FANC as a part of the Finnish mining-sceptical movement. The FANC had a prominent role within the FNSM but resigned from it in 2021 together with other ENGOs and the Reindeer Herding Association, probably because of the tensions and controversies identified by Lesser (2021).

Although the FANC has an important role within the Finnish mining-sceptical movement, it seems that the movement has no clear leadership. Nevertheless, there are some prominent and influential persons in some of the local movements who have a national presence even though it cannot be said that they represent leadership of the whole movement. This observation fits well with the environmental protest cycle theory in which leadership is absent, and SMs may have an important role (Table 6).

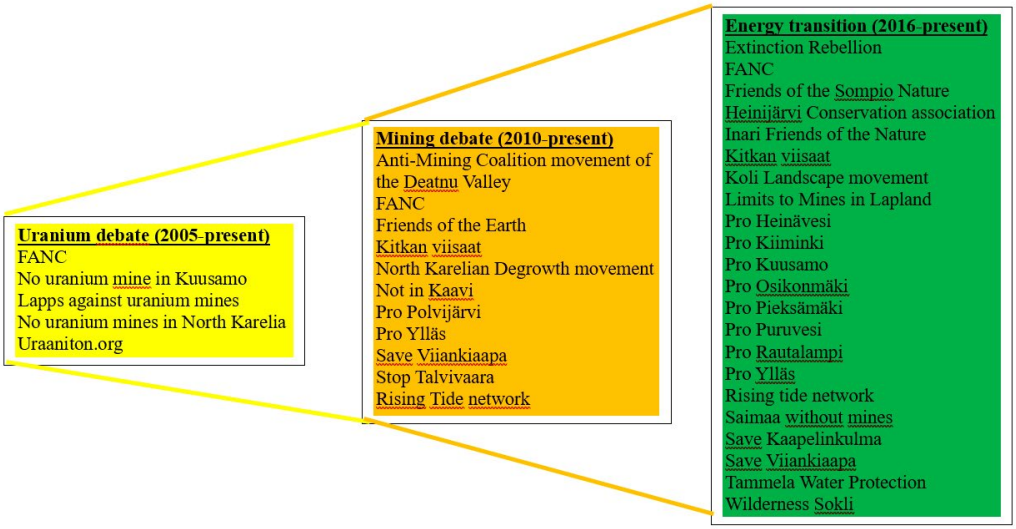
For instance, while Greenpeace concentrated on the Talvivaara mining issue, FANC joined a consortium opposing gold mining, in particular projects operated by Dragon Mining, formed by the Finnish and international ENGOs Siemenpuu-säätiö, Dodo ry and Friends of the Earth (Mauranen et al. 2014). The basis for their gold mining opposition was the environmental impact of ore processing (especially the use of cyanide), the use of gold in jewellery and as an investment asset, and its limited industrial application (Mauranen et al. 2014).

Many of the actors that participate in the Finnish mining-sceptical movement can be identified as SMs established and organized through social media (e.g., Pro Rautalampi, Pro Ylläs, Pro Heinävesi, Saimaa without Mines). Although they are locally focussed groups, they have networked nationally together with well-established ENGOs to form the Finnish mining-sceptical movement. The Finnish mining-sceptical movement has also networked with

other European mining-sceptical movements to protest EU R&D projects that focus on SLO and the establishment of the CRMA (MiningWatch Portugal 2020, Salovaara 2021, Ecologistás en acción 2023). However, FANC has not participated in that.

The data and results presented in Papers I and II made it possible to describe the evolution and chronology of the Finnish mining-sceptical movement and its actors. Table 11 shows the three stages of evolution of the Finnish mining-sceptical movement and associated contentious actors. The number of mining-sceptical actors has grown considerably during the years between the uranium debate and the energy transition. It also shows that together with the FANC, the oldest and still active mining-sceptical actor is the Kitkan viisaat association from Kuusamo, founded in 2009 as a result of the uranium debate and opposition to the nearby Juomasuo mine project. Prior to the formation of Kitkan viisaat, local resistance towards uranium exploration in the region was represented mainly by the "No uranium mine in Kuusamo" movement, fishing associations and tourism entrepreneurs.

Table 11. The Finnish mining-sceptical movement's actors (social movements and environmental non-governmental organizations) in alphabetical order throughout the three stages of its evolution. Data from Bruun (2014), Lipsanen (2014), Eerola (2022b, 2024b) and updates made by the author. FANC = Finnish Association for Nature Conservation.



While other movements and associations have faded away, new ones have also emerged, especially during the energy transition (Table 11). Interestingly, despite this development, the growth of the mining-sceptical movement shows an opposite trend when compared to that of the growing public support for mining in Finland (Kaivosteollisuus 2020, 2023); increasing support for mining and mineral exploration is due to global resource supply and security issues that arose firstly during the COVID 19 pandemic, the war in Ukraine and an increasing awareness of the strong dependency on raw materials.

Special mention is made here of a contentious phenomenon within the mining debate in Finland that was already identified by Eerola (2015, 2017). This also emerged as a topic within this thesis because its importance has increased together with the energy transition (Eerola 2022a, b, 2024b, 2026). It relates to a particular type of MEDs associated with tourism and second homes, especially recreational dwellings, and designated by Eerola (2015, 2017, 2022a) as '**not in my leisure area**' (NIMLA), or as **trans-local resistance** (TLR; Eerola 2024b, 2026). According to Banerjee (2011), the prefix "trans" refers to the ability of trans-local interactions to "both transcend territorial locality and change the local spaces from which they emerge". The term NIMLA was derived from **'not in my backyard'** (NIMBY). While NIMBY represents residential opposition towards any project proposal (e.g., Kopomaa et al. 2008), NIMLA is related to resistance practiced by people who do not live permanently in the locality (second homeowners and tourists) and by tourism entrepreneurs whose business interests are supposedly threatened by mining, mineral exploration or energy projects, such as wind turbines. NIMLA has evidenced their importance as relevant stakeholders of the mining industry in Finland (Eerola 2015, 2017, 2022a, 2024b, 2026, Eerola et al. 2015). Regarding tourism entrepreneurs, NIMLA can also refer to **'not in my livelihood area'**. Such entrepreneurs may live locally or elsewhere. As an example of this, the Finnish journalist Marja Hannula (2017) reported that the travel agency of a foreign tourism entrepreneur had threatened to cancel trips to the Ylläs ski resorts if the proposed Hannukainen mine, which is located in the vicinity (Fig. 7), received permission to commence operations.

Hannukainen in the Lapland municipality of Kolari (Fig. 7), and Juomasuo in Kuusamo (Fig. 14) are the oldest NIMLA examples of MEDs in Finland (Eerola

2015, 2017). In both areas, quartzites that are resistant to erosion have formed mountainous terrain favourable for the development of the Ylläs (Fig. 7) and Ruka (Fig. 14) ski resorts (Eerola 2026).

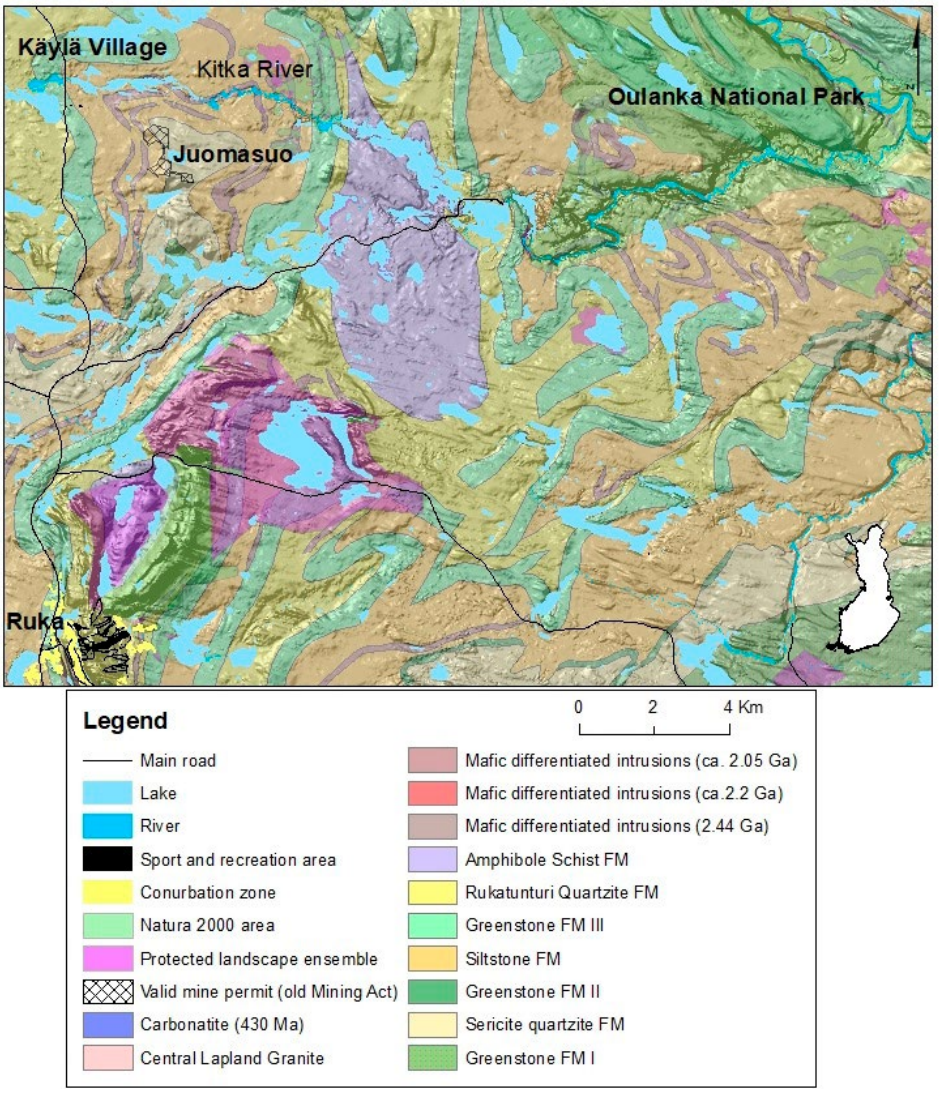


Figure 14. A geological bedrock map of Kuusamo, northeastern Finland, showing the Juomasuo mine project, Ruka resort, Oulanka National Park and lakes and rivers of the region (after Eerola 2022b). Background maps: modified bedrock of Finland 1:200,000, GTK open licence CC BY 4.0, data of the National Land Survey of Finland 09/2025, hill shade, shaded relief 8 m, mining register (Tukes).

As shown in Fig. 15, other examples of ski resorts on quartzite hilltops in eastern and northern Finland are Koli, Vuokatti, Pyhä-Luosto and Kittilä (Eerola 2026). At each of these locations, mineral deposits occur nearby or are in proximity to mining and mineral exploration projects. Except for Kittilä and Vuokatti, these areas are also associated with MEDs as exemplified by the NIMLA phenomenon (Eerola 2026). The MEDs of the Pyhä-Luosto and Koli areas have been described previously by journalists (Keskinen 2022, Oinaala 2022).

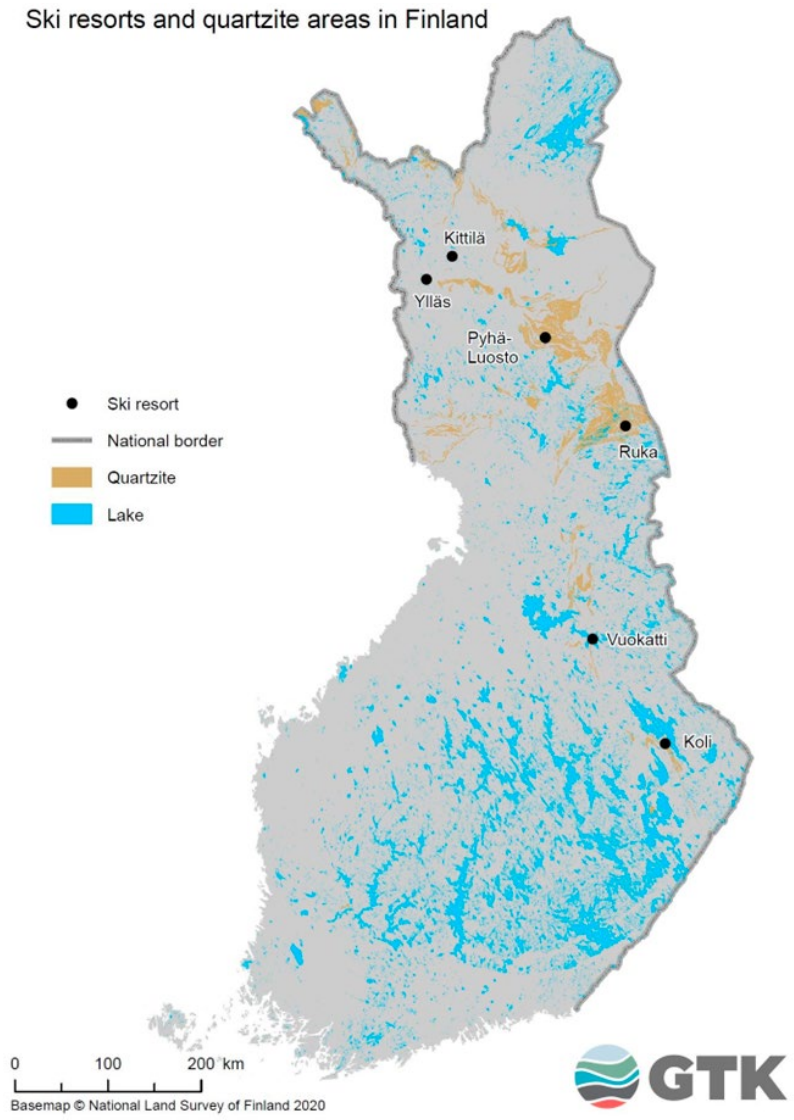


Figure 15. Ski resorts on top of quartzite hills across eastern and northern Finland.

It can be seen in Fig. 14, that because of diverse and competing interests between nature-based tourism, second homes, nature conservation, recreation and mining in the Kuusamo district, the mineral deposit at Juomasuo, the Oulanka National Park, the Ruka ski center, and surrounding rivers and lakes all interact and communicate with each other in the form of geosystem services (Eerola 2022b, 2025a). The Oulanka National Park is located in a geologically distinctive terrain that includes greenstones – or mafic-ultramafic volcanic rocks and dolomites, that are significant in terms of both geomorphology and as a substrate for biodiversity, with many rare and protected species. While such features provide the prerequisite conditions for nature-based tourism, second homes and recreation, the Juomasuo mineral deposit, with its associated uranium is a potential mining target, which many see as incompatible with other geosystem services and related livelihoods and activities in the same region (Lyytimäki and Peltonen 2016, Eerola 2022a). Accordingly, the ENGOs, tourism operators and entrepreneurs, second homeowners and the Kuusamo Municipality have opposed to mining in the area (Lyytimäki and Peltonen 2016, Sorvali et al. 2023). Opposition to the Juomasuo project has also been expressed by the Kitkan viisaat and Pro Kuusamo associations (Table 11).

However, as seen in Papers I and II (Eerola 2022a, 2024b), in Finland, the energy transition saw the expansion of mineral exploration into new areas (greenfields with grassroot exploration, Liikamaa 2024), including the lake areas of Saimaa and Päijänne (Figs. 5, 15), and the indigenous Sámi homeland. This generated several local mining-sceptical movements in those regions and/or made pre-existing interest groups and organizations more critical towards mining and mineral exploration (Table 11). Such new movements, especially the Saimaa without Mines, and Pro Heinävesi groups have been highly influential, exerting an influence on mining legislation through public petitions for revision and renewal of the Mining Act. Both movements were generated within the Saimaa Lake area, which is noted for extensive summer tourism and the abundance of second homes (Leino and Miettinen 2020, Niemelä 2020, Eerola 2022a).

The sudden emergence of numerous mineral exploration disputes and related new locally based mining-sceptical movements in such a short time

(Table 11) is a significant phenomenon. For Mononen (2020), it represented a turning point in the Finnish mining debate, which was previously focused mainly on individual mines and mining projects, with the notable exception of the uranium debate.

The Sámi homeland has been the stage for four mineral exploration disputes: the Deatnu Valley by Karelian Diamonds Oy in Utsjoki, Nellim by Arctic Minerals Oy in the Ivalo-Inari region, and those of the GTK and Akkerman Oy in the Enontekiö region (Lassila 2018, Eerola 2022a, Amnesty international 2025, Fig. 5). The cases of Akkerman and GTK generated the Sámi mining-sceptical movement of No Mines in NW Lapland and have been referred to as Finnish examples of "green colonialism" by the Amnesty International (2025). In the case of mineral exploration, "green" refers to CRM important for the energy transition, whereas "colonialism" refers to operation by a foreign company and the public research organization without the Free, Prior, and Informed Consent (FPIC) given by an indigenous population. Because of that, GTK was condemned by the United Nations' Human Rights Commission on violating children rights (Amnesty International 2025, and references therein).

As shown by Eerola (2022a), the Finnish MED's have mostly been at the level of public debate and law cases (low intensity, Table 9). There have been only a few cases where there has been more intense opposition by means of demonstrations and/or civil disobedience (medium intensity, Table 9): demonstrations against the Talvivaara mine in 2012-2013 and in 2019, civil disobedience in the form of non-violent resistance took place at the Kaapelinkulma gold mine, owned by Dragon Mining (Fig. 5). This direct action was carried out by the anarchist Rising Tide and Stop Kaapelinkulma movements (Eerola 2022a, 2024b).

Although protests by international Extinction Rebellion have focused mostly on climate change issues, it has now extended its activities also towards mining in Finland (Eerola 2024b). Extinction Rebellion is an international network that protests climate change and requests action towards it for the governments by civil disobedience (De Moor et al., 2020). It was founded in Great Britain in 2018 and in Finland in the same year (Vaarakallio 2021). In Finland, Extinction Rebellion has been active in forest disputes and protesting against extravagant air and cruise travel. However, in October 2023, it

participated in mining-sceptical action and demonstrations in Levi, Kittilä, during the Fennoscandian Mining and Mineral Exploration Conference by attaching its activists to excursion busses and in an attempt to invade the conference dinner venue, as a result of which six members were arrested (Eerola 2024b). During the winter of 2023-2024, Extinction Rebellion activists invaded the Sakatti Mining Oy drilling site in the Viiankiaapa Natura 2000 area (Fig. 16) and attached themselves to a drilling rig (Eerola 2024b). Natura 2000 areas are protected according to an EU nature directive; this status does not, however, preclude economic activities, such as mining and mineral exploration but care must be taken to ensure that there is no significant harm done to protected biodiversity (European Commission 2021). The Sakatti exploration and mining project is a case in which a protected mire is located above a significant mineral deposit (at depth of 500 m), thus representing geosystem services with contrasting economic and ecological interests, which has triggered an MED. Geology is intimately related to the case in the form of a post-glacial deposits and mire, groundwater reserves, and a substantial polymetallic mineral deposit. According to Lassila (2020, 2024), the case involves reindeer herding, recreation, nature protection and CRMs important for the energy transition. The project has also been opposed by the reindeer herders, FANC, and the locally based Save Viiankiaapa movement and Sompio Friends of the Nature (Lassila 2020, 2024, Table 11).

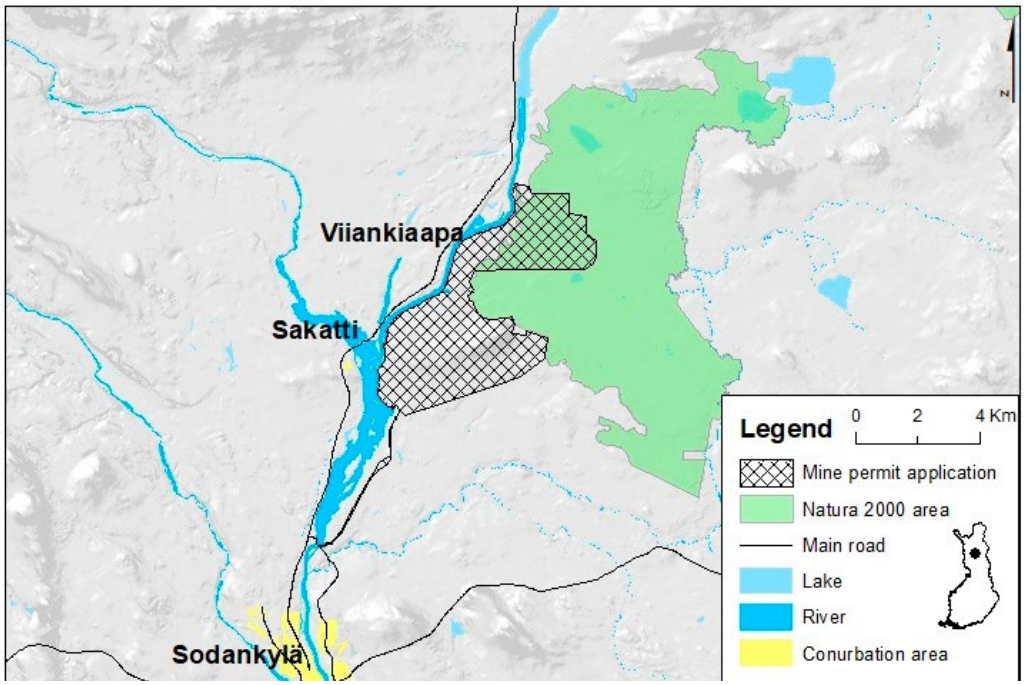


Figure 16. The Sakatti project and its mining permit application partially overlapping with the Viiankiaapa Natura 2000 area (after Eerola 2022b). Background maps: Data of the National Land Survey of Finland 09/2025, hill shade, shaded relief 8 m, mining register source (Tukes).

The acts of the Extinction Rebellion made Sakatti mining project increase from a low-intensity dispute (some organizing, Eerola 2022a) to one of medium-level intensity (visible organizing and mobilization, Eerola 2024b), using the categories defined in the EJAtlas (Temper et al. 2015, Tables 9, 10). Even though some previous Finnish MEDs have also been of medium level intensity, no **conflicts** (high level intensity with violence, Table 9) have yet been observed in Finland. However, Eerola (2024b) predicted that the designation of Sakatti as a strategic project within the auspices of the CRMA (European Commission 2025) may intensify resistance towards it.

Direct action and participation of anarchists in such acts resemble the 1990s radical activism of the fourth Finnish EPW in which both phenomena also occurred (see Konttinen 1999, Konttinen and Peltokoski 2004, Eerola 2024b). In fact, direct action by non-violent civil disobedience has been practiced by the environmental movement in Finland since the 2nd EPW

(Koijärvi movement). As reiterated by Tarrow (1994), Konttinen and Peltokoski (2004) and Lindholm (2005), the new EPWs share many of the characteristics of past EPWs.

Because of their importance and impacts, the uranium and mining debates and energy transition were seen to represent progressive stages in the evolution of the Finnish mining-sceptical movement (Eerola 2024b). A comparative case study allowed the identification of similarities between the uranium and mining debates and Finnish EPWs (Eerola 2024b). Accordingly, together with climate change debate, the evolution described above was suggested to form the 6th Finnish EPW.

5.2 Mining and mineral exploration disputes

As shown above, the mining-sceptical movement is closely associated with MEDs. As part of this thesis, the Finnish MEDs were mapped and described and their implications for the SLO were considered in Paper II. The PEA and literature review were applied to identify and locate MEDs. The SLO theory supported the study, and the MEDs were examined from this perspective. It was observed that the MEDs were principally concentrated in the northern and southeastern parts of the country (Eerola 2022a; Fig. 5). Because the central, southern and southeastern part of Finland is comprised by abundant lakes, which are popular for summer tourism and second homes, the intense mineral exploration in recent years, driven by the energy transition has inevitably led to the formation of MEDs, as classical example of the NIMLA phenomenon (Eerola 2026). According to Eerola (2022a), and as shown in Fig. 5, northern Finland has been mostly characterized by disputes related to mines and mining projects, while western Finland is almost devoid of them, with the exception of the Martimo case close to the city of Oulu (Eerola 2022a) and Laiva gold mine in Raahe (Mononen et al. 2023). On the other hand, a positive example of SLO in western Finland is the lithium mine project at Kaustinen. Apart from some complaints and concerns about water quality monitoring, there has not been any organized opposition (Leino et al. 2023, Eerola and Komnitsas 2025). According to Leino et al. (2023), this might be because the

locals do not perceive the mining project and its permitting process as unfair from the environmental perspective. This might be explained by cultural factors related to natural resource-based economy (fur and peat production, agriculture, forestry), the presence of an establishing manufacturing industry, including metal processing, along the western coastal area, and conservative pro-entrepreneurship values (Eerola and Komnitsas 2025). The conditions in this part of Finland are therefore quite different from the Saimaa lake district in southeastern Finland, characterized by second home and summer-tourism, as typified by the Heinävesi area (see discussion in next section).

The onset of MEDs began quite late in Finland when compared to the rest of the world. Although in 1960-1970 there were local protests concerning water pollution by mining at Outokumpu (Mononen and Björn 2019) and against uranium exploration by GTK during the 1980's (Koivunen et al., 1980, EVY, 1982), those were quite isolated episodes and can be considered to belong to the earliest phases of Finnish EPWs (1st and 2nd EPWs; Eerola 2022a, 2024b). Indeed, the Finnish mining-sceptical movement started to develop only in the mid-2000s, in response to concerns about uranium exploration by foreign companies (Eerola 2008, 2015, 2024b, Litmanen 2008, Jartti et al. 2011). This delay was principally due to the Finnish mining industry having been in decline during the 1990s after the withdrawal of government support for the state-owned mining and mineral exploration companies.

Soon after this period of declining investment, the demand for raw materials caused by growth of the Chinese and emerging market economies was also evident in Finland. The country experienced a rush of foreign mining and mineral exploration companies in the middle 2000s, and from this emerged resource nationalism (Eerola 2008, Jartti et al. 2014, 2020). According to Eerola (2015, 2024b), it was already apparent during the uranium debate that there was resistance to mining projects for other commodities as well, wherever uranium was present, even as a co-product; such projects included Talvivaara, Juomasuo, Rompas and Sokli (Fig. 5). Apart from the presence of uranium, the Rompas-Rajapalot project is partially located in and adjacent to a mire and wetland protected under the Natura 2000 program (Fig. 17). For this reason, a MED ensued, and the project has been opposed by the FANC (Eerola 2022a, Beland-Lindahl et al. 2023, Table 11). As in the Sakatti case

referred to above, diverse geosystem services (mineral deposit and post-glacial deposits and mire development) interact with each other because of their juxtaposition of diverse economic and ecological interests. While uranium is an issue at Rompas-Rajapalot, this is not the case at Sakatti. Conversely, reindeer herding has not been an issue at Rompas-Rajapalot, as it is located in a regular reindeer herding area, whereas Sakatti is in an area that has special reindeer herding status (Fig. 5). Within a special reindeer herding area, this activity is considered to be more important from the viewpoint of economic livelihood than in regular reindeer herding areas to the south.

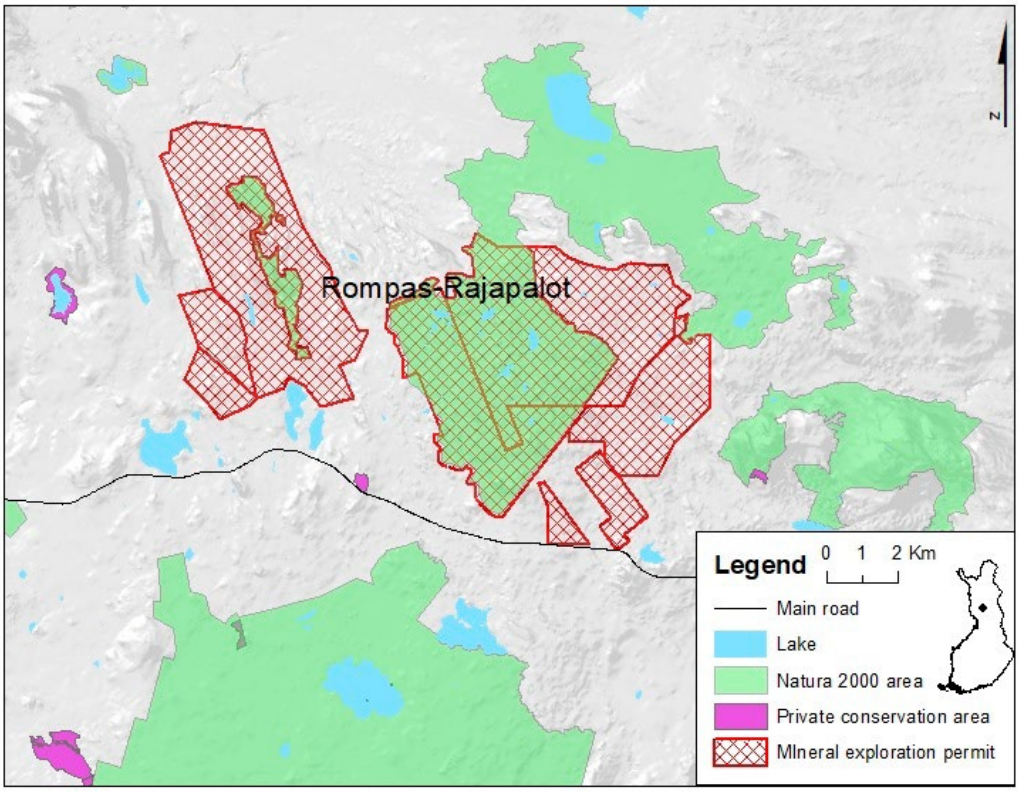


Figure 17. The Rompas-Rajapalot project between the Ylitornio and Rovaniemi municipalities (after Eerola 2022b). The project is partially located on a Natura 2000 area designated to protect a mire. Background maps: Data of the National Land Survey of Finland 09/2025, hill shade, shaded relief 8 m, mining register source (Tukes).

As shown by the example above, apart from the regional location of MEDs, it was observed by Eerola (2022a) that the most common reason for precipitating MEDs in Finland was that the proposed exploration or mining activity was in a sensitive context, either because of uranium, or with respect to associated land use activities (Table 12). Coincidently, in a popular petition for the reform of the Finnish Mining Act (Mink 2022), it was requested that such sensitive contexts should be excluded from mining and mineral exploration. This was motivated by the values, world views, leisure and recreational opportunities, and livelihoods (e.g., reindeer herding, fishing, tourism) of both the local resident population and temporary occupants of second homes, all of which may be challenged by mining and mineral exploration in the area (Eerola 2022a). In many cases, such contexts may overlap and have the potential for initiating MEDs. On numerous occasions, the cause of contention lies also with poor corporate conduct and reputation, as shown in the next section.

Table 12. Sensitive contexts prone to mining and mineral exploration disputes in Finland and their related examples (data from Eerola 2022a, 2026). NIMLA = 'Not in my leisure area'.

Sensitive contexts prone to mining and mineral exploration disputes		Examples of related contentious projects and locations
Association with uranium		Juomasuo, Rompas, Sokli, Talvivaara
Groundwater areas		Martimo, Sakatti, Vekseli
Nature conservation areas		Rompas-Rajapalot, Sakatti
Reindeer herding areas		Hannukainen, Sakatti, Sokli
Sámi homeland		Kevo Natural Park, Hietakero, Nelli
Tourism destinations	NIMLA	Hannukainen, Juomasuo, Pyhä-Luosto, Koli
Second homes along shores of water bodies	NIMLA	Aitolampi, Rautalampi, Juva, Puumala, Sulkava

In Paper II, groundwater areas were absent from the list because only two cases were related to them (Martimo and Vekseli; Eerola 2022a). Groundwater

areas were added here (Table 12), and the case of Vekseli is described further on.

Eerola (2022a) identified 20 MEDs, in which a total of 17 companies were involved, corresponding to 23% of companies operating in Finland (Eerola 2022b). This clearly means that apparently, most companies have not been involved in MEDs, or at least no media references to MEDs were detected regarding them.

Apart from those MEDs that have been ongoing for years, new and recent mineral exploration disputes were also identified by Eerola (2022a). However, as there was little data available at that time, they were only briefly mentioned. These included, in particular, mineral exploration cases from the lake areas and Sámi indigenous homeland (see Eerola 2022a, 2024b), with the Heinävesi case will be analysed in the next section as an example.

Despite the dominance of foreign-owned companies in mining and mineral exploration, some Finnish companies have also been involved in the Finnish MEDs and debate on SLO (Eerola 2022a): Terrafame (Talvivaara), Finnish Minerals Group (Sokli), Hannukainen Mining Oy (Hannukainen) and Suomen malmitutkimus Oy (Puumala, Juva, Sulkava, Fig. 5). This seems to indicate that Finnish ownership does not necessarily reduce resistance for those activities, especially if an MED was inherited from a former project owner and a project is within or close to any of the above-mentioned sensitive contexts. For this reason, Eerola (2024b) suggested that the participation of Finnish companies in MEDs may reduce the importance of resource nationalism in opposition to mining and mineral exploration.

As a result of the findings that show the main factor leading to the generation of MEDs in Finland are project location and its associated land use, Eerola (2022a) suggested including the importance of location within the Finnish SLO framework presented by Jartti et al. (2020). Having this in mind, responsible target selection was suggested by Eerola (2022a) as an important strategy to avoid MEDs. Companies need to be aware of sensitive contexts and to consider them during target selection.

5.3 Corporate conduct

Together with the above-mentioned sensitive contexts, corporate conduct and reputation have been also shown as important factors for SLO and MEDs in Finland (Eerola 2022a). A good example of the influence of corporate reputation is that of the transnational company Rio Tinto, whose global corporate reputation was severely affected following destruction of the Juukan cave, an ancient aboriginal sacred site in Australia. That incident was readily used as justification for opposing its mineral exploration program in Rautalampi, Finland (Piltonen 2024), a case also mentioned by Eerola (2022a). Furthermore, Rio Tinto also conducted aerogeophysical surveys over the Konnevesi National Park in Rautalampi region without informing local people which generated an attitude of suspicion towards the operation (Piltonen 2024). Other examples of poor reputation and corporate conduct in Finland include the companies Dragon Mining and Fennoscandian Resources (currently Grafintec Oy)(see Eerola 2022a, 2024b, Leino and Miettinen 2020, Suopajärvi et al. 2023). Dragon Mining has operated the Kaapelinkulma, Orivesi, and Jokisivu gold mines and the Juomasuo gold mine project in Kuusamo, whereas Grafintec has been developing the Aitolampi graphite deposit in Heinävesi. All of those projects have been the subject of MEDs (Eerola 2022a), and both companies were identified by Suopajärvi et al. (2023) as having realized reputational, local acceptance and political risks in Finland.

Poor corporate conduct in the form of lack of stakeholder engagement and communication was also observed recently, especially in regard to mineral exploration associated with the energy transition (Eerola 2022a). This contrasts with recommendations for responsible corporate conduct related to SLO (e.g., Parsons et al. 2014, Eerola 2017), and geoethics (e.g., Boon 2020, Ribeiro et al. 2021, Eerola 2024a). In many MEDs, poor corporate conduct and reputation were also associated with operation in sensitive contexts (Eerola 2022a, b). Therefore, companies need to more carefully consider site locations and the nature of activities into account in their project planning and operation as a responsible and routinely practiced geoethical strategy within the overall framework of ESG.

Beyond the issues of target selection, operation in sensitive contexts, and stakeholder engagement mentioned above, Paper III also focussed on the role of online communication related to NLIMET and SLO/SLE by companies practicing mineral exploration in Finland. According to companies studied by Eerola (2021), NLIMET improve the cost-efficiency of mineral exploration that it enables delineation of potential targets for closer examination with more accuracy. This maybe also resource-efficient because expensive drilling can be then directed to more promising targets. It also reduces environmental impact because NLIMET are non-invasive and subsequent follow-up drilling and trenching targets can be selected more carefully. This is especially true in the sensitive arctic environment in general, and in specific sensitive contexts, such as nature protection areas. The most commonly used NLIMET were closed loop drilling, drones, remote sensing, plant, soil, and snow sampling, portable drill rigs, and portable XRF analysis devices (Eerola 2021).

The study was undertaken through a survey on the corporate online communication on SLE/SLO perspective provided by companies performing mineral exploration in Finland. The survey results showed that from a total of seventy-three companies, only twenty were found to communicate about issues related to SLE/SLO, while nine communicated about new NLIMET. Coincidently, those nine companies also communicated about SLO/SLE. However, SLO as a term was rarely mentioned specifically, although reference was made to related activities and concepts such as stakeholder engagement, communication, benefit sharing and company-community relationships.

The potential role of NLIMET in SLE was also examined. The focus was on the nine companies communicating both new NLIMET and SLO/SLE. Communication of such issues seems to reflect social and environmental concerns of the companies, but it was also found that those companies were mostly operating in sensitive contexts (Table 12) and involved in MEDs. Therefore, based on stakeholder, situational and resource dependence theories (e.g., Kent et al. 2003) it was suggested that motivation for online communication of such topics may come from a challenged SLO/SLE and as an attempt to show that companies respect and deal with local communities and the environment by reducing impact of their mineral exploration. In contrast however, NLIMET seems not to influence SLO/SLE in any way, even

where they are deployed in sensitive contexts, although companies have shown a willingness to adapt to such challenging situations.

Useful examples for case studies of corporate conduct are the Grafintec Aitolampi project in Heinävesi and the Boliden Vekseli project in Pieksämäki-Joroinen. Both companies have communicated online both about NLIMET and SLO/SLE issues but operated in sensitive contexts, were involved with MEDs, and have exhibited at times poor corporate conduct. The Grafintec's (former Fennoscandian Resources) Aitolampi graphite prospect in the municipality of Heinävesi, within the Saimaa Lake area, is an example of the NIMLA phenomenon (Fig. 20). Leino and Miettinen (2020) noted that Fennoscandian Resources neglected to recognize the two local monasteries as important stakeholders in its community engagement, citing this as an example of poor corporate conduct. Monasteries offer accommodation for tourists in the region. As shown in Fig. 18, the Aitolampi prospect is located between two lakes, aligned along NW-SE-trending geological structures, and there are numerous second homes along their shores. Second homeowners are an important stakeholder group that have joined the opposition to mining in the Heinävesi district, from which the Pro Heinävesi movement has emerged (Leino and Miettinen 2020; Leino et al. 2023). The Varisvesi lake system is designated as a protected waterway landscape (Fig. 18).

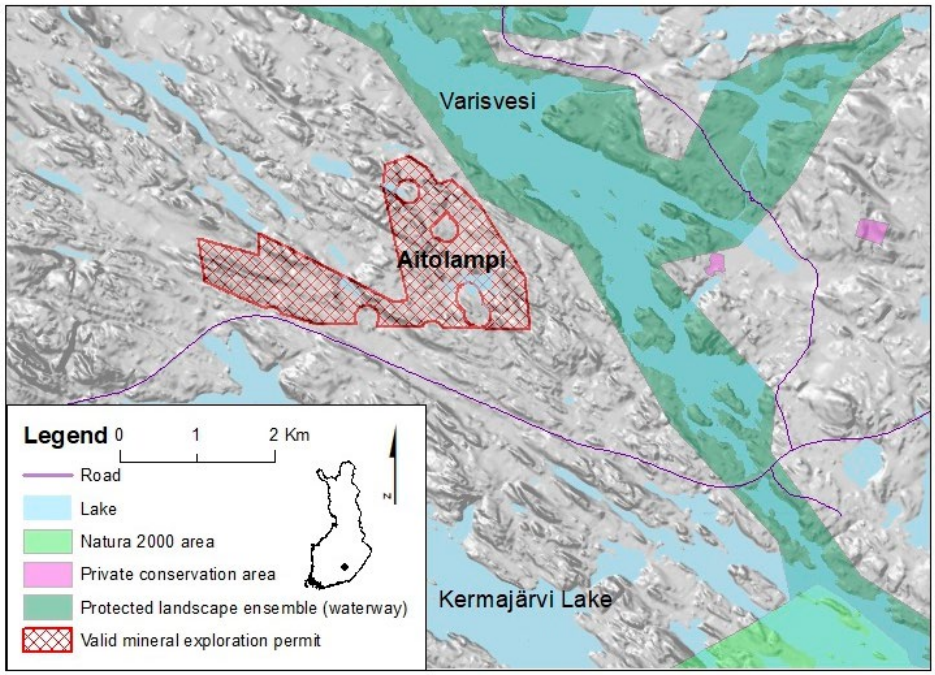


Figure 18. The Aitolampi graphite project in Heinävesi, situated between lakes in the Saimaa region. The lake shores have numerous second homes. Background maps: Data of the National Land Survey of Finland 09/2025, hill shade, shaded relief 8 m, mining register source (Tukes).

Eerola (2022a) observed that the parent company of Grafintec was also involved in a previous dispute with the local Sámi people at the Gallak project in Sweden (Beland Lindahl et al. 2018). When the company came to Finland in 2016, the reputation that the company had acquired was quickly noticed and reported on by the Finnish media.

The Vekseli mineral exploration project between Joroinen and Pieksämäki generated opposition due to concern about the impact on groundwater (Kosonen et al. 2019), as the Vekseli mineral exploration license area overlapped with that of a Quaternary glacio-fluvial esker formation that represents a groundwater resource, as well as being classified under the Natura 2000 program (Fig. 19). Because this esker complex contains an important groundwater resource upon which the surface water and terrestrial ecosystems are directly dependent (class 1E), thus justifying its protected status. The esker has formed over mineralized

bedrock which Boliden Finnex Oy had intended to explore. However, the local Pro Pieksämäki and Pro Joroinen SMs opposed the project (Table 11) and as the claim reservation was the subject of a moratorium (Fig. 19) it was subsequently relinquished by Boliden.

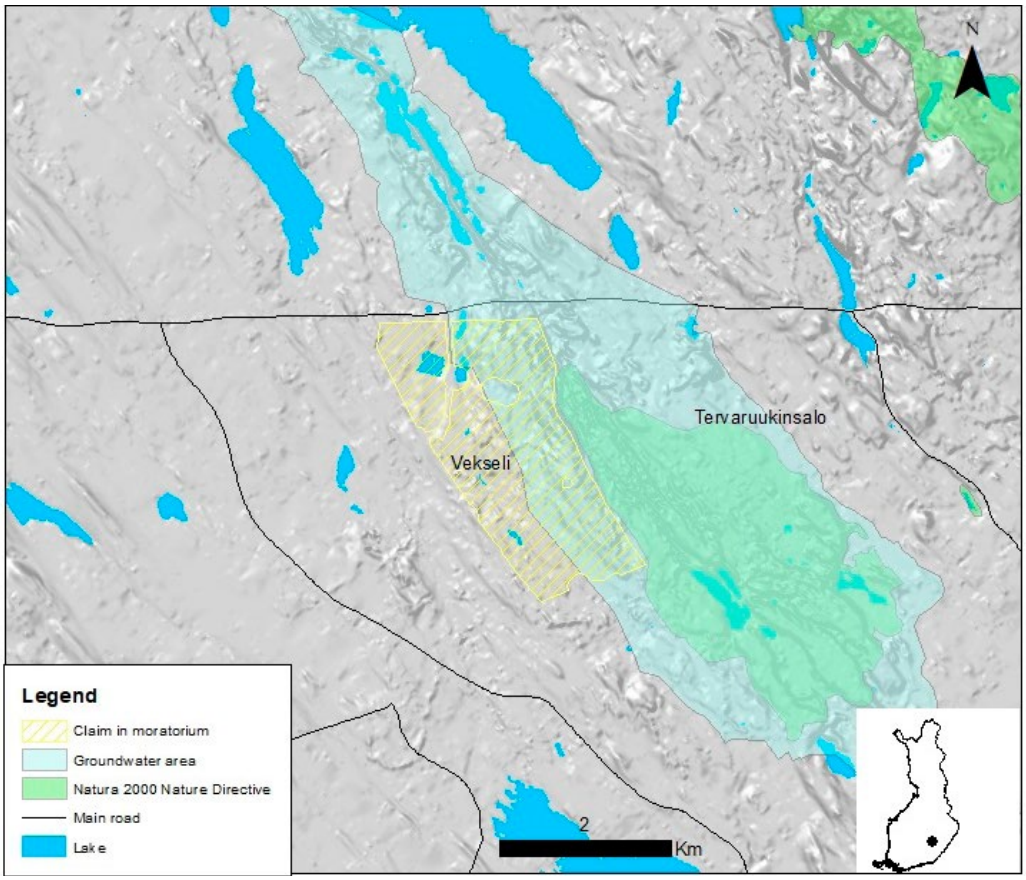


Figure 19. Mineral exploration permit area of Vekseli with groundwater and Natura 2000 areas. Background maps: Data of the National Land Survey of Finland 09/2025, hill shade, shaded relief 8 m, mining register source (Tukes).

Apparently, Boliden Finnex Oy did not undertake prior assessment of the associated land use, and the presence of an important groundwater area was not noticed. Generally, however, groundwater areas are excluded from permit applications. Probably, for this reason, MEDs associated with groundwater areas have been rare in Finland (Eerola 2022a, Fig. 5).

6 DISCUSSION

6.1 Sociopolitical geology

The thesis has documented the formation of the Finnish mining-sceptical movement, describes MEDs, identifies sensitive land use contexts as the main reason for them and examined corporate conduct and communication of companies practicing mineral exploration in Finland. However, the thesis is also concerned with sociopolitical geology and geoethics, which were not specifically mentioned in the published papers. Sociopolitical geology was introduced here as a synthesis of social geology (Mata-Perelló et al. 2012, Stewart and Gill 2017, Jebrak 2017, Erb et al. 2021) and political geology (Bobbette and Donovan 2019b) and is applied in explaining Finnish MEDs. The related research question is **How to interpret the generation of Finnish MEDs and the associated evolution of the Finnish mining-sceptical movement from a sociopolitical geology perspective?** This question will be discussed and answered below.

It is obvious that geology and social and political issues are involved in uranium, and mining debates, MEDs, and the mining-sceptical movement. Generation of MEDs, and mining-sceptical movements is a social and political process involving people who are mobilized towards opposing mining and mineral exploration. The motives for opposition to these activities usually relate to their real or imagined environmental and social impacts (Conde 2017). However, sociopolitical geology brings another layer to the examination of MEDs. Regarding MEDs, geology is primarily related to mineral deposits, which represent a type of geosystem service that potentially provides society with the minerals that it needs. A mineral deposit was formed in a place where there were suitable geological conditions and processes for accumulation of resources. As such, a mineral deposit cannot be transferred elsewhere for exploitation, and for this reason, its exploration and exploitation are place-based activities. However, if a mineral deposit is located in an area having a sensitive land use context (Table 12), such that there are competing land

use activities or inherent natural values, then exploration and extraction can cause an MED. Therefore, project location has a crucial role in SLO/SLE, because it is challenging to create trust in a sensitive context prone to MED.

As shown by the MED case studies presented above, many sensitive contexts are also related to and defined by geology: geological structures, landscapes, greenstone belts, mires, eskers with groundwater reserve, quartzites, and water bodies. Each of these represents in some way a geosystem service that generates and underpins diverse interests and activities in the same region. Such interests can contrast with those related to exploration and exploitation of mineral deposits, being related to nature conservation, tourism, second homes, groundwater, and reindeer herding. An MED may in turn evolve into local mining-sceptical group which, when networking with other similar groups, leads to the emergence of a national mining-sceptical movement. Accordingly, sociopolitical geology is related to MEDs and their actors, and in analyzing the diverse roles that land use takes in the form of interactions between various geosystem services. From that perspective, Heinävesi is a case in which lakes with second homes, and protected areas along their shores communicate and interact with the graphite deposit of Aitolampi. This is a typical example of NIMLA, in which diverse ecological, economic and private interests collided and which, in this case generated the Pro Heinävesi movement and subsequently, an MED and petition requesting revision of the Mining Act. In the case of Vekseli, an important groundwater area and its geosystem service associated with the ecosystem service provided by a protected area can be also seen as political actors with agency that activated local NGOs towards opposition to the project.

MEDs related to Juomasuo in the Kuusamo municipality and Hannukainen in the municipality of Kolari are the oldest cases identified as NIMLA (Eerola 2015, 2017). The more recent cases are those of Koli, and Pyhä-Luosto (Keskinen 2022, Oinaala 2022, Eerola 2026). All of these are geographically associated with tourism destinations having resorts on the summits of prominent quartzite hills (Fig. 15). Their relationship with geology is an example of a geosystem service product (landscape) that interacts with other ones, such as mineral deposits and tourism. Their proximity to or overlapping with mineral deposits may generate MEDs, but such proximity

also exists in Kittilä and Sotkamo, where mining and tourism have co-existed in harmony (Suopajärvi et al. 2019b, Tuulentie et al. 2019, Harju 2019). In the cases of Sakatti and Rompas-Rajapalot, both mineral deposits are located under protected mires which are Quaternary post-glacial sedimentary environments. In addition, Rompas has uranium associated with the mineral deposit. Therefore, within the context of sociopolitical geology, geosystem services communicate and interact with each other because of diverse social and economic interests. In this sense, as argued by Bobbette and Donovan (2019c), rocks and minerals may assume the role of political entities with agency. However, this relationship does not necessarily always lead to a MED.

6.2 Geoethics

Considering the sensitive contexts and analysis of the MEDs presented in this thesis, it appears that the companies involved in such disputes in Finland have not generally been aware and/or concerned of the history, land use, importance, sensitivity, and dispute potential of their target areas prior to applying for exploration or mining permits. This seems to have been especially evident during the recent and ongoing energy transition, with many company representatives having been surprised by opposition (Eerola 2022a). From a geoethical perspective, this is an interesting question. Therefore, mapping of the MEDs in Finland by Eerola (2022a) provided a background for examining their contexts and dispute potential. A greater awareness of these issues creates more opportunities for avoiding them in the future. Responsible target selection, effective communication and proper stakeholder engagement were identified as geoethical issues which companies need to consider and improve in their activities.

As the number of disputes related to mineral exploration exceeded those related to mines and mining projects in Finland (Eerola 2022a), mineral exploration deserves special attention, even though many aspects are also relevant for mining. As found by Eerola (2021, 2022a), only a few companies have been proactive in communication and stakeholder engagement. When local people, tourism entrepreneurs and second homeowners have

not been approached and informed about proposed exploration or mining activities, they have been negatively surprised by their permit applications. When information about a permit application comes from a third party (e.g., authorities, media, ENGO) instead directly from the company, this also seems to disturb residents, who feel disrespected themselves (Eerola 2009b, 2017). This also creates opportunities for prejudices, suspicion, and rumors (Hyytinen and Nikkola 2008, Karasti 2008, Fig. 10). As explained by Eerola (2022a) in this case, local people may become worried or annoyed and more willing to initiate opposition to a project, allying themselves with SMs and ENGOs. Ultimately this may lead to a situation where there are continual, or in some cases unjustified, allegations on the supposed social and environmental impacts of mineral exploration or of a possible mine without any opportunity for respectful and constructive dialogue.

According to Poluektova et al. (2024), primacy of information has a great impact on attitudes towards mineral exploration. It is important for a company that it gives the information on its activities and aims personally and at first hand (Eerola 2017, Fig. 10). This is especially relevant in the case of mineral exploration, which is usually an ephemeral activity, as the development of mine is in general, only a remote possibility. For this reason, the common and widespread practice of dissemination of threats and fears by those opposing a claim reservation may be unjustified and geoethically questionable practice. However, as Suopajärvi et al. (2023) and Beland Lindahl et al. (2023) pointed out, uncertainty related to determining whether a significant mineral resource will be discovered can affect both the exploration company as well as the local community and its stakeholder groups, such as tourism entrepreneurs. This uncertainty can be easily associated with concerns that can ignite fears and opposition. Concerned tourism entrepreneurs may delay investments in tourism and potential assets may remain undeveloped (Niemelä 2020). This is due to the expectations raised by mineral exploration activity, which is a global, not merely Finnish phenomenon, and their management of this issue is an important challenge (Thomson and Joyce 1997, Eerola 2017). Stakeholder expectations regarding mineral exploration may often be exacerbated. According to Beland-Lindahl et al. (2023), despite the uncertainty, mineral exploration is commonly perceived as inevitably resulting in the establishment

of a mining operation. Some communities may have a positive attitude, hoping that the opening of mine may revitalize the local economy and create employment, while others may fear its environmental impacts (Thomson and Joyce 1997, 2006, Eerola 2017). However, companies may abandon an area due to sustained opposition or for a number of other reasons. The frequent abandoning of areas by mineral exploration companies shows that mineral exploration is a highly dynamic industry; exploration may be of short duration because of negligible mineral potential and small chances for a discovery. As a generalization, claim reservations in a region 'come and go' without any further action or consequences. However, Kirsch (2016) indicated that mining-related protests focus on mineral exploration in order to oppose development of new mining projects. He referred to this as the "**politics of time**"; instead of waiting to determine whether a mine would actually be feasible and to maintain mobilization, campaigning already commences during the earliest stage of the mining life cycle. A countermapping is then carried out and looked after all possible environmental and social obstacles for mineral exploration and potential mining. However, the Sakatti project seems to be an exception – systematic opposition only commenced after announcement of the discovery of the mineral deposit under the Viiankiaapa mire and wetland in 2011 (Lassila 2020, Eerola 2022a); mineral exploration in the area had nevertheless already commenced in 2004.

Most of the allegations presented nowadays by the mining-sceptical movement concerning the social and environmental impacts of mining and mineral exploration had already been made during the uranium debate; this includes adverse effects on tourism and real-estate values, environmental impacts of mineral exploration, with some degree of confusion between mineral exploration, mining, permitting and their respective impacts (see Eerola 2010, 2012, 2014 and references therein, Table 3). When the relevant authorities appear to have ignored some of these allegations in granting permits, conspiracy theories have arisen over the supposed close relationship between mining authorities and companies (see Eerola 2014, 2023). However, dissemination of such allegations and conspiracy theories are neither (geo) ethical nor responsible. It has potential to cause negative social impacts on local livelihoods such as tourism, making visitors avoid a place because of

adverse propaganda (Eerola 2010, 2014). This affords yet another example that reinforces the importance of the uranium debate as a fundamental, initial step in the development and subsequent evolution of the Finnish mining-sceptical movement.

Another legacy of uranium debate has been intentional and persistent terminological distortion. As shown in Table 3 with reference to permitting, a claim reservation is often mistakenly referred to as a "mine reservation" by some, which distorts its meaning. A claim reservation is exclusively a pre-emptive right to apply for a mineral exploration permit. It does not grant approval for any form of mechanized exploration or extraction. A mine cannot be "reserved", and a claim reservation is not a mine, nor does it necessarily lead to the development and approval of a mine in the future (Eerola 2017). According to Sarpo (2008), the terms "mine reservation" and "mining project" (when referring to mineral exploration) were created by the anti-uranium movement Uraaniton.org in Askola, southern Finland. Its objective was to cause confusion and fear by deliberately adding the word "mine" as a prefix to an exploration permit, and activity, creating the false impression that an area is has been officially reserved for uranium mining (Sarpo 2008). This clearly has important implications from a geoethical perspective. The use of such misleading terminology should be avoided, especially by researchers. The style of language, and the careless or incorrect use of particular terms may have a great influence on SLO (Gallois et al. 2016) and in the above case at least, this confusion, or deliberate distortion of terminology is an example of intentional misuse by the mining-sceptical activists (Sarpo 2008).

More recently, Finnish female mining researchers have been targeted in social media, and their events have been disrupted by some representatives of the Finnish mining sceptical movement (Eerola 2023). Through **cancel culture**, diverse actors may exert pressure, try to silence, and harm the reputation and career of researchers whose findings contradict or fail to align with their views (Väliverronen and Saikkonen 2020, Saikkonen and Väliverronen 2022, Conversi et al. 2026). In issues related to mining and mineral exploration, this kind of conduct is identified here as a geoethical problem (Table 13). As explained by Eerola (2023) and Eerola (2024b, Paper I), such prejudiced attitudes, adopting the practices of extremist movements in

attacking R&D (e.g., Conversi et al. 2026), do not foster the type of open and constructive discussion which is necessary in addressing the challenges which society is facing with regard to climate change and the complex ESG issues surrounding mining and sustainability. Actually, as observed by Eerola et al. (2026), this radical part of the environmental movement and the populist right-wing curiously and paradoxically converge in their opposition towards the energy transition. Therefore, more constructive approaches are nevertheless expected from some parts of the mining-sceptical movement and more engaged scholars. The geoethical issues identified here as exemplifying poor corporate and activist conduct are summarized in Table 13.

Table 13. Geoethical issues of corporate and activist conduct in mineral exploration.

Actors	**Geoethical issues**
Companies	Lack of stakeholder engagement Lack of communication Lack of area profiling (negligible target selection) Operation in nature conservation areas
Activists	Dissemination of fears and threats Terminological distortion Conspiracy theories Targeting and disrupting researchers in social media and events

The use of NIMBY and NIMLA has been criticized (e.g., Burningham 2000, Van der Plank 2016, dos Santos 2021, MiningWatch Portugal 2020, Salovaara 2021). In fact, the terms may be considered by some as offensive because of the selfishness frequently associated with such disputes, which is in turn seen as reducing the importance of resistance and motivation. This criticism of the use of such acronyms may express a politically correct understanding of motivation and actions of the opposition movement, and a polite and respectful approach towards them. But why should people defending their residential or leisure territories through self-interest be considered inherently as something negative? Like many other species, humans are territorial animals. Therefore, NIMBY and NIMLA can also be considered as purely descriptive technical terms. For that reason, the underlying issue seems to

be a question of a school of thought, as the NIMBY concept is widely used in social sciences (e.g., Carley et al. 2020, McNee and Pojani 2021, Yu et al. 2022, Rissanen et al. 2024), economy (Gammelsœter 2025), tourism studies (e.g., Xie et al. 2019, Litvin et al. 2020, Oskam 2020), and research of MEDs (e.g., Badera 2014, Brown et al. 2017, Kojola 2020, Vanhulst et al. 2022).

6.3 Self-reflection

As qualitative research usually concerns people and their perceptions, it relies on primary sources which generally means interviewing those involved. Although interviews allow a deeper analysis of a subject by revealing personal impressions and opinions, this approach was not deemed necessary here. Rather, the analysis had a national focus and was mostly based on secondary sources, except for the autoethnography component, based on personal experience and participative observation by the author in uranium and mining debates and events related to the field. However, it is recognized that the research could have benefited from semi-structured interviews of representatives of the mining-sceptical movement, industry, and regulatory authorities, in order to review and obtain feedback on the issues discussed. Nevertheless, in the case of Paper I, it is also conceivable that such interviews would not have been possible. It must be admitted here that owing to my professional background, my research has been judged **a priori** as being of poor quality, or biassed, and even as a subject of complaints by some representatives of the mining-sceptical movement (MiningWatch Portugal 2020, Salovaara 2021). Across the interface between geology, society and environment (Fig. 1) it is natural that many societal actors and diverse interest groups could be interested in what research is being undertaken. It is therefore very important, considering the sensitive nature of the subject, for researchers to try to maintain integrity and objectivity at all times. Fortunately, however, there have been numerous opportunities for people from diverse backgrounds to contribute constructively to the papers, through discussions and critical comments on the manuscripts. This includes colleagues, representatives from industry, the mining-sceptical movement,

and academia. Taking their comments into account has improved the quality of the papers and this introductory synopsis.

6.4 Further avenues

As with all studies, this thesis generated numerous additional questions that remain to be answered by future research. Having developed the NIMLA concept (Eerola 2015) and having noted how its importance has grown in recent years (Eerola 2022a, b, 2024b), I considered that its origin, role, and implications deserved more attention and its own article (Eerola 2026). Following on this is the question of the relationship between tourism, real-estate values and mining and mineral exploration. Because of the economic importance of both activities, this needs to be studied because it is commonly claimed that exploration and mining activities, by their very nature, harm tourism and adversely affect real-estate values. However, such allegations have been usually made without presenting supporting evidence or concrete examples (e.g., Van der Plank et al. 2016, Lyytimäki and Peltonen 2016, Leonard and Lebogang 2018, Hast 2021). In the same way, international mining research has generated a series of other paradigms that also need to be scrutinized (e.g., power imbalance between the local communities, SMs, ENGOs, indigenous people and companies, and the role of emotions in activism).

Although the importance of place was recognized as one of the fundamental reasons for MEDs, this can also be questioned because appealing to the importance of sensitive contexts by countermapping is quite common in all types of environmental disputes and conflicts. Such practice typically involves opponents deliberately drawing attention to all possible issues and obstacles to a proposed project, which usually includes sensitive contexts. A recent example of this process relates to mineral exploration in Heinola in southern Finland (Pelli 2025), which represented a typical NIMLA phenomenon. Therefore, unwanted economic activities can also be opposed on principle and/or from an ideological standpoint and the appeal to diverse issues may be used in attempt to justify opposition. This subject also needs to be

investigated in more depth. Having identified and examined tens of MEDs in Finland, I have also noticed that they seem to have their own dynamics and patterns which also warrant further attention.

7 CONCLUSIONS

The papers that comprise this thesis have been reviewed and complemented by this introduction. The papers examine Finnish MEDs and their causes by progressing from an analysis of more general aspects and a wider chronological perspective to focus on corporate conduct, operational contexts and online communication. The studies were conducted by mixing qualitative and quantitative methods. Several theories were involved in the analyses presented in the papers, including protest waves, SLO, and stakeholder theory, whereas this introduction provides a perspective on the applications of sociopolitical geology. Therefore, this thesis represents a cross-disciplinary contribution for mining research: the evolution of the mining-sceptical movement was described, MEDs were mapped, and the relationship of the use and communication of new NLIMET with SLE and sensitive contexts was examined, particularly from the perspective of corporate conduct.

The Finnish MEDs can be attributed to issues relating to with land use in sensitive contexts followed by poor corporate conduct, and reputation. Such sensitive contexts include the Sámi homeland, tourism destinations, and areas of second homes, reindeer herding, groundwater and nature conservation and mineral deposits in which uranium is present. Many of these factors represent geosystem services which generate and influence diverse human interests that can conflict and collide and result in MEDs. Geosystem services assume the role of political actors with agency, in the sense recognized by sociopolitical geology. Spatiality and geology add a new layer to the study of SLO in the form of project location related to sensitive contexts and the potential for generation of MEDs. The role of the NIMLA/TLR represented by tourists, tourism entrepreneurs and second homeowners is also recognized and highlighted as an influential phenomenon.

The number of local SMs and ENGOs involved in MEDs has gradually expanded and formed both national and international networks, through which the mining-sceptical movement in Finland has emerged. Through this thesis, the Finnish mining-sceptical movement was identified and its evolution in three stages was described (uranium debate, mining debate

and energy transition). This evolution is proposed to form the 6th Finnish EPW, which is also associated with the climate-change debate. The mining-sceptical movement has succeeded in bringing the governance of mineral resources into the public arena, with the tangible consequence of petitioning for changes to the Finnish mineral policy and regulation.

Among the companies involved in MEDs and operating in sensitive contexts, some were found to communicate online about their new NLIMET and SLO-related issues. This was seen as an attempt to improve their public image in a situation in which their SLO was already being challenged or had been lost by operating in sensitive contexts. However, this type of communication and engagement does not seem to influence SLO/SLE to any significant degree. Area profiling and early contact and cooperation with a wide range of stakeholders may help companies to establish dialogue and identify any potential no go zones that ought to be excluded from exploration or mining activities. However, the best way to avoid disputes may be to exclude and avoid sensitive contexts by careful target selection. If this is not possible, it is recommended to practice effective stakeholder engagement and communication from an early stage and to take diverse stakeholder groups into account.

Finally, through the preparation of this thesis introduction, I perceived that I have practiced social and political geology throughout my entire career, which the concept of sociopolitical geology complements well. Therefore, the thesis has also been an emotional and philosophical journey engaging my own background, experiences and the differing approaches offered by the geosciences and social sciences.

Considering my journey, background, and career, it seems that my first papers on the Finnish uranium debate and related activism, and the latest on the Finnish mining-sceptical movement have come full-circle. They represent distinct points in time focused on the same topic that describe the origin, and expansion of the Finnish mining-sceptical movement, and related MEDs. The beginning of this movement was sparse and local but now, after two decades, it is a robust nationwide network of SMs and ENGOs which has also international connections. At the same time, the Finnish mining industry has been revigorated by foreign companies. This development has been a

wonderful opportunity and experience to be embark upon and follow. This thesis is only one step in this journey, although personally an important one. Hopefully, more cross-disciplinary dialogue and collaboration will be achieved between the industry, scientists and activists as well. It would be of great public interest in Finland and globally, if there would be a balanced public debate on the topic, leaving personal passions behind, looking for facts and respecting each other's opinions.

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ORIGINAL ARTICLES

ARTICLE I

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ARTICLE II

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ARTICLE III

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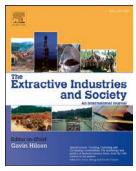
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Original article

The origin, evolution and impacts of the mining-sceptical movement in Finland

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ABSTRACT

The evolution of the Finnish mining-sceptical movement (MSM) is described and situated within the context of Finnish environmental protest waves (EPWs). This evolution occurred through the uranium debate (UD; since 2005) and mining debate (MD; 2010–ongoing). These stages are described and compared with the characteristics of the Finnish EPWs. The purpose is to determine whether the evolution of the MSM represents a new EPW in Finland.

Five EPWs are reported to have occurred in Finland. After the end of the last EPW at the beginning of 2000s, the Finnish environmental movement lost its impetus, followed by a swell/latency. However, the climate change debate returned nuclear energy to the agenda. Together with the rebirth of the Finnish mining industry resulting from activities carried out by foreign companies, uranium exploration restarted in Finland in 2005, which raised opposition. The UD revitalised the environmental movement and opened spaces for local resistance in the countryside. Even though uranium exploration ended in Finland, the UD continued as attention shifted towards other projects associated with uranium. The environmental problems of the Talvivaara mine increased opposition and directed the MD towards projects also focused on other commodities. Because of its duration, impacts, and importance, the evolution of the MSM is suggested to form the sixth Finnish EPW.

1. Introduction

Environmental activism, referring to individual or collective action towards environmental protection, is one of the drivers of sustainability. It identifies issues that threaten the environment, from local to global, and develops strategies to raise awareness or produce solutions to address the problems. It may be represented by horizontal social movements (SM) and/or traditionally structured environmental non-governmental organizations (ENGO). According to Devlin (2020), SMs are groups pursuing a common aim to change political institutions, policy, social institutions, attitudes, or behaviour.

Because of the environmental impacts of mining, mining conflicts can be conceived as environmental struggles, and the related activism has played an important role in them (Conde, 2017). However, such activity can also include concerns about impacts on indigenous people, livelihoods (e.g., agriculture, tourism), and/or real estate values, i.e., social-economic issues. These are attached to values, worldviews, and perspectives on local sustainability that may differ from those of the extractive industry (e.g., Beland Lindahl et al., 2023; Leino et al., 2023). For this reason, it is important to understand the activities, motives, and dynamics of mining resistance to avoid or address conflicts, which can be costly for companies, communities, and the state (Franks et al., 2014; Zachrisson and Beland Lindahl, 2019).

Zachrisson and Beland Lindahl (2019) referred to the opposition to mining in Sweden as a mining-sceptical movement. Such movements are critical towards mining and demand reforms in its governance. However, movements may also be anti-mining and oppose the activity in certain places or under any circumstances. Although 'anti-mining' is a more common term in the literature (e.g., Arce and Nieto-Matiz, 2024), 'mining sceptical' is also adopted here, because it corresponds to a self-denomination of the Finnish mining-related social movement (in Finnish: "*kaivoskriittinen*"). In fact, its representatives do not like the term 'anti-mining' (J. Natunen, MiningWatch Finland, written communication, 2019) and, according to M. Mink (personal communication 2023, Saimaa without Mines movement), do not oppose mining *per se* but rather its impacts.

According to Zachrisson and Beland Lindahl (2019), a mining-sceptical movement evolves through the interaction of diverse local and national actors that join forces, although with different resources and logics. A mining-sceptical movement is here understood as

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being composed of individuals, ENGOs, local associations, SMs, and networks that are critical towards mining and mineral exploration.

As described by Martinez-Alier (2001) and Hilson (2012), mining conflicts started to increase globally during the 1980s to 1990s, when both mining companies and ENGOs migrated from the Global North to the Global South as part of the globalization process and faced each other in social and environmental issues. In the late 1990s, the mining industry reacted to resistance by creating associations and corporate social responsibility (CSR) programmes to voluntarily improve its performance and mitigate its impacts, and thereby enable its operations. However, soon after, China's economic growth provoked a global resource rush, which expanded mining conflicts all over the world (Conde, 2017).

Mining conflicts are caused by environmental and social impacts, a lack of participation in decision making, a lack of trust in mining companies and authorities, and insufficient compensation for the grievances suffered (Conde, 2017). However, not all communities resist mining (Conde and Le Billon, 2017). Those that are more likely to resist perceive a threat to their well-being or livelihood, which may depend on the stage of the mining life cycle, the moment of perception of the threat, the local context, the project location, corporate conduct and reputation, the commodity (e.g., uranium, coal), access to information, the ability to organize, and the creation of alliances (Conde, 2017; Eerola, 2022). According to Lodhia and Hess (2014), the involvement of ENGOs and the government as regulators is essential to ensure the responsibility of mining companies and accountability for their social and environmental impacts. Governments can react to the resistance in diverse ways, depending on the country's reliance on mining, the economic situation, and the strength of civil society (Conde, 2017). Policy and legislative changes are the most common responses to social pressure, but some governments may respond through repression, with the state becoming a part of the conflict, which is common in the Global South (e.g., Arce and Nieto-Matiz, 2024). In fact, the ability of the state to maintain the well-being of its population, open participation in political, environmental, and natural resource debates, and the accommodation of mining-sceptical demands crucially affect the way in which mining struggles might evolve (Conde, 2017; Zachrisson and Beland Lindahl, 2019). Therefore, the trust of citizens in the government also has a strong role in how mining conflicts evolve (Lesser et al., 2021; Arce and Nieto-Matiz, 2024). However, according to Zachrisson and Beland Lindahl (2019), while a movement's growth and strategies are affected by political opportunities, they ultimately depend on the activities of the mining industry and the emergence of contested local projects.

In Finland, there is an ongoing debate on mining that started from a debate on uranium in the mid-2000s, and which has manifested in local mining and exploration disputes (MEDs). The uranium debate was characterized by opposition towards uranium exploration, whereas the mining debate has mostly involved opposition towards mines, mine projects, and mineral exploration for other commodities, although some of these commodities are also associated with uranium (Eerola, 2015, 2022). These episodes are termed debates because Finnish MEDs have mostly been of low intensity (involving some organised opposition) and at the level of a public debate (Eerola, 2022). For this reason, Eerola (2022) referred to Finnish mining-related struggles as disputes rather than conflicts. The term conflict is reserved for struggles of high intensity (mass mobilization, violence, and mass arrests), which are common in the Global South (Eerola, 2022).

Research related to the Finnish uranium debate (2005–) has mainly been limited to a master's thesis, with a few exceptions (Eerola, 2008, 2015; Litmanen, 2008; Jartti and Litmanen, 2011; Kainulainen, 2011; Litmanen et al., 2014). Research on the subsequent mining debate (2010–ongoing) has mostly focused on contentious projects (e.g., Sairinen et al., 2017; Lassila, 2018; Leino and Miettinen 2020; Eerola, 2022). However, a comprehensive overview of their evolution and the role of the evolving mining-sceptical movement is lacking. According to Zachrisson and Beland Lindahl (2019), this has also been a common problem elsewhere. Eerola (2015) noted similarities between the uranium and mining debates and the previous Finnish environmental protest waves (EPWs). This article contemplates the importance of these debates and the evolution of the mining-sceptical movement within the context of Finnish EPWs.

The following research questions orientated the study: Why did the mining-sceptical movement emerge, how did it evolve, what have been its outcomes, is it related to the Finnish EPWs, and if so, how? This article first presents the EPWs as its theoretical background, and the materials and methods are subsequently described. Then, the evolution of the mining-sceptical movement through the uranium and mining debates and their impacts in Finland are reviewed. Finally, the importance and status of these stages and the mining-sceptical movement are analysed and discussed within the continuum of the Finnish EPWs, after which conclusions are presented.

2. Theoretical framework

Historically, protests have been reported to occur in protest cycles, cycles of contention, or waves of collective action (Tarrow, 1994; Della Porta and Diani, 1999). The Finnish tradition is followed here, and the cycles are referred to as waves (e.g., Konttinen, 1999). Tarrow (1994) defined the cycles/waves as "a phase of heightened conflict across the social system," with "intensified interactions between challengers and authorities which can end in reform, repression and sometimes revolution."

According to Tarrow, openings in political opportunity can promote collective action. Waves start when the authority, e.g., the government, becomes seen as vulnerable to social change as demands for change increase (Tilly, 1978). A certain national or international event might create a critical moment for the increased mobilization of small and invisible networks (Della Porta and Diani, 1999). However, according to Koopmans (2004) and Tarafdar and Ray (2021), the diffusion of the issue, protest, and demands by mass media (and nowadays by social media) is necessary for this to happen. Nevertheless, when this favourable moment passes, the movement dissolves and is usually followed by a period of latency (Melucci, 1989). For instance, Koopmans (2004) argued that the end of a wave can also be explained by the stabilization of the social situation between the parties and its institutionalization. Therefore, analysis of the interaction of the diverse actors involved is also important in the study of protest waves (Koopmans 2004). Protest waves can be environmental, political, social, or a mixture of these, and they have occurred all over the world (e.g., De Moor et al., 2020; Paret, 2021; Tarafdar and Ray, 2021; Liang, 2022).

The characteristics of protest waves, according to Tarrow (1994), are:

- the rapid dissemination of collective action and mobilization, as existing SMs create political opportunities for others to act or join in;
- innovation in the forms of protest;
- the creation of or a major change in collective action frames, discourses, and frames of meaning;
- the coexistence of organized and unorganized activists; and
- increased interaction between the challengers and authorities.

In general, protest waves can be positive for society in the form of resulting legislation and policy reforms. Siisiäinen (1990) and Tarrow (1994) noted that all movements leave vestiges, even when defeated or suppressed. The impacts of their success or failure are cumulative over time, producing new protest waves. As Lindholm (2005) pointed out, the most significant contribution of the wave theory is that when observed from its perspective, protests and demands for change do not appear as separate events, less active periods also become important, and the changing nature and intensity of protests are more understandable. As argued by Koopmans (2004), protest waves are the most explicit theoretical attempt to deal with time and space in contentious politics.

Anti-mining protests all over the world can be seen as a global EPW and as part of the global environmental justice movement (EJM) against extractivism, which started in the 1980s and has intensified since the 2000s (Martinez-Alier, 2001; Scheidel et al., 2020). National mining-related EPWs have been observed, for instance, in Australia (Adamson, 1999) and Peru (Arce, 2014).

Environmental activism in Finland has traditionally been described as a wavy movement (e.g., Rannikko 1994; Konttinen, 1999; Lindholm, 2005). This is also supported by Puohiniemi (2011), who argued that there have been more wave-like cycles of environmental attitudes over time in Finland than trend-like rises or falls.

During each individual EPW, ENGOs and SMs receive a flow of new members, and different groups start to act together on an issue of common concern (Konttinen, 1999). According to Konttinen (1999), the mobilization stage of a wave has always been triggered by some key event that has attracted major debate and media attention, forming an attention cycle. Waves have been followed by subsequent stages of latency, i.e., periods of little or no activity. According to Lindholm (2005), there have been five EPWs in Finland (Fig. 1).

However, instead of waves, Stranius (2006, 2010) proposed the term "layers", whereas Konttinen and Peltokoski (2010) referred to them as the "densification of activist networks". Despite this discussion, the wave theory is explored here because of its use in the international literature. In Fig. 1, the waves are represented in the form of successive and transitional layers following the suggestion of Stranius (2006, 2010) and Tarrow's (1994) cumulative effects of waves.

Apart from the first and second waves, the EPWs in Finland have been unrelated to mining. According to Mononen and Björn (2019), the historical mine of Outokumpu, owned by the public national company Outokumpu Oy, faced local protests due to water pollution in the 1960s and 1970s during the first Finnish EPW (Fig. 1). As part of the second wave, uranium exploration by the Geological Survey of Finland (GTK) was opposed (Fig. 1; Koivunen et al., 1980; EVY, 1982).

According to Konttinen (1999) and Lindholm (2005), Finnish EPWs have been characterized by:

- widespread mobilization;
- media attention;
- politicization of national environmental and natural resources management;
- debate on environmental justice, decision making, and the relationship between experts and common citizens;
- anti-authoritarianism;
- distrust towards authorities and experts;
- demand for reforms;
- criticism of modernity; and
- anti-nuclear attitudes.

Konttinen (1999) observed that Finnish EPWs have been influenced by similar waves abroad. Like their counterparts elsewhere, all the waves have impacted Finnish society by changing environmental attitudes, policy, legislation, and administration (Konttinen, 1999).

The Global Justice Movement (GJM, a "movement of movements"; Mertes, 2004) formed the last recognized Finnish EPW at the turn of the millennium (Fig. 1; Lindholm, 2005). Ylä-Anttila (2010) referred to the GJM in Finland as the "return of politics" after the collapse of socialism, the 1990s neoliberal "lack of alternatives", and the "end of history." However, it quickly ended at the beginning of the 2000s. Konttinen and Peltokoski (2004) described the following situation as a "swell", where minor disputes (surges) have formed continuous minor mobilizations concentrated on different issues but unrelated to each other (Fig. 1). According to Valkonen (2007) and Konttinen (2012), at the beginning of the 2000s, some local and non-networked peat and forest disputes occurred in northern Lapland, central Finland, and Ostrobothnia. However, these did not attract any wider national debate or media attention at that time.

In the mid-2000s, Stranius (2006) still recognized a post-GJM latency stage within the Finnish environmental movement (Fig. 1). Climate change, nuclear power, forest disputes, and genetic modification emerged as topics from his interviews with Finnish environmental activists. However, Stranius (2010) noticed that no new issues had emerged from the Finnish environmental movement. No further Finnish EPWs have subsequently been described, and the wave theory apparently lost its relevance in Finland after the end of the GJM. Nevertheless, according to De Moor et al. (2020) and Vaarakallio (2021a), climate change activism is a global post-GJM EPW that has also been present in Finland.

3. Materials and methods

This article revives the EPW concept and applies it to an analysis of the evolution of the Finnish mining-sceptical movement. The subject covers a period from the 1960s until the present, but the emphasis is from the mid-2000s onwards. Chronograms are elaborated to illustrate the evolution of the Finnish EPWs and the uranium and mining debates (Sections 2 and 4).

This study is based on published literature and media reports, as well as the author's participative observation and interpretations through the years. The author practiced this in the role of an observer as participant (Gold, 1958) by working in uranium exploration from 2006 to 2008 and participating in the public debate on mining-related issues, as well as in events and at demonstrations organized by the mining-sceptical movement and mining industry until present. Conversations and correspondence with activists, the state, industry, and academic representatives along the years have also been useful. However, none of these verbal interactions have been formal, systematic, or recorded. Instead, they are mainly based on the author's memory, impressions, reflections, and interpretation. This characterizes autoethnography, which is an approach to research and writing that seeks to describe and systematically analyse personal experience to understand cultural experience (e.g., Ellis et al., 2011). This was applied to examine the evolution of the mining-sceptical movement through author's experience, perception and memory of its events along the years.

The author also has long experience in related research and academic discussion. Beyond this experience, and autoethnography, the subject was additionally approached by reviewing the relevant literature on Finnish EPWs, the uranium and mining debates, and MEDs, which has been collected and read in full over the years. The literature was

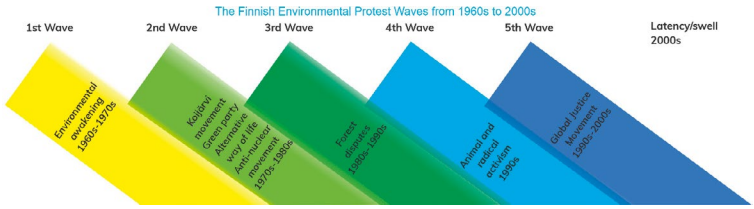


Fig. 1. Schematic representation of Finnish environmental protest waves as successive layers from 1960s to 2000s.

searched in Google Scholar and additionally received as suggestions from Academia.edu and Science Direct, as well as from other scholars. The literature reviewed and cited here covers most of the papers and books published on the topics regarding Finland. However, as there is relatively little academic literature on the role of the mining-sceptical movement in MEDs, magazine and media articles by journalists, politicians, and activists were also used to complement the picture. Regarding these, the article type and the role of its author are mentioned in the text to distinguish them from research articles. The reviewed literature can be categorized in three groups: literature on Finnish EPWs mainly consists of books and articles within them, whereas literature related to the uranium and mining debates and MEDs is composed of peer-reviewed articles published in national and international journals. Media reports occur as national magazine and newspaper articles.

The literature review was carried out following a semi-systematic approach by applying content analysis. The included articles and books deal with EPWs, the results of polls, crucial MEDs, and analysis of the uranium and mining debates. A semi-systematic literature survey can be useful for detecting themes, theoretical perspectives, or common issues within a specific research discipline or methodology, or for identifying components of a theoretical concept (Snyder, 2019). Therefore, a semi-systematic review was used here to examine how the EPWs and the uranium and mining debates progressed over time, while content analysis was applied to identify, analyse, and report patterns in the form of certain themes within a text (cf. Braun and Clarke, 2006), i.e., the characteristics, causes, consequences, and evolution of EPWs, the uranium and mining debates, and the mining-sceptical movement.

A semi-systematic literature review contributes to the mapping of research, synthesizes the state of knowledge, and provides a historical overview of the topic (Snyder, 2019). The present review helped to answer the first three research questions: why did the mining-sceptical movement emerge, how did it evolve, and what have been its outcomes? The author's experience, participative observation, autoethnography, research questions, and literature guided the elaboration of its history and evolution following the previous EPWs through the uranium and mining debates and assisted in reflecting on their role within the context of EPWs in Finland. The literature is disseminated throughout the text instead of being presented in a separate review section. Beyond the reviewed and cited literature, this study is also based on the author's three previous papers (Eerola, 2008, 2015, 2022). They were published in distinct moments and stages of the evolving Finnish mining-sceptical movement during the period covered here and connected to the author's autoethnographic experience. Therefore, this can also be considered as a retrospective and longitudinal study, as was the corresponding study conducted by Zachrisson and Beland Lindahl (2019) in Sweden.

The evolution, causalities, outcomes, and impacts of the uranium and mining debates are described and observed within the context of the Finnish EPWs by comparing their characteristics with each other and examining the similarities between the latter and former. Therefore, the research was conducted as a comparative case study (e.g., Yin, 2009), mainly using secondary qualitative data (i.e., document review; Patton, 2002). Cases can be place- and time-related processes, systems, groups, or their combinations (Yin, 2009). EPWs can be considered as such, and a comparative case study approach was applied to investigate the patterns, differences, and similarities of the diverse protest waves (e.g., Koopmans, 1998; Liang, 2022). The Finnish EPWs and the uranium and mining debates were identified as the cases to be characterized and compared. A framework of categories was constructed to facilitate this comparison, in which the characteristics of the EPWs and the uranium and mining debates are summarized in Section 5. This assisted in answering the final research question: are the uranium and mining debates and the associated mining-sceptical movement related to the Finnish EPWs, and if so, how? However, as pointed out by Lindholm (2014), an EPW only exists when a researcher proposes it as such, and this may purely be a matter of taste. The reflexive nature of autoethnography is in accordance with this view.

4. The evolution of the mining-sceptical movement in Finland

Mining has been practiced in Finland for centuries, but the state-owned national mining industry was discontinued in the early 1990s. Mining activity was then in recession until the mid-2000s. When Finland entered the European Union (EU) in 1995, foreign investment was allowed into the country. During the 1990s, some foreign companies explored for diamonds and gold in Finland without any controversy. However, signs of potential disagreement were already apparent at that time (see Eerola, 2017, p. 7).

According to Eerola (2008) and Kröger (2016), the global mining boom in the mid-2000s also focused on Finland because of its mineral potential, legislation, good geo-data, infrastructure, economic and political stability, and international promotion. Since this reactivation of the Finnish mining industry, its actors have mostly been private and of foreign origin. This sudden activation of a private and alien mining industry (especially focused on uranium) after decades of practical absence appears to have shocked many, because environmental awareness had increased during that time (Eerola, 2008; Puohiniemi, 2011). According to Rannikko and Määttä (2010), Mononen (2012), and Leino et al. (2023), there has also been perplexity regarding changes in the idealized countryside because of the mining industry. Moreover, from the 2010s onward, MEDs have been related to the fear of environmental and social impacts and mine accidents, such as the gypsum pond leakage at the Talvivaara nickel mine in 2012 (see Sairinen et al., 2017). The uranium and mining debates are considered as evolutionary stages of the Finnish mining-sceptical movement and are described below.

4.1. 2005–Present: The uranium debate

Debate on climate change returned nuclear power to energy policies in the mid-2000s, which led to an increased demand for and a rise in the spot price of uranium on the global market (Anonymous, 2006). Uranium exploration restarted in Finland, decades after it had ended in the 1980s (Eerola, 2008). The French company Cogema/Areva applied for mineral exploration permits in southern Finland in 2005, which was the key event triggering the uranium debate (Litmanen, 2008). According to Litmanen (2008), the negative reaction to this was due to the foreign origin of the company, uranium as the commodity, and the extent of the permit areas applied for in densely populated southern Finland. Mining authorities were not trusted, and possibilities to influence decision making were also poor, as there was no consultation. The uranium debate spread to further provinces where other foreign companies had applied for permits, and local and national opposition to uranium exploration emerged (Fig. 2). Litmanen (2008) described anti-uranium demonstrations and events in rural locations with artistic performances and speeches by counter-experts, in which mining authorities were challenged by opponents of uranium exploration.

Apparently, the national mining authorities were not prepared for the mining boom, the sudden reactivation of uranium exploration, or the resistance this generated (Eerola, 2008, 2015). They were surprised by the opposition, as was the re-emergent mining industry.

Despite its local nature, Litmanen (2008) characterized the Finnish anti-uranium movement as having national and international networks with similar struggles elsewhere. Although several local anti-uranium movements were active in Finland (e.g., Uraaniton.org in Askola, the Anti-Uranium Movement of North Karelia and Kitkan viisaat ry in Kuusamo), the central actor appears to have been the Finnish Association for Nature Conservation (FANC; Litmanen, 2008; Eerola, 2015).

The uranium debate raised criticism of the GJM type against the global mining industry operating in Finland (resource nationalism; Eerola, 2008; Jartti and Litmanen, 2011; Litmanen et al., 2014). The main demand was a review of the Mining Act from 1965, and the

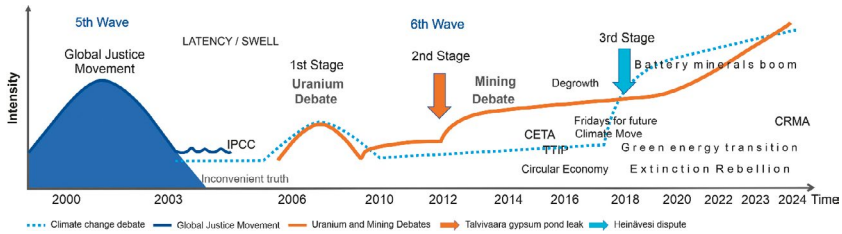


Fig. 2. Schematic representation of the period following the post-Global Justice Movement swell/latency with the development of the uranium and mining debates (after Eerola, 2015). Not to scale. IPCC = Intergovernmental Panel for Climate Change; TTIP = Transatlantic Trade and Investment Partnership; CETA = Comprehensive Economic and Trade Agreement; CRMA = Critical Raw Materials Act. Inconvenient truth refers to David Guggenheim's documentary film on climate change.

anti-uranium movement also displayed a strong anti-nuclear attitude (Litmanen et al., 2014; Kröger, 2016). Resource nationalism and the participation of an archbishop and eco-theologist (Kainulainen, 2011) were new phenomena in Finland. The sudden activation of mining and mineral exploration by foreign mining companies, latent activism, the unpreparedness of the authorities, the lack of trust in them and lack of participation in decision making, and the outdated Mining Act appear to have created an opportunity for the emergence of the anti-uranium

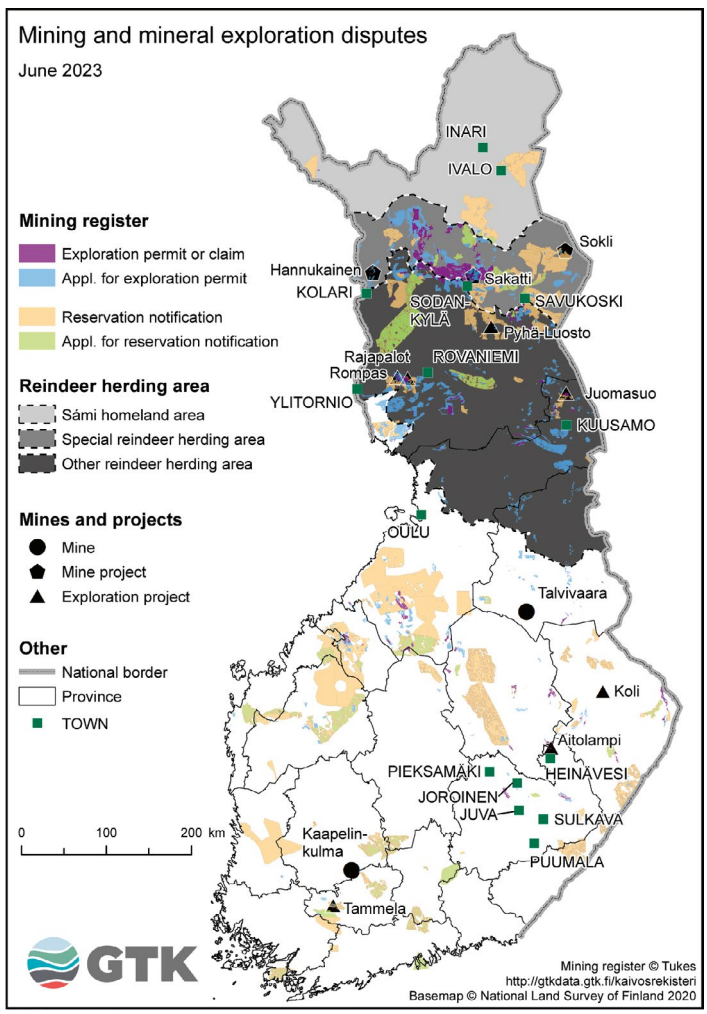


Fig. 3. Mine and mineral exploration projects and locations associated with ongoing mining and mineral exploration disputes (after Eerola, 2022).

movement and its demands. Because of the 2008 financial crisis and the long license processing time, foreign uranium exploration companies withdrew from Finland in 2008–2010. The uranium debate is identified as the first stage in the evolution of the Finnish mining-sceptical movement (Fig. 2).

Although Sweden has had an uninterrupted mining industry, the onset of the Swedish mining-sceptical movement had quite similar causes, but it started later, in 2012, and uranium was not involved (see Zachrisson and Beland Lindahl, 2019). However, struggles regarding uranium have also occurred in Australia and Namibia (Adamson, 1989; Conde and Kallis, 2012).

4.2. 2010–Present: the mining debate

According to Eerola (2015), the foundations of the mining debate were already established during the uranium debate; anti-uranium activists focused their attention on mining and mineral exploration projects in which uranium was associated, such as at Juomasuo (gold–cobalt), Rompas (gold–cobalt), Sokli (phosphorus), and Talvivaara (polymetallic; M. Flöjt, Kitkan viisaat ry, pers. comm. 2007; Figs 3, 4). At that time, these projects were mostly operated by foreign companies. These cases are amongst the oldest and still active MEDs in Finland (see Eerola, 2022). The Talvivaara mine and Sokli mine project are nowadays operated by the Finnish state-owned companies Terrafame and Finnish Minerals Group, respectively.

The debate on mining intensified when environmental problems at the Talvivaara mine began in 2010 (Sairinen et al., 2017; Fig. 2). Its turning point can be considered the publication of a magazine article on Talvivaara by the journalist Juha Kauppinen (2010). He presented evidence that the intention to extract uranium was not handled in the original mining license application for Talvivaara, but it was submitted afterwards, when the mining license had already been authorized. This was considered as "immoral hiding", with the accusation that the goal was to establish a uranium mine (Kauppinen, 2010). This continued the debate surrounding uranium (Litmanen et al., 2014). At the same time, the Talvivaara mine caused an unpleasant smell and salinization of nearby lakes due to its sulphate emissions (Sairinen et al., 2017). Anti-uranium actors had already become critical towards the whole mining industry during the uranium debate, but this activism started to become more widespread, especially after the escalation of Talvivaara's environmental problems. The Stop Talvivaara movement was consequently established (Sairinen et al., 2017). Talvivaara was a crucial step in the second stage of the evolution of the Finnish mining-sceptical movement, as it started the mining debate (Fig. 2).

Sairinen et al. (2017) described how the persistent and growing environmental problems of Talvivaara increased opposition towards the mining industry until the moment when its gypsum pond leakage formed the key event of the Finnish mining debate in autumn 2012 (Figs 2, 4; Eerola, 2015). Anti-Talvivaara protests and action camps were organized (Sairinen et al., 2017). Although Greenpeace and the Rising Tide Network also participated in the Talvivaara struggle, according to Eerola (2015) and Sairinen et al. (2017), the FANC became the main national actor in the opposition, and the local struggle turned into a national one. Social media became increasingly important in the mobilization of opposition (e.g., the Stop Talvivaara movement), and Talvivaara also inspired arts (Sairinen et al., 2017).

A magazine article by the Green Party politician Riikka Karppinen (2015) illustrated well the role of Talvivaara within the mining debate:

> "*The company Talvivaara Oy not only tainted its own reputation but challenged public trust in the whole mining industry and placed the actions of the authorities in the focus of public debate. Mining-sceptical critics united those interested in environmental, economic and employment issues, and the challenge to Talvivaara's activities was not represented by any single political party or group.*"

Talvivaara's wide national media attention, the politicization of the issue, social mobilization, criticism, and the lack of trust in the authorities and experts were described by Sairinen et al. (2017). Talvivaara became a problem for the entire mining industry in Finland and a symbol of the whole debate on the issue.

For instance, Dragon Mining, the former project holder of the Juomasuo mine project, attracted opposition from a coalition of ENGOs (FANC, Friends of the Earth, Siemenpuu säätiö ry) towards the company and gold mining in Finland (Mauranen et al., 2014). At the same time, twelve local MEDs and their mining-sceptical groups were described in Finland by FANC representatives Bruun (2014) and Lipsanen (2014; Table 1). Many of these are still active today, while new ones have emerged (Table 2). In fact, more recently, Eerola (2022) identified and

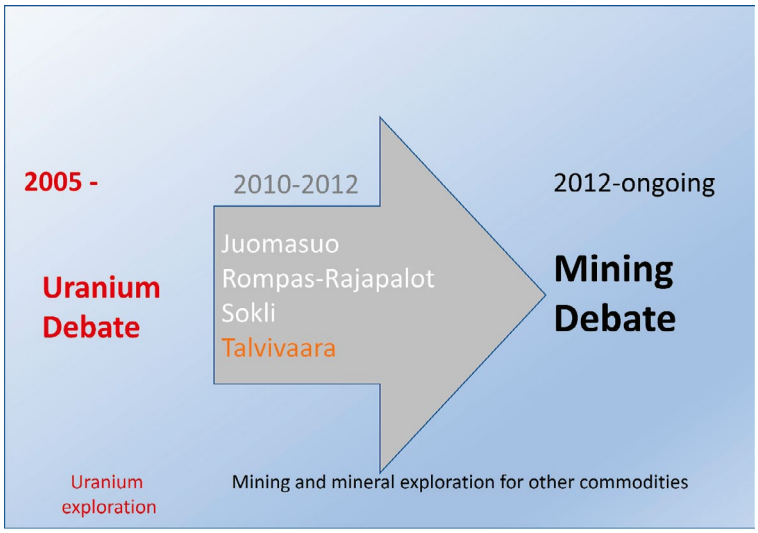


Fig. 4. Evolution from the uranium to the mining debates along with the mine and mineral exploration projects associated with uranium. Talvivaara is written in orange because its gypsum pond leakage was the key event for the mining debate.

Table 1
Mining and mineral exploration disputes in Finland and their contentious actors based on Bruun (2014), and Lipsanen (2014). FANC = Finnish Association for Nature Conservation.

Contentious project/locality	Main contentious actors
Hannukainen iron mine project/Kolari	Pro Ylläs association, second homeowners, tourism entrepreneurs
Juomasuo gold–cobalt mine project/Kuusamo	Kitkan viisaat association, Pro Kuusamo association, second homeowners, tourism entrepreneurs
Kaavi copper–cobalt mine/ Kylylahti	Local community, second homeowners
Kevo Natural Park diamond exploration/Utsjoki	Indigenous Sámi people
North Karelia	Formerly an anti-uranium movement; after that a local degrowth movement
Orivesi gold mine	FANC, Friends of the Earth
Pahtavaara gold mine/ Sodankylä	Reindeer herders, residents
Raahe gold mine	Residents, FANC
Rompas gold–cobalt exploration/Ylitornio	FANC, environmental authorities
Sakatti nickel–copper mine project/Sodankylä	FANC, Viiankiaapa movement, Friends of Sompio Nature, reindeer herders
Sokli phosphate mine project/ Savukoski	Wilderness Sokli movement, Friends of Sompio Nature, FANC, reindeer herders
Talvivaara polymetallic mine/ Sotkamo	Stop Talvivaara movement, FANC, Rising Tide Network

described twenty ongoing MEDs in Finland and listed their contentious actors and issues, including those of the Talvivaara mine. Amongst local communities, municipalities, and second homeowners, local to national organizations (SMs, ENGOs, and associations) have participated in these MEDs. The recent and ongoing MEDs have been updated in Table 2.

These local disputes have had common causes, especially the locations of the projects in sensitive contexts (Eerola, 2022):

- Association with uranium;
- Nature conservation areas;
- Reindeer herding areas;
- Sámi homeland;
- Tourism destinations;
- Lakes and rivers with second homes.

These contexts are also found in Sweden (Fjellborg et al., 2022). Talvivaara was the only case related to pollution, but its fear is present even in cases related to mineral exploration (Eerola, 2022; Leino et al., 2023), as this activity is commonly associated with a future mine and its environmental impacts (Beland Lindahl et al., 2023).

The Heinävesi case started resistance against battery minerals exploration in the Saimaa Lake area of southeastern Finland in 2018 (Eerola, 2022). For instance, the MEDs of Hannukainen and Pyhä-Luosto, Juomasuo in Kuusamo, Koli, Heinävesi, and other local struggles along the Saimaa and Päijänne lake areas in southeastern Finland have been related to tourism destinations and second homes (Eerola, 2022; Table 2, Fig. 3). Eerola (2015, 2017, 2022) referred to this type of trans-local resistance amongst tourists, tourism entrepreneurs, and second homeowners towards, for instance, wind power, mining, and mineral exploration as the 'not in my leisure area' (NIMLA) phenomenon. Second homeowners, in particular, are an important and influential stakeholder group, as they are wealthy, older, highly educated people representing diverse liberal professions (Voutilainen et al., 2021). They may form trans-local temporary elites in second home localities and influence the debate about local livelihoods. They may also ally with ENGOs, and NIMLA-type trans-local resistance can be practiced remotely, even from abroad, via social media. According to Eerola (2022), the Saimaa without Mines movement was initiated by claim reservations applied for by a small Finnish company, Suomen malmitutkimus Oy, in Puumala, Sulkava, and Juva (Fig. 3, Table 2).

Table 2
Recent and/or ongoing mining and exploration disputes in Finland and their contentious actors mostly based on Eerola (2022). FANC = Finnish Association for Nature Conservation. (*) The company has left its permit area to expire (**) The company retrieved from permit area due to opposition.

Contentious project/locality	Main contentious actors
Aitolampi mine project/Heinävesi	Pro Heinävesi association, second homeowners
Hannukainen mine project/Kolari	Pro Ylläs association, second homeowners, tourism entrepreneurs
Hietakero mineral exploration/ Enontekiö*	No Mines in NW Lapland movement (Sámi)
Hyrkkylä/Lappeenranta, Kirkkosaari/ Taipalsaari, Märkälä/Savitaipale, mineral exploration	Landowners, municipalities
Inari-Ivalo mineral exploration	Reindeer herders, Sámi Parliament, Inari Friends of Nature association (FANC)
Kaapelinkulma mine/Valkeakoski	Save the Kaapelinkulma movement, Friends of the Earth, Rising Tide Network. org
Kalkkinen/Asikkala, mineral, Exploration**	Kalkkinen Village Association, Save Päijänne movement
Kiiminki/Oulu	Pro-Kiiminki Association
Koli mineral exploration/Lieksa*	The Koli Landscape movement, FANC
Korpilahti/Jyväskylä, mineral, Exploration**	Municipality, FANC, Save Päijänne movement, villagers, second homeowners
Joensuu, Kontionlahti, Ilomantsi mineral exploration*	Second homeowners' associations
Juomasuo mine project/Kuusamo	Kitkan viisaat association, Pro Kuusamo association, second homeowners, tourism entrepreneurs
Juva, Puumala Sulkava* mineral exploration	Saimaa without Mines movement, municipalities, second homeowners
Osikonmäki mineral exploration/ Rantasalmi	Pro Osikonmäki association
Pieksämäki-Joroinen mineral exploration	Local communities, municipalities, Pro Pieksämäki association
Porvoo-Askola mineral exploration**	Municipalities, politicians, local associations
Puruvesi mineral exploration	Pro Puruvesi
Pyhä-Luosto mineral exploration/ Sodankylä-Pelkosenniemi	Tourism entrepreneurs, municipalities, No Mine in the Pyhä-Luosto Area movement
Rautalampi, mineral exploration	Municipalities, landowners, Pro Rautalampi movement
Rompas-Rajapalot mine project/ Ylitornio	FANC, environmental authorities
Sakatti mine project/Sodankylä	FANC, Viiankiaapa movement, Friends of the Sompio Nature, reindeer herders, Extinction Rebellion
Sokli mine project/Savukoski	Wilderness Sokli movement, Friends of Sompio Nature, FANC, reindeer herders
Talvivaara mine/Sotkamo	Stop Talvivaara movement, FANC, Rising Tide Network
Suhanko/Ranua	Limits to Mines in Lapland Association
Torronsuo-Särkisuo mineral exploration/Tammela	Heinijärvi Conservation Association, Tammela Water Protection Association, FANC, residents

In 2019, direct action with civil disobedience was taken at the Kaapelinkulma gold mine by the Save Kaapelinkulma movement (see Eerola, 2022; Fig. 3). In 2023, the Extinction Rebellion and the Mining-Sceptical Social Movement (Kaivoskriittinen kansanliike) organized demonstrations against mining at the Fennoscandian Exploration and Mining event in Levi, Lapland (Fig. 5). Extinction Rebellion blocked roads, while activists also attached themselves to an excursion bus and tried to invade the conference dinner venue. Six activists were arrested. Extinction Rebellion has also interrupted drilling by the Sakatti project in the Viiankiaapa Natura 2000 area in Sodankylä, Lapland (Fig. 3). This resembles the past activism of the previous EPWs in the 1970s to 1990s (Koijärvi movement, forest disputes, and radical and animal activism; see Konttinen and Peltokoski, 2004). There have also been cases of such action in Sweden (Zachrisson and Beland Lindahl, 2019; Fjellborg et al., 2022).

The Finnish MEDs were considered by Eerola (2022) as mostly being



Fig. 5. A demonstration by the Mining-Sceptical Movement at the Fennoscandian Exploration and Mining event in Levi, Lapland. Photograph by the author.

of low intensity (involving some organisation of opposition), whereas the Talvivaara and Kaapelinkulma cases were of medium intensity (street protests, visible mobilizations). In this sense, the Finnish cases are comparable to the European cases (Kivinen et al., 2020; Lesser et al., 2021). However, they differ from those found in the Global South, where mass mobilizations, violence, and mass arrests have caused conflicts to be of high intensity (e.g., Scheidel et al., 2020; Arce and Nieto-Matiz, 2024). Nevertheless, only 23% of companies were involved in MEDs in Finland (based on data by Eerola, 2022), and several projects have been favoured by local people because of their potential economic benefits, while at the same time they might also have been concerned about the potential environmental and social impacts (see Tuulentie et al., 2019; Beland Lindahl et al., 2023; Leino et al., 2023; Mononen et al., 2023). According to Sairinen et al. (2017), even Talvivaara received strong local support for a long time, despite its problems. Poll surveys have revealed wide approval of mining and mineral exploration amongst the population, despite critical attitudes towards foreign companies and uranium (Jartti et al., 2017, 2020). Support has increased due to the green energy transition and supply security issues (Kaivosteollisuus ry, 2023).

4.3. Impacts

Eerola (2015) considered the public debate surrounding uranium, the introduction of public consultation to the mineral exploration licensing process, its prolongation by appeals, and acceleration of the review of the Mining Act in 2011 as the main achievements of the anti-uranium movement. The Mining Act, renewed in 2011, more strongly considered environmental and social issues than before, which changed the licensing process. A license to exploit and process uranium and thorium can be authorized by the government, but the municipality has the right of veto. Therefore, the conditions for local influence have significantly improved in this regard.

The uranium debate also emerged as a research topic in environmental sociology. This additionally brought to debate the social license to operate (SLO) and the importance of stakeholder engagement and communication in mineral exploration in Finland (Eerola, 2008). In the aftermath of the uranium debate, the Finnish mineral strategy was established as the first in the EU (Ministry of Employment and the Economy, 2010). It proposed that the general acceptability and image of mining should be improved so that "models of cooperation and activities are built between local people, companies and the authorities to safeguard sustainable wellbeing and mining throughout the lifecycle" (Ministry of Employment and the Economy, 2010).

However, beyond this, the uranium debate appears to have had little impact on the activities of uranium exploration companies and did not affect those companies engaged in mining and mineral exploration for other commodities (Eerola, 2015). In fact, according to Jartti and Litmanen (2011) and Litmanen et al. (2014), the uranium struggle was not as widespread as its public debate implied. Nevertheless, Jartti et al. (2017, 2020) observed that criticism towards uranium as a commodity has subsequently increased, and the association of exploration with uranium belongs to the sensitive contexts in which MEDs have emerged in Finland (Eerola, 2022).

Considering the environmental problems caused by Talvivaara, the importance of mining as a growing industry sector in the EU and Finland, and opposition towards it, the Finnish government launched a sustainable mining programme (Ministry of Employment and the Economy, 2013). Furthermore, the Finnish Independence Fund (Sitra) founded the Finnish Network for Sustainable Mining (FNSM) in 2014. This is a forum in which the mining industry, ENGOs, and other stakeholders discuss and collaborate to develop toolkits and protocols for mining and mineral exploration companies operating in Finland (Eerola, 2017; Lesser, 2021). The mining industry also started to pay more attention to its communication and stakeholder engagement. With the help of public funding programmes, national social science research on CSR and the SLO of the mining industry in Finland expanded through several projects (see Eerola, 2017).

In Finland, attention is often given to the responsibility of Finnish companies operating in the Global South. As noted by Finnwatch (2016) and FANC's representative, Anna Pulkka (2019), the debate has now also concerned the global mining industry operating in Finland. Free trade agreements, the Transatlantic Trade and Investment Partnership (TTIP) and Comprehensive Economic and Trade Agreement (CETA), were also brought into the discussion within the mining debate (Eerola, 2015; Pulkka, 2019; Fig. 2). According to the critics of these free trade agreements, Pulkka (2019) noted in her magazine article that their investment protection entitles North American companies to receive

compensation if the environmental legislation becomes unfavourable for them. This has led the mining debate towards the topics of the GJM. Beyond this, there has been opposition to the dismantling of environmental regulation by Finnish governments, and the concept of degrowth also emerged in the mining debate (see Eerola, 2015). Degrowth demands a decrease in consumption and economic growth (e.g., Kallis, 2018).

In his interview for a magazine article by journalist Sampsa Oinaala (2014), Prof. Pertti Rannikko suggested that the mostly local criticism towards mining formed the basis for a nationwide movement. In fact, some years later, the mining debate was considered by Pettersson et al. (2017) as the most intense ongoing environmental and natural resource struggle in Finland. According to Zachrisson and Beland Lindahl (2019), enough simultaneously contested licensing processes are needed for a national mining-sceptical movement to form. It also requires interaction between several local and national entities that join forces. Social media contributed to the emergence and nationwide networking of multiple local and national mining-sceptical groups related to MEDs (see Eerola, 2022, Table 2) and the establishment of MiningWatch Finland. They joined forces to demand a new review of the Mining Act, including major property rights protection for landowners, greater influence in decision making by municipalities, the introduction of mining taxes/royalties and no-go zones, and an increase in guarantee sums for safe mine closure. They also organized a demonstration in support of this re-review in Helsinki on 11 November 2021. The new Mining Act came into force on 1 June 2023. The local Pro Heinävesi and Saimaa without Mines movements had a crucial role through popular petitions in demanding such legislative renovation.

The Evangelical Lutheran Church of Finland and local monasteries became involved in the case of Heinävesi (Leino and Miettinen, 2020), which started resistance towards mineral exploration in the Saimaa Lake area (Eerola 2022). The sudden increase in mineral exploration disputes caused Mononen (2020) to suggest this as a "turning point" in the mining debate in Finland. Before this, the mining debate had mainly concentrated on mines and mine projects. According to Eerola (2022), the focus of disputes on mineral exploration made Finland deviate from the global and European trends, in which most struggles have concentrated on mine planning, construction, production, and expansion (Franks et al., 2014; Kivinen et al., 2020). Therefore, the battery minerals boom caused by the green energy transition is suggested to have formed the third step of the ongoing mining debate in Finland after the uranium debate and Talvivaara (Fig. 2). However, many of the old MEDs persist, while new ones have emerged and others have faded away, i.e., the number of MEDs is constantly changing (see Eerola 2022 and Tables 1, 2). This appears to reflect the dynamics of mineral exploration, in which new permits are applied for while others are left to expire, and the related opposition also disappears or becomes latent. However, Eerola (2022) also reported cases in which companies have withdrawn their permit applications because of opposition (Table 2).

As the green energy transition has expanded mineral exploration to lake and river areas with second homes, the NIMLA phenomenon has led to the emergence of new mining-sceptical associations that differ from traditional environmental activism. These are run by diverse professionals, professors, and entrepreneurs with a pool of counter-experts, as exemplified by the Saimaa without Mines and Limits to Mines in Lapland associations. They organize the annual Mining-Sceptical Days (Fig. 6), at which eighteen municipalities from the Saimaa Lake region made a joint declaration against mining in their territories in 2023 (Kokkonen, 2023).

MEDs related to the green energy transition have also occurred elsewhere Europe. In Serbia, the Jadar Valley lithium project by Rio Tinto was blocked by the government because of resistance (Ivanovic et al., 2023), and Portugal has several contentious lithium projects (Silva and Sareen, 2023).

The Finnish mining-sceptical movement is well networked with its European peer. Recently, they joined forces in a petition by Ecologistas en Acción (2023) to revoke the Critical Raw Materials Act (CRMA), launched by the European Commission (2023). The objective of the CRMA is to reduce the EU's import dependency and increase its self-sufficiency and supply security in mineral raw materials, of which many are critical and important for the green energy and digital transition. This means the expansion of mineral exploration and mining in the EU, with its accelerated permission track for strategic mining projects. Together with engaged scholars, the Finnish and European mining-sceptical groups have also complained to the European Commission about Horizon-funded mining-related EU research projects (MiningWatch Portugal 2020; Ecologistas en Acción 2023). amongst other issues, they oppose the concept of the social license to operate, i.e.,



Fig. 6. Activist panel in the II Mining-Sceptical Days in Savonlinna, 22-23 September 2023. Photograph by the author.

public acceptance of an activity, and its R&D by the projects.

5. Analysis and discussion

Although many of the Finnish MEDs have also been associated with livelihoods (e.g., tourism and reindeer herding), the Sámi homeland, and second homes (Eerola, 2022), these sensitive social-economic contexts are ultimately attached to the environment because of their nature-based activities, natural resources, the environmental impacts associated with resource extraction, and the participation of ENGOs. Therefore, the uranium and mining debates and the associated mining-sceptical movement appear to have been important in the evolution and continuum of the Finnish environmental movement and EPWs. Eerola (2015) suggested that the post-GJM latency and swell stage was interrupted by the uranium debate in the Finnish countryside (Fig. 2). However, the uranium debate did not emerge from the interviews with environmental activists conducted by Stranius (2006), because it was only starting at that time. The uranium debate can be seen as the return of the environment and localness to Finnish rural areas from the global trade policy arenas of the GJM (Eerola, 2015). It marked the reactivation of both Finnish environmental activism and the mining industry after years of latency and decades of recession (Fig. 2). In fact, the uranium debate was the starting point for the ongoing mining debate and mining-sceptical movement in Finland. As MEDs related to projects associated with uranium are still active today (Figs 3, 4, Table 2), this implies that the uranium debate has not yet ended but has merged with the mining debate (Fig. 4).

The uranium and mining debates have covered almost twenty years of mining-related struggles in Finland. They have lasted longer than any of the EPWs in Finland (Fig. 2). This can be explained by the fact that the mining debate is a continuation of the uranium debate, and its reasoning created a foundation for the mining debate. Uranium acted as a bridge (Fig. 4), and it appears that the demands related to these debates have not yet been resolved. Therefore, it is expected that the mining debate will persist even following the recent re-review of the Mining Act and especially because of the CRMA within the context of the green energy transition. It may intensify the resistance and even stimulate its radicalization.

Based on characteristics of the uranium and mining debates, both share common patterns with the previous Finnish EPWs (Sections 2 and 4), although their topics have been different (Fig. 1). These similarities are listed below and in Table 3. Such as in the previous EPWs, by challenging the mining industry, experts, and authorities, both debates politicized national environmental and natural resources management by presenting strong criticism and distrust in them. Environmental justice was raised together with a request for major participation in decision making and changes to the Mining Act (Kröger, 2016; Pulkka, 2019; Leino et al., 2023). By presenting their counter knowledge and own experts, the SMs and ENGOs raised the question of the relationship between experts and common citizens in the debate. As uranium has been associated with both debates, anti-nuclear attitudes have additionally been observed in them (Litmanen et al., 2014). Direct action has also been taken by the mining-sceptical movement, similarly to the past EPWs of the 1970s to 1990s. Therefore, as the EPWs each carry a legacy from the previous waves (cf. Tarrow, 1994), this evidences a layer-like and transitional nature of the waves (Fig. 1), as suggested by Stranius (2006, 2010). However, resource nationalism and theological dimensions to the natural resource debate in Finland have also emerged from the debates for the first time, as well as resistance from indigenous Sámi (Lassila, 2018; Eerola, 2022). Nevertheless, the involvement of Finnish companies in MEDs may reduce the importance of resource nationalism, because a company's nationality appears not to influence contentious attitudes. Regarding foreign companies, there is a popular belief that they exploit Finnish natural resources for their exclusive benefit (e.g., Kröger, 2016; Pulkka, 2019; Leino et al., 2023). However, the production of raw materials and their importance for society are ignored in the discussion. Despite being a mining country, Finland imports most of its mineral raw materials. Therefore, public interest, i.e., raw materials supply security, usually overrides private land ownership and community rights in mining-related issues. Together with the impacts of mining, this appears to be the fundamental problem for the mining-sceptical movement.

Table 3
Comparative characteristics of the Finnish environmental protest waves and the uranium and mining disputes. FANC = Finnish Association of Nature Conservation; NIMLA = Not in my leisure area; SLO = social license to operate; CSR = corporate social responsibility.

Characteristics		
Protest waves	Uranium debate	Mining debate
Key event	Extensive claim applications in a densely inhabited area	Talvivaara gypsum pond leakage
Contested activity	Uranium exploration	Mining and mineral exploration
New issues and innovations	Resource nationalism, mining governance, archbishop and eco-theological priests involved, artistic performances	Resource nationalism, free trade agreements, social media, inspiration for arts, Sámi resistance, involvement of monasteries and the Finnish Church, mining governance
Collective action	Reactivation of local networked environmental activism and demonstrations in the countryside, FANC	Wide mobilization, demonstrations, petitions, FANC, MiningWatch Finland, Sámi resistance, NIMLA, networked SMs, direct action
Opportunity window	Resource rush, uranium, foreign companies, unpreparedness of the authorities and industry, latent activism, the outdated Mining Act	Talvivaara gypsum pond leakage, resource nationalism, weak supervision, and slow reaction of the authorities
Media attention	Mainly local	Local and national
Anti-nuclear attitudes	✓	✓
Distrust in authorities	✓	✓
Challenge of authorities and experts	✓	✓
Request for major participation in decision making	✓	✓
Impacts	Government action: mineral strategy, introduction of consultation to the mineral exploration permit process, acceleration of the review of the Mining Act; the SLO and stakeholder engagement in the debate, academic activation	Government action: foundation of the Finnish Network for Sustainable Mining, Programme for Sustainable Mining, re-review of the Mining Act; funding for social mining research, wide academic activity, CSR and SLO debate, inspiration for arts

The mining-sceptic movement has prompted changes in legislation, government actions, and academic and artistic activities (Table 3). The main issues brought into the debate surrounding natural resource governance have been mining legislation and policy, mining taxes, royalties, international free trade agreements, the SLO, and CSR.

The criticism towards mining can be considered as a "new issue" that was felt lacking by Stranius (2010), and there is now space for nationwide middle-class movements related to them, as predicted by Prof. Rannikko (Oinaala, 2014). This is exemplified by the NIMLA phenomenon and the number of local networked mining-sceptical groups with joint activities. However, the FANC has maintained its quite central role within the mining-sceptical movement locally, regionally, and nationally, because it can regulate and absorb a considerable part of the

Finnish environmental movement due to widespread articulation by its local and provincial member organizations (Konttinen, 2012).

The climate change debate, MEDs, and forest and peat disputes (Fig. 2) are part of a wider current national and global debate in which consumption, economic growth, and the need for natural resources are being challenged by the requirements for degrowth, sharing economy and circular economy concepts driven by climate change as part of the global EJM (e.g., De Moor et al., 2020; Scheidel et al., 2020; Knuth et al., 2022). The climate change debate has generated the Climate Move, Fridays for Future and Extinction Rebellion climate movements (De Moor et al., 2020), which are also active in Finland (Vaarakallio, 2021b; Fig. 2). As was noted above, the Finnish Extinction Rebellion expanded its protests against mining in Finland. However, the green energy transition appears to be a controversial issue for the environmental movement. Although it has demanded this transition for decades, it has started to oppose it because of its requirement for mineral raw materials, implying more mines with their associated impacts (e.g., Knuth et al., 2022; Leino et al. 2023; Silva and Sareen 2023). Instead of this, the environmental movement requests degrowth and the hearing of local communities in a just transition. At the same time, there is an expanding environmental-sceptical (and anti-human rights) counter-current represented by the radical right and far right, which deny climate change and oppose the green energy transition (e.g., Jylhä et al., 2020). In any case, Granvik (2021), IEA (2021), and Michaux (2021) have suggested that the known mineral resources maybe insufficient and that new production cannot be ramped up quickly enough to meet the demands of the green energy transition. Despite this, the mining industry, governments, and the EU are rushing into the transition with zeal, while the environmental movement is upset and wants to obstruct it in its proposed form. Regardless of the urgency, this shows that the issue needs to be discussed more deeply by society and that solutions need to be sought together. In this sense, attacking R&D on responsible mining might not be the best way to protest against extractivism and to contribute to the debate. Cooperation is needed.

The climate change debate generated uranium exploration, the green energy transition, and the associated MEDs in Finland (Eerola, 2022); these are the intersection points between the parallel currents of the climate change, uranium, and mining debates (Fig. 2). Therefore, as the climate change debate is coeval and interconnected with the mining-sceptical movement, they are suggested to form parts of the same 6th EPW, combining Vaarakallio's (2021a) view.

6. Conclusions

Here, the evolution of the Finnish mining-sceptical movement is reviewed within the context of environmental protest waves (EPWs). The uranium debate evolved after the post-GJM latency and was followed by the mining debate, the country's most intense ongoing environmental and natural resource struggle (Pettersson et al., 2017). It is suggested that the Finnish mining-sceptical movement developed in three steps: via the uranium debate, Talvivaara, and the battery minerals boom, with the last two forming part of the mining debate. They represent the evolution of the mining-sceptical attitudes and movement in Finland, which has lasted almost two decades. The uranium and mining debates meant the reactivation of both environmental activism and the mining industry in Finland following the global resource rush and climate change debate. They formed the very first wide and persistent mining-sceptical mobilization directed towards the global mining industry operating in Finland, with the generation of national debate and impacts on natural resource governance. As observed above, they also share common characteristics with the previous Finnish EPWs, and with Tarrow's (1994) waves. For this reason, the evolution of the mining-sceptical movement from the uranium to the mining debate is suggested to form a unique evolving cycle as the sixth Finnish EPW, together with the coeval climate change debate and forest and peat disputes. Therefore, this study supports the view presented by Koopmans (2004) that EPWs do not evolve in isolation, but they are strongly interlinked with other events and are influenced by them.

The debate produced by mining-related issues reflects the development of Finnish society towards sustainable mineral resource and environmental governance. It can be also seen as part of the adaptation process of the global mining industry in Finland, and vice versa. During both the uranium and mining debates, local SMs have emerged in several places. However, the traditional and well-established FANC has occupied a central role within both debates. Nevertheless, the new local associations are apparently assuming a major protagonist role with regional, national, and European influence because of legislative initiatives, wide networking, and joint appeals.

So far, the Finnish MEDs have mostly been at the level of public debate. However, the CRMA within the context of the green energy transition appears to have inflamed opposition. Therefore, the role of the state in securing the well-being of its population, affording participation in the natural resource debate, accommodating its demands, and dealing with the MEDs in a peaceful manner may shape the further evolution of the mining debate. This can be supported by the responsible conduct of the mining industry and the development of its sustainability strategies. In this sense, the uranium and mining debates and associated mining-sceptical movement should not be considered as a negative issue from the mining industry perspective; in fact, they are lessons to be learned to improve its environmental and social governance performance. At the same time, the environmental movement can learn about mining and mineral exploration and develop its strategies towards advocacy in mineral resource issues. In this regard, greater transparency, dialogue, and collaboration are needed between the mining industry, the state, ENGOs, and SMs, especially because of the green energy transition.

CRediT authorship contribution statement

Toni Eerola: Writing – review & editing, Writing – original draft, Visualization, Validation, Methodology, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

None.

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ARTICLE II

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Corporate conduct, commodity and place: Ongoing mining and mineral exploration disputes in Finland and their implications for the social license to operate

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ABSTRACT

The Finnish mining and mineral exploration disputes (MMEDs) of the 2000s started with the uranium dispute (2006–2008), when the global mining industry rushed into Finland. The Finnish mining skeptical movement originated by focusing on projects associated with uranium. One of these projects, the Talvivaara polymetallic mine, became the key event of the following mining dispute because of its gypsum pond leakage in 2012. Many disputes have persisted for years, while others have ended, and new ones have appeared.

Twenty ongoing disputes were identified in Finland. Fourteen of the cases are related to mineral exploration, four to mine projects, and two to mines. The long-term disputes are mostly focused on mines and mine projects in northern Finland, whereas the most recent disputes are mostly related to mineral exploration in southeastern Finland. The main reasons for disputes are the conflicting use of land (indigenous Sámi homeland, lake regions with holiday homes, nature conservation, reindeer herding, and tourism), an association with uranium, poor corporate conduct (lack of communication and stakeholder engagement) and/or reputation.

The identification, mapping and monitoring of MMEDs in Finland will support future studies regarding the analysis of their causes, dynamics, evolution, actors, and possible solutions. Their investigation can help to understand and avoid disputes, conciliate diverse interests, and solve disagreements.

1. Introduction

The state-owned national mining industry was discontinued in Finland at the beginning of the 1990s. Foreign investments were allowed in the country when Finland joined the European Union (EU) in 1995. Some foreign companies explored for diamonds and gold during the 1990s. There were no controversies, but the potential for them was already visible in the tension between the Mining and the Nature Conservation acts, uncertainties among local people, and in the need to share information about mining and mineral exploration (Eerola, 2017).

Finland was targeted during the global mining boom in the 2000s because of its bedrock, mining legislation, good geo-data, infrastructure, economic and political stability, and international promotion (Eerola, 2008; Kröger, 2016). Finland has been among the preferred mining investment destinations (e.g., Stedman et al., 2020), and its actors are mostly private and of foreign origin. This sudden activation of a private and alien mining industry after decades of its virtual absence shocked many, especially regarding uranium exploration (Eerola, 2008). The opposition towards mining has been related to a fear of the environmental and social impacts and mine accidents, such as that of the Talvivaara nickel mine's gypsum pond leakage in 2012 (Sairinen et al., 2017).

Environmental activism, indigenous people, and local communities have a central role in mining and mineral exploration disputes (MMEDs) and in the social license to operate (SLO, Conde, 2017; Joyce and Thomson, 2000; Moffat and Zhang, 2014; Parsons et al., 2014; Prno, 2013). The SLO means acceptance or approval of mining and mineral exploration by a local community (Thomson and Boutilier, 2011) or by society more widely (Joyce and Thomson, 2000). For this reason, it is important to study and understand MMEDs, their dynamics, and causes in order to avoid or address disputes that can be costly for companies, communities, and the state (Zachrisson and Beland Lindahl, 2019). However, even though there has been active research on mining in Finland in the social sciences, few studies concern Finnish MMEDs. Existing studies on the uranium dispute (2006–2008) are mainly limited to master's theses, with a few exceptions (see references in Eerola, 2015, 2017). Research on subsequent and ongoing opposition has focused on the Hannukainen, Juomasuo, and Sakatti mineral exploration and mine

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projects (Heikkinen et al., 2013; Koivurova et al., 2015; Lassila, 2020; Lesser et al., 2017; Lyytimäki and Peltonen, 2016), the Talvivaara mine (Sairinen et al., 2017), diamond exploration in the Kevo Natural Park in Utsjoki (Lassila, 2018) and graphite exploration in Heinävesi (Leino and Miettinen, 2020, Fig. 1). However, a comprehensive picture of the ongoing MMEDs in Finland is lacking. As Finland is an important mining country within the EU, with much further potential to be developed, it is pertinent to focus on the general picture of Finnish MMEDs. The SLO is also important because of the transition to green energy and to reduce the EU's dependency on the import of raw materials (e.g., Guzik et al., 2021).

The spatiality of such disagreements is an important tool in investigating disputes and social movements (Nicholls et al., 2013); spatiality helps to understand their causes and dynamics. This article presents the results of a mapping of Finnish MMEDs accomplished within the Horizon 2020 funded Mining and Metallurgical Regions of Europe (MIREU) Project (Eerola, 2021). The purpose of this article is to identify, summarize, categorize, and update cases of MMEDs, and to reflect their geographical distribution, causes, dynamics, intensity, impacts, and influence on the SLO in Finland.

The article is structured in the following manner: After the introduction, the theoretical bases and materials and methods are presented. A description of the ongoing cases of MMEDs, which are discussed in a subsequent section, follows. The article ends with conclusions.

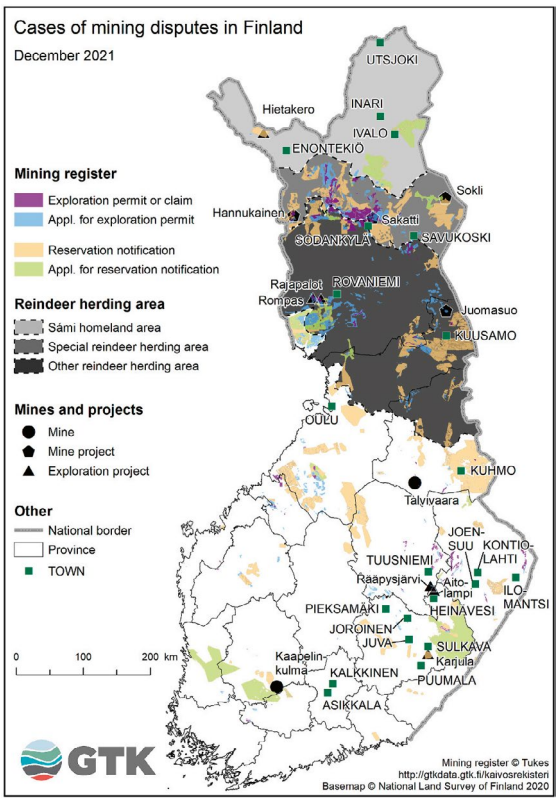


Fig. 1. Mines, mine, and mineral exploration projects mentioned in the text; mineral exploration concessions and applications; and reindeer herding and Sámi homeland areas in Finland. Geological Survey of Finland (GTK).

2. Mining conflicts, disputes, and the SLO

The existence of an opposition towards mining and mineral exploration is generally manifested through appeals, petitions, referendums, protests, and conflicts (e.g., Conde, 2017). Urkidi (2010) defines MMEDs as a situation in which different social actors have opposing evaluations on a matter related to the environment. Therefore, while it may be difficult to say when the SLO is gained, it is easier to say when the SLO is not gained, and this may be manifested by, e.g., a conflict (Thomson and Boutilier, 2011). Conflicts may be costly for companies due to delays or even a halt in projects (Franks et al., 2014). As the SLO is granted by a host community, and its attainment is important for companies to avoid conflicts, host communities have become more influential in decision making regarding mining industry projects (Moffat and Zhang, 2014; Parsons et al., 2014; Prno, 2013). As pointed out by Tuulentie et al. (2019), this development gives a further motivation for companies to maintain good relationships with local stakeholders to achieve the SLO. In this sense, according to Thomson and Boutilier (2011), the SLO has three elements: 1) social legitimacy related to openness, honesty, and respecting local social norms; 2) credibility; and 3) trust achieved by shared experiences and collaboration. It can be challenging to obtain the SLO, but if some of these elements are not met, the SLO can be lost abruptly any moment and a conflict may emerge. Information sharing, and dialogue are essential prerequisites for a company's actions in communities, and this can be achieved by communication and stakeholder engagement (Eerola, 2017; Tuulentie et al., 2019).

Within Thomson and Boutilier's (2011) SLO model, conflicts occur below the legitimacy boundary which separates acceptance and withheld/withdrawn fields (Fig. 2). Within the scalar European SLO framework proposed by Lesser et al. (2021), these same indicators fall below the drivers of (the loss of) SLO, with different levels of community and societal dimensions (Fig. 3).

Mining conflicts are hereby understood as those comprising all life cycle stages of mining: mineral exploration, mine project, mine, and mine closure. Mining conflicts are usually caused by environmental and social impacts, a lack of participation of local communities in decision-making, a lack of trust in companies and authorities, and insufficient compensation for the grievances suffered (Conde, 2017). However, not all communities resist mining (Conde and Le Billon, 2017). Those more likely to resist perceive a threat to their health or livelihood (Conde, 2017).

Resistance depends on several factors: the stage of the mining life cycle, the moment of perception of risk, the local context, commodities to be explored or mined (coal, uranium, sulphides), corporate conduct, access to information, and the ability to organize and to create inter- and extra-local alliances of different scales (Conde, 2017; Eerola, 2017).

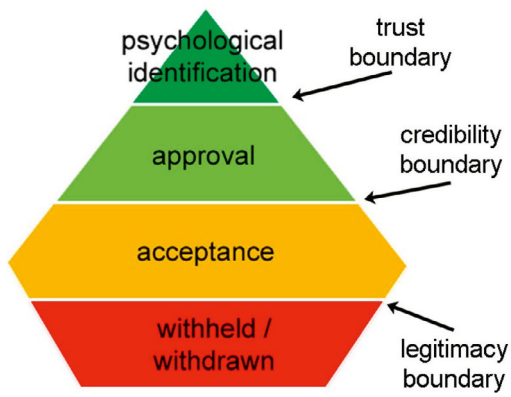


Fig. 2. The "pyramid" model of the SLO (Thomson and Boutilier, 2011).

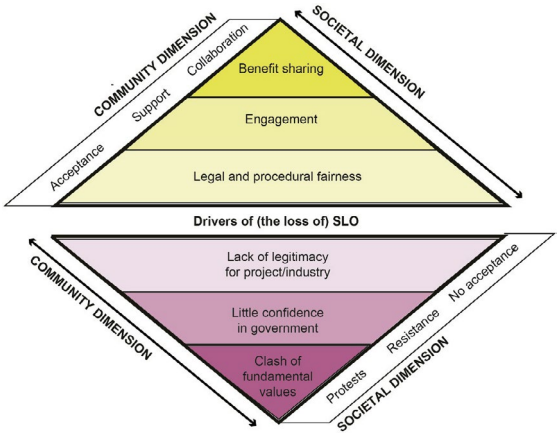


Fig. 3. Scalar European SLO model (Lesser et al., 2021).

According to Lodhia and Hess (2014), the involvement of environmental non-governmental organizations (ENGOs) and the government as regulators has been suggested as essential for making mining companies responsible and accountable for their social and environmental impacts. However, according to Ballard and Banks (2003), resistance happens often in remote resource frontiers with a lack of effective presence of the state, without formal channels for demands, or without social or political representation. The only way to be heard may be through mobilization and protest (Conde, 2017).

Mining conflicts were reviewed globally by Conde (2017) and mapped by the Environmental Justice Organizations, Liabilities and Trade (EJOLT) Project for its Environmental Justice Atlas (EJAtlas, Temper et al., 2015) and in Latin America by Haslam and Tanimoune (2015). Badera (2014) reviewed literature on contentious cases of mining in Europe, and Kivinen et al. (2020) investigated mining conflicts in the EU using the EJAtlas. Bruun (2014) listed Finnish mining skeptical movements, and their struggles were described by Lipsanen (2014). Eerola (2015) undertook a preliminary mapping of MMEDs in Finland, and these were recently identified, mapped, updated, and described by Eerola (2021).

Zhang et al. (2015) concluded that the SLO at a national level is influenced by a multitude of factors: governance capacity, procedural and distributional fairness, and trust in authorities and the mining industry. According to Jartti et al. (2020), beyond the abovementioned issues, a commodity (uranium), the balance of benefits over impacts, and the companies' foreign origin (resource nationalism) are important factors for the SLO in Finland. In addition, Jartti et al. (2020) have recognized that people's perceptions and beliefs may also be affected by other factors, such as place identity and dependence on impacted natural resources for their livelihoods, which, according to them, deserve further investigation. In fact, as has been observed by Beland Lindahl et al. (2022), Eerola (2008, 2015, 2017, 2021), Lassila (2018, 2020), Lipsanen (2014) and Lyytimäki and Peltonen (2016), the conflicting use of land (Sámi homeland, nature conservation, reindeer herding, and tourism), commodity (uranium) and corporate conduct also matter in Finland.

Any disagreement or controversy regarding mining and mineral exploration is often described as a 'conflict' in the literature without any further definition and independent of its intensity. However, the use of 'conflict' may overemphasize any disagreement, even when it occurs in the form of a public debate. In such cases, 'conflict' may sound too dramatic expression. Therefore, calling all public debates or local mining struggles a 'conflict' is not always justified (Eerola, 2015). As Putnam and Wondolleck (2003) define a 'dispute' as an episode concerning certain issues and events, Eerola (2015), ICMM (2015), and Lesser et al. (2021), call European and Finnish mining and mineral exploration struggles as 'environmental disputes' rather than 'conflicts'. This is because, according to Badera (2014) and Eerola (2015), environmental conflicts in the EU and Finland are modest when compared to those occurring in, e.g., the Global South, which regularly involve large protests and violence. For Eerola (2015), Kivinen et al. (2020), and Lesser et al. (2021), the 'opposition' in Finland and in Europe in general is rarely physical and violent, but rather occurs in the form of discourse and debate, public referendums, petitions, and, sometimes, demonstrations. Therefore, following ICMM (2015), a dispute is defined as disagreement between companies and local communities because of differences in interests and priorities: "*Disputes arise when two or more parties believe their interests are incompatible. Non-violent disputes can be essential to social progress and development and are often a feature of the interactions between mining companies, host communities and host governments. However, in some instances disputes or related protests can escalate towards conflict that weaken or damage relationships between companies and communities. When conflict does occur, demonstrations or protest may result in physical violence.*" (ICMM, 2015).

Within the categorization of conflict intensity in the EJAtlas, most EU MMEDs are considered as *latent* (no visible organizing), *low* (some local organizing), and *medium* (street protests, visible mobilizations) (Kivinen et al., 2020). The category *high* involves widespread mass mobilization, violence, mass arrests, etc., hereby considered as conflicts, which are rare in the EU (Kivinen et al., 2020). Most of the disputes in the EU occur at the mine planning stage (Kivinen et al., 2020), which follows the global trend (Franks et al., 2014).

3. Materials and methods

Although many cases of MMEDs are already quite well known in Finland and have been monitored over a long period by the author, they were checked by using the methodology described below. The author obtained a list of companies with valid permits and their applications from the Finnish Mining Authority on March 31, 2020. The total number of entities was 104. From those entities, 73 companies mining or exploring for metals, diamonds, phosphorites, and graphite were selected and listed within the Appendix together with their nationality, commodities, and project locations. The commodities have been the focus of the SLO debate in Finland (Eerola, 2015, 2017, 2021), due to the major environmental and social impacts of their mining and because the projects were started mainly by foreign companies since the 2000s commodity boom. The companies mining and exploring for other commodities are mainly national and have been well established in their localities for decades or even for centuries.

As the academic literature concerning ongoing MMEDs in Finland is scarce, identification of the cases was based on protest event analysis (PEA); namely, the use of online media reports to identify and code contentious events (e.g., Koopmans and Rucht, 1999). According to Koopmans and Rucht (1999), PEA provides a more solid empirical ground for observing protest activities in large geographical areas over considerable spans of time. It also allows quantification of many characteristics of protests, such as frequency, timing, duration, location, claims, size, carriers, forms, and targets, as well as the immediate consequences and reactions (police interventions, damage, counterprotests, etc.) (Koopmans and Rucht, 1999). The methodology has been applied to detect forest conflicts in Canada (Bengston and Fan, 1999) and mining conflicts in Latin America (Haslam and Tanimoune, 2015).

Online media reports are good indicators of companies' activities, sustainability, impact on the local stakeholders' attitudes, and disputes (Bengston and Fan, 1999; Byun and Jong-Min, 2018; Cahana et al., 2015; Haslam and Tanimoune, 2015). Contentious actors need publicity for their activities and demands to be effective, and these online sources are accessible and useful (Earl et al., 2004). In Finland, a lack of negative news is often considered to be a sign of a good or neutral relationship

with stakeholders, whereas an environmental struggle always attracts wide media coverage (Harju, 2019). One of the EJAtlas' criteria for conflict identification is the reporting of a disagreement by one or more media stories, while other criteria are economic activity or legislation that may cause environmental or social harm and claims by an environmental justice organization that such harm has occurred or may occur (Temper et al., 2015).

Cases of MMEDs were searched for in online media reports on the companies and their projects using the company and/or project names as key words in the Retriever media analysis software. This software was used by the Geological Survey of Finland (GTK) to monitor media coverage of geology and mining issues, and its archive begins in 2004. Contemporary media coverage was also regularly monitored by the author to detect any new cases.

Articles concerning MMEDs were found in national, regional, and local online newspapers, magazines, scientific journals, and ENGOs' reviews and websites. Articles covering protest issues were identified by their titles and content and considered as indicators of disputes. These articles were read to grasp the main points of the cases, and their selected references were collected to represent them in Table 1. Other indicators of disputes were mentions of organized opposition - its actors, social media groups, and petitions - obtained both from literature and media reports. Based on such indicators, a framework was built including the name of the company, its contentious project, issues/concerns, indicators, and actors (Table 1). The contentious projects and mentioned localities are shown in Fig. 1. However, as Earl et al. (2004) have pointed out, it is recognized that any given picture based mainly on news reports might be incomplete. The media may also overemphasize controversies and opposition (Eerola, 2017) or be quite uncritical towards mining and mineral exploration (Lyytimäki et al., 2021).

To provide examples of the volume of media records of some of the long-term and recent contentious cases, Table 2 presents the total amount of media reports and total number of contentious articles in Finnish. It also shows the periods over which the companies and their projects were covered, and the current stage of the projects within the mining life cycle. The contentious cases and their issues/concerns are organized and quantified in Table 3 together with the companies involved.

Table 1
Companies facing ongoing opposition in Finland with their nationalities, projects, localities, commodities, issues, indicators, and the main organized contentious actors in 2020–2021. See projects and localities in Fig. 1. FANC = Finnish Association for Nature Conservation.

Company and its own or parent company nationality	Project/locality and commodities	Issue(s)/concerns	Indicator(s)	Main contentious actor(s)
Akkerman Finland Oy Dutch	Hietakero/Enontekiö, mineral exploration: nickel, copper, cobalt	Sámi homeland, reindeer herding, nature conservation	Melamies (2020), organized movement, social media, petition	No mines in NW Lapland movement
Arctic Minerals AB Swedish	Inari-Ivalo; Martimo/Oulu mineral exploration: copper, zinc, silver, cobalt	Sámi homeland, reindeer herding, groundwater, nature conservation	Seipiharju (2021); Ukkonen and Loukkola (2021), organized movement, social media group	Reindeer herders, Sámi Parliament, Pro-Kiiminki Association
Boliden FinnEx Oy Swedish	Pieksämäki- Joroinen, mineral exploration: copper	Groundwater	Kosonen (2019)	Local community
BR Gold Mining Oy Canadian	Osikonmäki/Rantasalmi, mineral exploration: gold	Saimaa Lake area, holiday homes, tourism	Kilpeläinen (2019), organized movement	Pro Osikonmäki association
Dragon Mining Oy Australian	Kaapelinkulma/Valkeakoski, mine: gold	Nature conservation, reputation, illegal dump within the Orivesi mine	Hämeen Sanomat (2019), organized movement, social media group	Save the Kaapelinkulma movement, Friends of the Earth, Rising Tide Network.org
FinnAust Mining Oy Australian	Hyrkkylä/Lappeenranta, Kirkkosaari/Taipalsaari, Märkälä/Savitaipale, mineral exploration: nickel, copper	Saimaa Lake area, holiday homes, tourism	Ylönen et al. (2020)	Municipalities, landowners
Oy Fennoscandian Resources Ab/Beowulf Ltd., British	Aitolampi/Heinävesi, Rääpysjärvi/Tuusniemi, mineral exploration: graphite	Saimaa Lake area, holiday homes, tourism, reputation	Leino and Miettinen (2020), organized movements, social media group, petition	Pro Heinävesi, Pro Tuusniemi associations
Hannukainen Mining Oy/Tapojärvi Oy Finnish	Hannukainen/Kolari, mine project: iron, copper, gold, cobalt	Tourism, reindeer herding, nature conservation	Lesser et al. (2017), organized movement, social media group, petition	Pro Ylläs association, holiday homeowners
Latitude 66 Cobalt Oy Australian	Juomasuo/Kuusamo, mine project: gold, cobalt (uranium)	Tourism, nature conservation, uranium	Hämeenniemi (2018), organized movement, social media groups	Kitkan viisaat association, Pro Kuusamo association
Magnus Minerals Oy Finnish	Joensuu, Kontionlahti, Ilomantsi, 18 commodities	Claim reservation size, holiday homes, lake area	Sutinen (2021), organized movement	Holiday home owners' association
Mawson Resources Oy Canadian	Rompas-Rajapalot/Ylitornio, mineral exploration: gold, cobalt (uranium) Korpilahti/Jyväskylä, mineral exploration: gold, zinc	Natura 2000 area, uranium Nature conservation, lake area with holiday homes	Väinönheimo et al. (2020), appeals, court rulings Pöytäkangas (2021), organized movement, social media group	FANC, environmental authorities, Municipality, FANC, Save Päijänne movement, villagers, holiday homeowners
Pallagen British	Kalkkinen/Asikkala, mineral exploration: nickel, copper, gold, cobalt, palladium	Päijänne lake area, holiday homes, water contamination	Saavalainen (2021), organized movement, social media group	Kalkkinen Village Association, Save Päijänne movement
Rio Tinto British	Rautalampi, mineral exploration: gold, nickel, zinc, iron, copper, palladium	Saimaa Lake area, tourism, nature conservation	Ronkainen (2020), petition	Municipalities, landowners
Sakatti Mining Oy/Anglo American plc British	Sakatti/Sodankylä, mine project: nickel, copper	Natura 2000 area, reindeer herding	Lassila (2020), organized movement, social media group	FANC, Viiankiaapa movement
Suomen malmitutkimus Oy, Finnish	Juva-Puumala-Sulkava, mineral exploration: nickel, graphite	Saimaa Lake area, holiday homes	Porvari (2020), organized movement, social media	Saimaa without mines movement, municipalities
TalvivaaraOy/Terrafame Oy Finnish	Talvivaara/Sotkamo, mine: nickel, zinc, copper, cobalt, lithium (uranium)	Pollution	Sairinen et al. (2017), organized movement, social media group	Stop Talvivaara movement, Rising Tide Network
Yara Finland Oy Norwegian/Finnish Minerals Group Finnish	Sokli/Savukoski, mine project: phosphorus, niobium, uranium	Natura 2000 areas, reindeer herding, uranium	Kurko (2020), organized movement, social media	Wilderness Sokli movement, FANC

Table 2
The media coverage, number of contentious articles in Finnish, and period covered of some contentious projects by mineral exploration and mining companies in Finland from 2006 to 2020.

Company (current holder)	Project(s) and current stage	Number of media reports	Number of contentious articles	Period covered
Akkerman Finland Oy	Hietakero, mineral exploration	22	15	2018–2020
Boliden FinnEx Oy	Pieksämäki, mineral exploration	34	7	2017–2020
FinnAust Mining Oy	Kangasniemi, Puumala	48	15	2016–2020
Hannukainen Mining Oy/ Northland Oy	Hannukainen mine development	359	110	2006–2020
Latitude 66 Cobalt Oy	Juomasuo mine development	148	69	2008–2020
Sakatti Mining Oy	Sakatti mine development	340	59	2011–2020
Yara Finland Oy	Sokli mine development	294	92	2007–2020

The long-term cases are summarized and divided according to the current stage of the projects involved within the mining life cycle: mineral exploration, mine project, and mine. Brief reference is made to the most recent cases (2019–2021) due to limited data. The cases are referred to by the project or location name. The EJAtlas' conflict scale is applied to categorize the intensity of the disputes.

4. Results

As both the mining industry and the MMEDs are dynamic, the situation has changed since the previous studies in Finland carried out by Bruun (2014), Eerola (2015), and Lipsanen (2014). Some of the old disputes have ended, but many others persist, while new ones have emerged or may be evolving.

Seventeen companies and their twenty ongoing contentious projects were identified from media reports and literature. These companies are listed in Table 1 together with their projects/localities, commodities, issues/concerns, indicators, and contentious actors. The total media coverage and the total number of contentious articles of some of the disputes involving the abovementioned companies and projects are given as examples in Table 2. The cases are described below.

4.1. Mines

4.1.1. Talvivaara

For many years during the 2000s there was great positive publicity concerning the Talvivaara mine, and the government, authorities, public opinion, and industry were largely in favour of the project (Sairinen et al., 2017). National public opinion changed and began to challenge the mining company in 2010, after finding that the mine also intended to produce uranium (Kauppinen, 2010). Negative public opinion increased due to several environmental problems, and the Stop Talvivaara movement was founded. Ultimately, the gypsum pond leakage of Talvivaara mine in 2012 became the key event of the Mining Dispute and public mining debate in Finland (Eerola, 2015). Nationwide protests were organized, and authorities and their actions were challenged. This influenced the whole of the mining industry in Finland: the government launched its plan for Sustainable Mining, and the Finnish Independence Fund (Sitra) created the Finnish Network for Sustainable Mining, which is a collaboration forum between mining companies and their stakeholders, including ENGOs. The authorities also demanded several studies on environmental impacts, which, however, were questioned by protesters (Sairinen et al., 2017).

After the bankruptcy of the owner of the Talvivaara mine, the mine was nationalized and transferred to the state-owned Terrafame Ltd. The situation has significantly improved due to changes in overall mine management measures that include transparency, communication, safety, and environmental issues, but also due to the measures taken by the authorities. Because of the Talvivaara case, the Ministry of the Environment set up stress tests and an official working group to deal with topical issues related to the environmental safety of mines (Välisalo, 2014; Ympäristöministeriö, 2014). The working group assessed the means to prevent environmental incidents and proposed the launch of a mine specialization program for three northern Environmental Authority Centres. The authorities also initiated multiple legal cases against the management of the Talvivaara mine, which may also have improved the image of the authorities and the new mining company. Talvivaara is the only Finnish MMED included within the EJAtlas.

4.1.2. Kaapelinkulma

The Kaapelinkulma gold mine was opened in 2019 by Dragon Mining Oy (Dragon Mining, 2020). At the same time, this company closed the Orivesi gold mine in the same province because of an illegal dump found within the mine (Muhonen and Gröndahl, 2019).

After a newspaper article reported the declaration made by the company's CEO in the Hong Kong Stock Exchange in 2018 - that the company would not obey the environmental laws or permits devised at the Kaapelinkulma gold mine site but would mine the gold before the permits were valid (Muhonen and Gröndahl, 2019) - national public opinion has been very critical towards the company. Dragon Mining's activities and attitudes have contributed to the discussion around the review of the Mining Act in Finland (Muhonen and Gröndahl, 2019). The company has also gained a bad reputation from its previous Juomasuo project in Kuusamo (see section 4.2.2.). The company, and gold mining more broadly, have been the targets of a campaign by a coalition of national and international ENGOs (Mauranen et al., 2014).

A company employee also felled some of the forest in a protected area near the Kaapelinkulma site, acting against the environmental permit. This led to a police investigation and legal proceedings, but the employee was acquitted (Saukkonen, 2019). There has been non-violent civil disobedience, blockades, and a protest camp organized by the Rising Tide (Hyökyaalto) Network and Save Kaapelinkulma Movement both in the mine area and at the processing plant in Sastamala, and appeals were made to revoke their licenses (Hämeen Sanomat, 2019). This kind of direct action is quite rare, especially in anti-mining protests in Finland. However, based on media coverage, the sites have been calm since April 2019. In addition, opponents have lost all the appeals and lawsuits taken out against the company. The company is planning to expand the mine (Palomaa and Mansikka, 2021).

4.2. Mine projects

4.2.1. Hannukainen

Plans for reopening the Hannukainen iron, copper, and gold mine were started in 2005 by Northland Oy, which went into bankruptcy in 2014 (Lesser et al., 2017). Hannukainen Mining Oy, owned by the Finnish company Tapojärvi Oy, restarted the process in 2015 (Hannukainen Mining, 2021).

At the beginning of the mine development by Northland, the company-community relationship was good, even though the mine project is located 10 km from the Ylläs Ski Resort (Lesser et al., 2017). Opposition originated from local and international tourism entrepreneurs and holiday homeowners in 2013, coinciding with the company's economic difficulties, when it could no longer maintain its stakeholder engagement (Koivurova et al., 2015; Lesser et al., 2017). The operator changed, but the situation did not. In 2019, a petition against the mine collected 51 000 signatures (Ruokangas and Aula, 2019, Table 1). However, a subsequent poll pointed to local support for the mine (Ruokangas, 2020b).

Table 3
Issues/concerns of the cases of disputes and their quantification. Nr = Number of cases per issue/concern.

Issues/concerns		Company	Project/Location	Nr
Corporate conduct		Akkerman	Hietakero	13
(lack of or poor communication and stakeholder engagement)		Arctic Minerals	Martimo, Ivalo-Inari	
		Boliden Finnex	Pieksämäki-Joroinen	
		BR Gold Mining	Osikonmäki	
		Dragon Mining	Kaapelinkulma	
		Fennoscandian Resources	Heinävesi, Tuusniemi	
		FinnAust Mining	Hyrkkylä-Korkkosaari-Märkälä	
		Magnus Minerals	Joensuu-Kontionlahti-Ilomantsi	
		Pallagen	Kalkkinen	
		Rio Tinto	Rautalampi	
		Suomen malmitutkimus	Juva-Puumala-Sulkava	
Project location and associated land use	Groundwater	Arctic Minerals	Martimo	2
		Boliden Finnex	Ylivieska	
	Lake regions with holiday homes	Boliden Finnex	Piekäsmäki-Joroinen	10
		BR Gold Mining	Osikonmäki	
		Fennoscandian Resources	Heinävesi, Tuusniemi	
		FinnAust Mining	Hyrkkylä-Korkkosaari-Märkälä	
		Magnus Minerals	Joensuu-Kontionlahti-Ilomantsi	
		Mawson	Korpilahti	
		Pallagen	Kalkkinen	
		Rio Tinto	Rautalampi	
		Suomen malmitutkimus	Juva-Puumala-Sulkava	
	Nature conservation	Akkerman	Hietakero	8
		Arctic Minerals	Martimo	
		Fennoscandian Resources	Heinävesi, Tuusniemi	
		Sakatti Mining	Sakatti	
		Mawson	Rompas-Rajapalot, Korpilahti	
		Rio Tinto	Rautalampi	
	Sámi homeland	Akkerman	Hietakero	2
		Arctic Minerals	Inari-Ivalo	
	Reindeer herding	Akkerman	Hietakero	5
		Arctic Minerals	Inari-Ivalo	
		Hannukainen Mining	Hannukainen	
		Sakatti Mining	Sakatti	
		Yara Finland/Finnish Minerals Group	Sokli	
	Tourism	Fennoscandian Resources	Hienävesi, Tuusniemi	5
		Hannukainen Mining	Hannukainen	
		Latitude 66 Cobalt	Juomasuo	
		Suomen malmitutkimus	Juva-Puumala-Sulkava	
Effective pollution		Talvivaara/Terrafame	Talvivaara	1
Reputation		Beowulf (Fennoscandian Resources)	Heinävesi, Tuusniemi	3
		Dragon Mining	Kaapelinkulma	
Uranium		Latitude 66 Cobalt	Juomasuo	4
		Mawson	Rompas-Rajapalot	
		Talvivaara/Terrafame	Talvivaara	
		Yara Finland/Finnish Minerals Group	Sokli	
Total				53

The main cause of the dispute is the conflicting use of land, as the region is a popular skiing and hiking destination, there is reindeer herding, and National Park and protected natural areas are nearby (Table 1). There are also hotels, numerous holiday homes, and entrepreneurs that depend on tourism. The protestors fear the damage not only to the environment, but also to the image of the region and to local livelihoods, which might change due to mining.

4.2.2. Juomasuo

Juomasuo's association with uranium incited opposition towards the project since its former ownership by Dragon Mining Oy in Kuusamo (Lipsanen, 2014; Lyytimäki and Peltonen, 2016; Mauranen et al., 2014, Fig. 1). Dragon Mining also applied for mineral exploration permits close to the Ruka Ski Resort (Lipsanen, 2014; Mauranen et al., 2014). After a failed environmental permit application, Dragon Mining Oy sold the prospect to the Australian Kuusamo Gold Oy, which changed its name to Latitude 66 Cobalt Oy.

Although the current holder has been much more open and communicative, opposition has continued (Hämeenniemi, 2018). According to a poll in February 2018, almost half of the local people opposed the mine development (Pirttikoski, 2018). The Municipality of Kuusamo tried to exclude mining from its area through urban planning, but this strategy was considered illegal in a High Court ruling (Purunen, 2019). The intended mine would be close to different national parks, protected natural areas, and leisure centres (see Guzik et al., 2021). The dispute relates mainly to associated uranium and the conflicting use of land, i.e., nature tourism vs. mining.

4.2.3. Sakatti

The Sakatti nickel-copper-PGE mine development project is in the mining municipality of Sodankylä, already the location of the Kevitsa nickel and Pahtavaara gold mines and a focus of intense mineral exploration. The Sakatti deposit was found in 2011 by AA Sakatti Mining Oy, a subsidiary of the British company Anglo-American plc, and is located on the margin of the Viiankiaapa mire Natura 2000 area (nature conservation units based on an EU nature directive; European Commission, 2021). For this reason, the Finnish Association for Nature Conservation (FANC) has opposed the project (Suomen luonnonsuojeluliitto, 2021). Due to opposition, Sakatti Mining decided to build an underground mine to avoid any impact on the Natura 2000 area (Ruokangas, 2020a). According to successive polls, most of the local population in Sodankylä seems to favour the mine project and mining in general, although some local opposition also exists (Lassila, 2020; Suopajärvi et al., 2019; Tulilehto and Suopajärvi, 2021; Tuulentie et al.,

2019). However, according to Tuulentie et al. (2019), distrust is directed more towards the municipality and the authorities who grant permits for mining than towards the company itself, and there is also pressure to obtain more economic benefits for the community. Sodankylä Municipality is currently devising a mining forum, agreement, and program, which would be the first of its kind in the EU (Tuulentie et al., 2019).

4.2.4. Sokli

The phosphorite deposit of Sokli in Savukoski has been under investigation and development since 1967, when it was discovered (Pohtila, 2018). There have been several attempts to start mining, but its remote location and lack of appropriate infrastructure have made it uneconomic so far (Pohtila, 2018). In 2007, it was sold to the Norwegian company Yara Finland Oy, which planned to develop it (Pohtila, 2018). Recently, Yara sold the deposit to the state-owned Finnish Minerals Group (Konttinen and Passoja, 2020). The plan is to produce phosphorite for fertilizer. The deposit also has uranium and niobium resources.

Due to its association with uranium, resistance to the Sokli project emerged during the uranium dispute in 2007, when Yara Finland Oy bought the deposit and announced its intention to develop it for mining (Bruun, 2014; Lipsanen, 2014). Additionally, the deposit is located between two Natura 2000 areas and in a reindeer herding area (Kurko, 2020). The reindeer herders and FANC have appealed to the High Court against the permits. However, local people, the government, and the regional authorities have been supportive of the mine project because of its potential for employment and because it favours the regional development policy of Eastern Lapland (Pohtila, 2018).

4.3. Mineral exploration

4.3.1. Rompas-Rajapalot

The Rompas gold-cobalt deposit, discovered in 2008, was sold by the French nuclear company Areva to the Canadian company Mawson Oy in 2010. Mawson Oy expanded its mineral exploration to the Rajapalot area, which is located 10 km to the east of Rompas. The Rompas-Rajapalot project is partially located within Natura 2000 areas, and this is the reason for FANC's opposition, as well as the associated uranium (Väinönheimo et al., 2020). Even though the Rajapalot prospect is not associated with uranium, FANC continues to cite the supposed association with uranium in their appeals against the company's permits in that area. There has been a long legal battle between Mawson, FANC, and the environmental and mining authorities, and successive requests for police investigations into the company and FANC on the environmental impacts by the company within the Natura 2000 areas (e.g., Niskasaari, 2016). Company's employees were fined for environmental damages. However, it seems that most of the local population does not oppose exploration activities (Beland Lindahl et al., 2022), but the position of the government, the authorities, and the municipality is controversial; the environmental authorities have been critical of the operation within the Natura 2000 areas (Niskasaari, 2016) and the Ministry of the Environment is also attempting to expand nature conservation areas in the prospect area, yet the municipalities of Rovaniemi and Ylitornio and local politicians favour the project.

Recently, the company announced that it would start mine planning and an environmental impact assessment (EIA) (Kallio, 2020).

4.3.2. Heinävesi and Tuusniemi

Oy Fennoscandian Resources Ab applied for licenses to explore the Aitolampi and Rääpysjärvi graphite prospects in Heinävesi and Tuusniemi. The dispute began in summer 2018, when a representative of FANC was interviewed for an article about the project, stating that the supposed mine "will pollute the whole Saimaa Lake area" (Kokkonen, 2018). Other reasons for the dispute seem to have been a poor communication and stakeholder engagement by the company (Leino and Miettinen, 2020). Additionally, the lake area is a very popular summer tourist destination. Many celebrities and politicians, who have holiday houses there, have joined the campaign against the mineral exploration project together with two local monasteries and the Finnish Church, increasing the negative publicity of the project (Luikku, 2019). The area also has nature conservation areas, and its waterways are one of the most iconic national landscapes.

The Pro Heinävesi and Pro Tuusniemi movements were founded in opposition through their social media groups (Table 1). These movements campaigned actively for the popular petition that demanded a legislative initiative to revise the national Mining Act (Leino and Miettinen, 2020; Pulkka, 2019, Table 1). Due to resistance, the company postponed the project to concentrate on EIA of mineral exploration and potential mining in Heinävesi (Kasurinen et al., 2019). The municipalities and province administrations are against the project (Keränen, 2020). A recent proposal for the establishment of a private nature conservation area in the company's target area challenges the company's activities in Heinävesi and the case is being resolved in court (Tiirikainen, 2021).

Beowulf Ltd., the parent company of Oy Fennoscandian Resources Ab, had a bad reputation when it came to Finland from Sweden, where it was involved in a dispute over the Gállok Project (Beland Lindahl et al., 2018; Persson et al., 2017). This dispute had also been observed by the Finnish media (Kallio, 2016). Recently, Fennoscandian Resources changed its name to Grafintec Oy.

4.3.3. Other recent cases of mineral exploration

A new cycle of contention emerged during the ongoing battery minerals (cobalt, nickel, graphite, lithium) boom (Keränen, 2020; Eerola, 2021). It started with the abovementioned Heinävesi and Tuusniemi cases in the Saimaa Lake region. Other mineral exploration projects have also been opposed in the same region (Fig. 1); people in Pieksämäki and Joroinen have expressed concern about mineral exploration in a groundwater area by Swedish company Boliden FinnEx (Kosonen, 2019), and the Canadian company BR Gold Mining Oy's mineral exploration permit application has been opposed in Osikonmäki (Kilpeläinen, 2019). Local people have organized resistance against the claim reservation applications by the Finnish company Suomen malmitutkimus Oy in the Juva, Puumala, and Sulkava regions (Porvari, 2020), British company Rio Tinto's exploration has been opposed in Rautalami (Ronkainen, 2020), and that of Australian company Finnaust Mining has also been opposed in several localities in the Saimaa Lake area (Ylönen et al., 2020, Table 1).

Another dispute started within the Sámi homeland and reindeer herding area in Enontekiö, northwestern Lapland and indigenous Sámi homeland, where the Dutch company Akkerman Finland Oy applied for the Hietakero claim reservation in spring 2020 (Fig. 1, Melamies, 2020). Over 30 000 signatures were collected for a petition against the project with the support of Finnish celebrities (Niemelä, 2020). The Swedish company Arctic Minerals AB also faces resistance from the Sámi Parliament and reindeer herders regarding its claim reservations in the

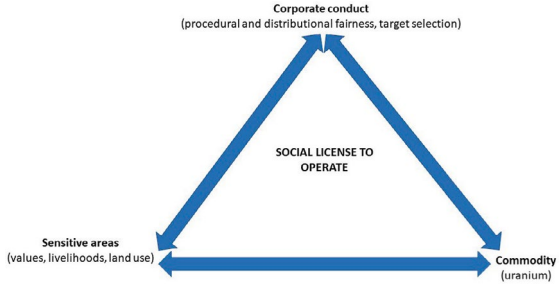


Fig. 4. A corporate framework for the social license to operate in Finland, composed of interdependent factors that influence the acceptance of mining and mineral exploration.

Inari and Ivalo area, northern Lapland and Sámi homeland (Seipiharju, 2021). The company is also involved in another dispute regarding its claim reservations in the Oulu region, northern Finland (Ukkonen and Loukkola, 2021, Fig. 1).

The British company Pallagen applied for a claim reservation in Asikkala, in the Lake Päijänne region of southeastern Finland, where local people and holiday homeowners were concerned about water contamination by a supposed mine (Saavalainen, 2021). Due to pressure, the company withdrew its application for a permit (Tapiomäki and Ojanperä, 2021). Large claim reservation areas applied for by the Finnish company Magnus Minerals Oy were the subject of complaints by the holiday homeowners' association in the lake regions of Joensuu, Kontionlahti, and Ilomantsi (Sutinen, 2021). A mineral exploration permit application to Mawson Oy in Korpilahti was opposed by the Jyväskylä Municipality, FANC, and local villagers, based on environmental concerns in a lake area with holiday homes and nature conservation areas nearby (Pöytäkangas, 2021, Table 1). Mawson's reputation due to fines for environmental damages regarding Natura 2000 in Rompas were used in campaign against the company. Mawson cancelled its granted due to resistance and limited resources (Pöytäkangas, 2022).

According to media reports of the most recent cases of disputes concerning the mineral exploration mentioned above and in Table 1, the companies Akkerman, Arctic Minerals, Boliden Finnex, BR Gold Mining, FinnAust Mining, Magnus Minerals, Pallagen, and Rio Tinto have not engaged with local communities since the very beginning, and locals have been surprised by the companies' permit applications. This suggests poor corporate conduct and lack of corporate social responsibility (CSR). Opposition movements have arisen in all these localities due to a fear of the environmental impacts of the supposed mines (Table 1, Niemelä, 2020). Notably, the above companies have been surprised by the opposition.

5. Analysis and implications for the SLO in Finland

Twenty ongoing cases of MMEDs were found in Finland. There are some common reasons behind the opposition in some of the long-term disputes. A.A. Sakatti Mining Oy and Mawson Oy explore within nature conservation areas (Table 1). The properties of Talvivaara/Terrafame Oy, Mawson Oy, Yara Finland Oy, and Latitude 66 Cobalt Oy have associated uranium, and the latter, together with the property of Hannukainen Mining Oy, is in a touristic region (Table 1). Talvivaara is the only case of pollution.

The projects are opposed by local communities and ENGOs, except for the Rompas-Rajapalot and Sakatti projects, where resistance appears to come mostly from FANC but also from some minor local opposition. Their holders, Mawson and Sakatti Mining, evidently have been able to manage the company-community relationship well, even when operating in sensitive nature conservation areas and when considering that the Rompas prospect is also associated with uranium.

Together with the past dispute over the Kevo Natural Park diamond claim reservation in the Utsjoki region (Lassila, 2018), the recent claim reservations in Enontekiö by Akkerman and in Inari-Ivalo by Arctic Minerals are the only ones in which the indigenous Sámi people have been involved (Fig. 1). MMEDs involving indigenous people can easily escalate towards *glocal* struggles, whereby a local issue and the company involved can become the target of a global campaign and adverse media attention, which may impact on the company's image and financing (Eerola, 2017; Heikkinen et al., 2013; Lassila, 2018; Paredes, 2016; Urkidi, 2010).

A sudden rise in mineral exploration disputes since 2018 is due to the battery minerals boom, especially in the Saimaa Lake region in southeastern Finland. This region has been the most active target area of mineral exploration in Finland, together with Lapland (Kaivosteollisuus ry, 2020). The Saimaa Lake area is a popular holiday home location, and the owners are among the most critical stakeholder groups in mining and mineral exploration in Finland (Eerola, 2017). Along with other cases of MMEDs related to tourism, such as those of Juomasuo and Hannukainen, disputes in the lake regions with holiday homes are connected to the Not in My Leisure Area (NIMLA) phenomenon in Finland (Eerola, 2015, Table 1). All have created organized and networked movements in their regions with their own social media groups (Table 1). Hannukainen, Juomasuo, Sokli, and Talvivaara are also examples of cases in which disputes were inherited from the former project owners.

The dispute over the Kaapelinkulma gold mine is the first in Finland where a mining skeptical movement has applied non-violent civil disobedience and its holder has been the target of a campaign by a coalition of ENGOs for years. Within the scale of the EJAtlas, the Talvivaara and Kaapelinkulma disputes can be classified as medium intensity disputes (street protest, visible mobilizations) reaching the highest level of dispute in Finland. All the other cases presented here are of low intensity (some organizing). The dominance of low intensity cases may be explained by Finland being a democratic Nordic welfare country where citizens generally trust the government and authorities, social equality is highly valued, human rights are respected, and the culture of demonstrations is peaceful (Eerola, 2017; Tammikko, 2019). However, if the current situation changes, more radical outcomes of environmental struggles may be expected (Tammikko, 2019).

The mining skeptical movements have petitioned for a revision of the Mining Act. The changes demanded concern major landowners' property rights, influence in decision-making, the introduction of mining taxes/royalties, an increase in sums guaranteed to ensure safe mine closures, and the exclusion of nature conservation areas, important water systems, and Sámi homeland from mineral exploration and mining (Leino and Miettinen, 2020; Pulkka, 2019). These issues are being considered and studied by the government. The mining skeptical movements organized a demonstration in support of these petitions in Helsinki on November 12, 2021.

Ten issues/concerns of disputes were identified from the text and Table 1: reputation, corporate conduct, groundwater, lake regions with holiday homes, nature conservation, reindeer herding, Sámi homeland, tourism, pollution, and uranium. These issues/concerns of disputes are organized and quantified in Table 3 according to the companies and cases involved.

As shown in Tables 1 and 3, issues/concerns may overlap in many cases, i.e., companies may be involved in disputes with multiple issues and some of the companies may even have multiple cases, such as Arctic Minerals, Fennoscandian Resources, and Mawson. Groundwater, lake regions with holiday homes, nature conservation, Sámi homeland, and tourism can be included under a common category of project location and associated land use, which define most of the cases related to issues/concerns (32; 60,37%) from a total of 53 (Table 3). Based on such results, it is observed that local context and place matter in such projects; the conflicting use of land, the commodity involved (uranium), but also corporate conduct are all important factors in the acceptance of mining and mineral exploration at local and national levels in Finland. These factors are included in Fig. 4. From a corporate perspective, these factors should be considered by companies to avoid disputes in Finland. Therefore, this study complements the SLO model proposed for Finland by Jartti et al. (2020) by introducing the importance of place.

The factors in Fig. 4 are related to perceptions, values, beliefs, and livelihoods and are attached to a place of affected communities and stakeholders, who may conflict with a company's objectives if it fails to consider these factors in its strategy and operations. In fact, the issues related to land use are mostly the same as those demanded to be excluded from mineral exploration and mining in petitions to revise the Mining Act. Therefore, to avoid disputes in Finland, careful planning, and a risk assessment of sensitive contexts are recommended when selecting target areas for mining and mineral exploration. In this sense, Tolvanen et al. (2019) recommended the application of Public Participation methods using Geographic Information System (PPGIS) to reveal people's preferences for land use and to resolve potential disputes

related to mineral exploration and mining. Furthermore, Kivinen et al. (2021) recommend the use of GIS-based prospectivity and land use data to predict potential disputes through the application of Mine Potential and Mine Deposit Potential tools.

However, the logics of a mining boom, such as that of ongoing battery minerals, pushes any mineral exploration strategy away from careful planning, target selection, risk assessment, communication, and stakeholder engagement towards quick applications for permits because of intense competition for areas between companies. On the other hand, immediate contentious reactions by local communities, ENGOs or mining skeptical movements towards any proposed projects may defy attempts for further dialogue. As a result, disputes multiply.

Indeed, the industry experience and SLO literature emphasize the importance of communication and stakeholder engagement. However, corporate conduct appears as the major single issue in Table 3 related to mineral exploration companies. For instance, a bad corporate reputation and poor corporate conduct (lack of communication and stakeholder engagement) illustrate the absence of procedural fairness, i.e., company-community interaction, which is an important component in creating the legitimacy and trust necessary to achieve the SLO and to be valued and respected (Jartti et al., 2020; Moffat and Zhang, 2014; Prno, 2013; Thomson and Boutilier, 2011; Zhang et al., 2015). Therefore, corporate conduct, in the sense of a company's attitudes, behavior, advance planning, target selection to avoid sensitive contexts, communication, and stakeholder engagement also have a strong role to play in the SLO, reflecting the importance of CSR (Conde, 2017; Conde and Le Billon, 2017; Eerola, 2017, Fig. 4). These seem to have been neglected by most of the mineral exploration companies regarding the most recent disputes.

In short, following the reasoning of Jartti et al. (2020) and considering opposition to foreign companies, i.e., resource nationalism in Finland, Finnish companies with careful planning and target selection, communication, and stakeholder engagement may have better chances to obtain and maintain the SLO than foreign companies with opposite attitudes. However, from the seventeen companies involved in MMEDs, five are Finnish: Finnish Minerals Group, Hannukainen Mining, Magnus Minerals, Suomen malmitutkimus, and Terrafame. All of them operate in sensitive contexts (Tables 1 and 3) except Terrafame, which inherited its dispute from the previous project owner.

Although from different contexts, the results of this study find resonance with those of the study of mining conflicts in Latin America by Haslam and Tanimoune (2015); a company's nationality and conduct, commodity, and land use are important factors for conflicts therein. It is good to note that each case of misconduct and dispute anywhere may harm the reputation of the companies involved and the public image of the whole industry and which may also influence debate and generate or increase resistance towards mineral exploration and mining elsewhere (Eerola, 2017; Jartti et al., 2020; Zhang et al., 2015). Ultimately, the lack of SLO may challenge the transition to green energy and increase of self-sufficiency in mineral raw materials in the EU (Guzik et al., 2021). The evolution of the mining skeptical movement and disputes may depend on how and to what extent a government accommodates demands of the movement and the actions taken by companies to resolve them (Zachrissen and Beland Lindahl, 2019). In fact, disputes are lessons to develop the mining industry's CSR and a state's mineral governance.

6. Conclusions

Both the PEA and media monitoring allowed for MMEDs to be identified, mapped, and reviewed in Finland as the first step to study their regional distribution, causes, and dynamics. The PEA was shown to be effective in identifying cases, especially when no previous studies existed. The identified disputes were found in three stages of the mining life cycle: two cases related to mines, four to mine projects, and fourteen to mineral exploration, bringing a total of twenty cases in Finland, with the involvement of seventeen companies. A proportionally higher number of cases related to mineral exploration differs from global and EU trends, in which most cases are linked to mine development (Franks et al., 2014; Kivinen et al., 2020). This trend is recent in Finland and is due to the battery minerals boom. The disputes are related mostly to metals (gold, base metals, and battery minerals), and only one case is related to industrial minerals (Sokli, phosphorite). Uranium is associated with phosphorus, gold, cobalt, or nickel in four cases. The cases are in northern Finland, especially Lapland (nine cases), and in south-southeastern Finland (eleven cases). Both regions are the most active target areas of mineral exploration in Finland. As most of the cases can be categorized as of low intensity, and only two as of middle intensity, it is justified to call them disputes instead of conflicts.

The Talvivaara is the most important case of a mining dispute in Finland and only case included in the EJAtlas. Its environmental problems, especially its gypsum pond leakage in 2012, were the key events which intensified the mining debate in the country. Howewer, most of the cases seem to be related to the conflicting use of land (Sámi homeland, tourism, lake areas with holiday homes, and reindeer herding). Therefore, it is suggested that the location of a project is one of the most fundamental causes of disputes in Finland, revealing territories of contention. The model for SLO proposed by Jartti et al. (2020) for Finland was based on regional queries. Here the author examined concrete cases of contention to see their reasons in local level and complemented the model. The commodity involved may also be a factor, as uranium has been identified as one of the most critical causes of some disputes, confirming Jartti's et al. (2020) results. Nonetheless, a company's reputation and especially its conduct are also clearly significant in many cases. Therefore, based on the results, the safest way to provoke a MMED in Finland is to apply and operate in a sensitive context (Sámi homeland, tourism, lake areas with holiday homes, and reindeer herding) associated with uranium and without any communication and stakeholder engagement. For instance, companies that avoid sensitive areas and engage with stakeholders may have a better chance to obtain the SLO in Finland. If sensitive contexts (e.g., nature conservation areas and Sámi homeland) are not avoided based on their own intrinsic value, they are recommended to be strategically taken in account in planning and risk analysis or even avoided due to their potential to provoke disputes. What remains to be investigated, is the importance of the presence or absence of active and prominent person(s) or group to organize and run resistance.

A more detailed analysis of the cases in subsequent studies would certainly shed further light on the dynamics of MMDs in Finland and the lessons to be learned.

Author statement

I hereby certify that I have been responsible for all changes made in the revised manuscript and approve this version to be submitted. This is the author's original work, it was not and would not be considered to be published elsewhere.

Data availability

No data was used for the research described in the article.

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ARTICLE III

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New low-impact mineral exploration technologies and the *social license to explore*: Insights from corporate websites in Finland

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ABSTRACT

The websites of companies practicing mineral exploration in Finland (CPMEF[1]) were surveyed for references to new low-impact mineral exploration technologies (NLIMET[2]) and the social license to explore (SLE[3]), i.e., acceptance/approval of mineral exploration by the local community. The purpose was to examine which NLIMET are used by the companies and how they understand the SLE, how these two topics are communicated on their websites, whether they are interlinked, and what may be the motivation for communicating these topics.

Twenty companies were found to refer to SLE-related issues on their websites. However, most of these websites do not directly mention the SLE as a term, but instead address it under terms such as acceptance, stakeholder engagement or the company–community relationship. Nine companies report the use of NLIMET. Coincidently, the same companies mostly also refer to the SLE. The operational contexts of companies mentioning NLIMET were examined, and most of them were found to be exploring in sensitive areas and/or deposits associated with uranium and facing opposition. Indeed, such contexts may challenge the acquisition the SLE in Finland, even if the companies apply and communicate the use of NLIMET.

1. Introduction

A website is a fundamental tool of modern corporate communication, with implications for the company's public image (Jose and Lee, 2007; Lodhia, 2012). Corporate websites are sources of information on companies and their activities. Investors and environmental non-governmental organizations (ENGOs[4]) monitor company websites, but they can be also useful for local communities in areas where companies are starting mineral exploration (Eerola, 2017). These websites support stakeholder engagement in the field, especially in the very early stages of operation.

The involvement of stakeholders, including communities, is one of the categories of corporate environmental communication (Jose and Lee, 2007), and information on company–community relationships can be found on websites and in sustainability reports (Bice, 2014). A good company–community relationship is referred to as the social license to operate (SLO), i.e., acceptance or approval of activities by the local community (Thomson and Boutilier, 2011) or by society (Joyce and Thomson, 2000). Bice (2014) examined the SLO of Australian mining companies based on their sustainability practices expressed via their websites. She concluded that social issues were those that were least reported on and understood by the surveyed companies.

The websites of mineral exploration companies are an underexplored topic in this sense, as most surveys have focused the websites of mining companies (Bice, 2014; Jose and Lee, 2007; Lodhia and Hess, 2014; Lodhia and Hess, 2014; Ranängen and Lindman, 2018). This might be because mineral exploration companies do not usually present sustainability reports due to the small social and environmental impact of their activities and the lack of resources for their elaboration. Lyons et al. (2016) used the websites of Australian junior companies to investigate their corporate social responsibility (CSR) practices in developing countries. CSR refers to voluntary activities exceeding statutory obligations in terms of the environment, economy, and society (Garriga and Melé, 2004). In Finland, only mining and major mineral exploration companies have presented sustainability reports on their websites, which have mostly been written in English and directed towards international investors (Eerola, 2017). Some companies practicing mineral exploration in Finland (CPMEF) have presented their CSR activities, such as

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[1] CPMEF = Companies practicing mineral exploration in Finland.
[2] NLIMET = New low-impact mineral exploration technologies.
[3] SLE = Social License to Explore.
[4] ENGO = Environmental non-governmental organization.

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stakeholder engagement practices (Eerola, 2017).

According to the Fraser Institute's annual surveys, Finland is among the most attractive mining investment destinations (e.g., Younis and Aliakbari, 2021). Mineral exploration is most active in northern and southeastern Finland (Kaivosteollisuus ry, 2020, Fig. 1). Sixty-one companies reported on their mineral exploration activities for the mining authority in 2020 (Liikamaa, 2021), which is compulsory for permit holders in Finland. Despite considerable investments and activity during the last decades, only two significant discoveries have been made: the Sakatti Cu–Ni–PGE deposit in Sodankylä and the Rompas–Rajapalo Au–Co deposit in Ylitornio, northern Finland (Kaivosteollisuus ry, 2020). Finnish mineral exploration permits are summarised in Table 1. There is no legislation concerning the SLO, but consultation is compulsory when applying for mineral exploration permit.

Mineral exploration is characterized by geo-scientific surveys and mineral potential investigations. Wide areas are surveyed for this purpose using geo-scientific methods and techniques. The low environmental impact of mineral exploration can be further minimized using new low-impact mineral exploration technologies (NLIMET; Sarala, 2015). Technologies designed to address health, safety and environmental issues may have competitive advantages that could positively influence public perceptions (Jose and Lee, 2007; Franks and Cohen, 2012; Lacey et al., 2019). Based on their low environmental impact, the applied technologies may have an important role in people's perceptions and attitudes towards the mining industry, and therefore in the SLO (Franks and Cohen, 2012; Lacey et al., 2019). However, acquisition of the SLO may be influenced by the design traits of the technologies and their interplay with the environmental and social contexts in which they are applied.

NLIMET have been applied and tested particularly in sensitive areas

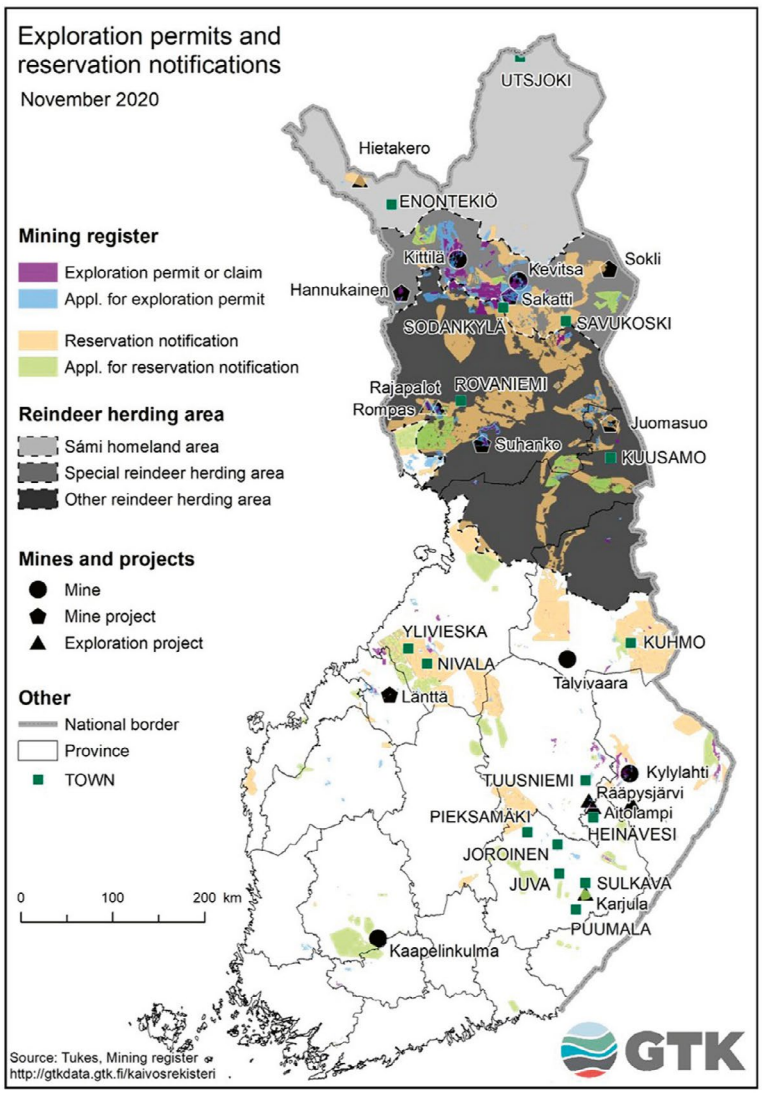


Fig. 1. Mines, development and mineral exploration projects and locations mentioned in the text, mineral exploration concessions and their applications, active mineral exploration localities and reindeer herding and Sámi homeland areas in Finland. Base map © National Land Survey of Finland 2020.

Table 1
The mineral exploration permits in Finland.

Permit	Activity	Rights	Validity	Duties
Claim reservation	Reconnaissance, preliminary surveying	A pre-emptive right to apply for an exploration permit. The freedom to roam gives the right to survey and take small-scale samples	Two years	Notification of landowners on sampling
Mineral exploration permit	Mineral exploration	Mineral exploration activities: excavation and deep drilling.	Four to 15 years	Consultation, reporting of activities to the mining authority

such as those used for nature conservation in Finland (Sarala, 2015). However, few studies have considered the impact of new technologies on the SLO (Franks and Cohen, 2012; Lacey et al., 2019), especially in relation to mineral exploration (Suopajärvi et al., 2019a).

As corporate websites can be also used to communicate about the technologies applied by companies in mineral exploration, the purpose of this paper is to examine whether and how CPMEF communicate both their use of NLIMET and SLO-related topics on their websites. It also explores their conception and understanding of the SLO, which NLIMET are communicated by the companies, the motivations for their communication, and whether these two topics are interlinked on their websites, the operational contexts of the companies and whether the use of NLIMET influences their SLO.

Mineral exploration is the first stage of the mining life cycle and is of crucial importance in earning the SLO (Thomson and Joyce, 1997), which is the top priority of the minerals industry (Ernst & Young Private Ltd., 2019). Therefore, this article aims to contribute to the debate on the role of NLIMET in the SLO, as well as to studies on corporate websites from the viewpoint of mineral exploration.

The article is structured as follows: After the introduction, the article describes the theoretical frameworks and the materials and methods applied in the study. Then, the results and interpretation are presented and discussed within the subsequent sections, where recommendations are also presented. Finally, conclusions are drawn.

2. Theoretical frameworks

According to Lodhia and Hess (2014), legitimacy and stakeholder theory have been the most frequently applied frameworks in studies on sustainability reports and corporate websites of the mining industry beyond the CSR. Lodhia (2012) also used media richness theory to examine the advantages of website use by the Australian mining industry. However, organizational communication theories, such as those of situational and resource dependency, help to explain the dynamics of organizational responses to stakeholders in general, and organizational responsiveness through the Internet more specifically (Kent et al., 2003). In order to examine corporate website communication on NLIMET and the SLO for mineral exploration, these theories, the SLO and Constructive Technology Assessment, are appropriated and applied here to address the following research questions: How do companies express and understand the SLO on their websites, which NLIMET are used and how are these communicated by the companies, are these two topics interlinked on the websites, and what may be the motivation behind their communication?

Stakeholder theory offers a broad framework to understand the stakeholder relations of an organization. It assumes that values are necessarily and explicitly a part of business (Freeman, 1994). Relationships and interaction with stakeholders represent value creation by stakeholder management, and the stakeholders are all those who might be affected by an organization or who can affect it (Mitroff and Linstone, 1993). Consequently, if a corporation wishes to communicate and consult with stakeholder groups, it must understand their values (Freeman, 1994; Kent et al., 2003). Therefore, the importance of stakeholders has expanded and the maintenance of good relations with them (i.e., the SLO) is essential to maintain the legitimacy and operations of the corporation (Thomson and Boutilier, 2011).

According to Ranängen and Lindman (2018), stakeholder theory is regarded as a CSR theory. Environmental communication is one of the CSR activities (Bice, 2014; Jose and Lee, 2007). Environmental concerns affect a wide variety of stakeholders and these stakeholders in turn affect corporate environmental practices (Jose and Lee, 2007). According to Jose and Lee (2007), companies seeking stakeholder engagement stress the need for dialogue and open communication with the community. Stakeholder theory explains how individuals recognize, define and resolve problems, and it can be applied to web-mediated organization–public relationships (Kent et al., 2003). Cozier and Witmer (2001) extended stakeholder theory to shift the focus from publics around organizations and their problems to forming and reforming publics through communication behaviours, i.e., influencing the public. This would be especially interesting to explore regarding the communication of NLIMET and the SLO by CPMEF.

For instance, situational theory suggests that external publics exert influence on organizations (Grunig, 1989). Due to the negative impacts of mining, its stakeholders have pressured the mining industry to act in a responsible manner (Thomson and Boutilier, 2011; Parsons et al., 2014). These stakeholders have specific information needs and enact specific communication behaviours. While situational theory helps us understand how and why publics apply pressure on organizations, it is also important to understand why publics have power over some organizations, and this can be achieved through resource dependency theory (Kent et al., 2003). It holds that organizations vary in their dependence on external publics and their environment, entailing social ties of mutual dependence between the parties (Emerson, 1962). Therefore, organizations depend on their environment and their survival depends on their adaptation to it (Pfeffer and Salancik, 1978; Cullen-Knox et al., 2016). According to Badaracco (1998) and Cullen-Knox et al. (2016), this dependency extends to web-mediated relationships, because due to new communication technologies, individuals have unprecedented access to information and a powerful tool for public influence. As the mining industry does not sell its products directly to consumers, it has a lower need for electronic media for advertising and marketing purposes (Lodhia and Hess, 2014). The assets that mineral exploration companies pursue are not major market shares or better sales to customers, but financing and access to land to practice their activities. This can be achieved by establishing and maintaining a good image among shareholders and stakeholders.

These theories help us to understand corporate motivations for communicating environmental and social issues under the umbrella of the CSR concept (e.g., Ranängen and Lindman, 2018). Communication of NLIMET and the SLO can be seen from this perspective. NLIMET are expected to reduce environmental impacts and SLO issues are related to the approach of companies towards local communities. Therefore, the communication of such issues by companies may signal their environmental and social concerns, which they consider as important topics for stakeholders.

To examine the SLO concepts expressed via the websites of CPMEF, it is important to distinguish between the SLO in relation to mining and mineral exploration. These share many similarities in their SLO, but due to differences in their activities (see Table 2), the local acceptance of mineral exploration is referred to as the *social license to explore* (SLE, Suopajärvi et al., 2019a).

The SLE is especially important in areas where mineral exploration companies are newcomers and often the first representatives of the industry (Moon and Whateley, 2006). This early stage of exploration is

Table 2
The main differences between mineral exploration and mining. Permits according to the Finnish Mining Act (Table 1).

CRITERIA	MINERAL EXPLORATION	MINING
Activity	R&D	Production
Time	Years to decades	Decades to centuries
Company	Junior, may change	Mid-tier to major
Location	Wide areas	Defined site
Financing	Financial market	Revenue from production
Licenses	Claim reservation, claim[a]	Mining, environmental and construction permits
Impacts	Low	High
Risks		
Economic	High	Medium
Social	Low	High
Environmental	Low	High
Conflict potential	Low	High

[a] See Finnish mineral exploration permissions in Table 1.

crucial in shaping relationships and influencing the attitudes of local people towards a project, especially if it moves forwards to mining (Thomson and Joyce, 1997). Even though the average industry success rate of mineral exploration is 1/1000 (Thomson and Joyce, 1997; Moon and Evans, 2006), mineral exploration raises expectations: some expect that a possible mine will improve the local economy and create jobs, while others may fear its environmental and social impacts (Thomson and Joyce, 1997; Moon and Whateley, 2006). Therefore, communication and early interaction between the company and the local people is important to share information and to establish dialogue and collaboration (Eerola, 2017; Thomson and Joyce, 1997). However, because of the type of activity, their small size and risky funding, junior companies face major challenges in operating sustainably (Lyons et al., 2016, Table 2).

NLIMET may play an important role in SLE. Sarala (2015) presented a set of NLIMET, including surficial geochemical soil, snow and plant sampling and portable X-ray fluorescence (XRF) analysers. Drones are applied in geophysical field surveys, and audiomagnetotellurics and gravity data are used in the investigation of electrical properties and deep structures in the bedrock. Self-organizing maps, multidimensional modelling, digital elevation maps and semi-automated detection of geological features are used in the visualization of survey results. The data obtained via their application can be applied in regional and local-scale geological models, which help in understanding geological processes and locating deep-seated mineral deposits with a low environmental impact.

Regarding the use, communication, and acceptance of NLIMET, Constructive Technology Assessment (CTA) plays an important role in addressing social performance within mineral industry R&D (Voβ and Kemp, 2006), and therefore also in the SLO/SLE (Franks and Cohen, 2012). Guston and Sarewitz (2002) presented three analytical CTA components: 1) socio-technical mapping, 2) early, controlled testing and identification of unanticipated impacts, and 3) communication between technology users and the public. On one level, the acceptance of a technology is based on perceptions of its risks, while on another level, it is based on the way the technology is used and communicated (Franks and Cohen, 2012). Both might influence the SLO/SLE of the activity associated with their application. Therefore, the present analysis of the online communication of NLIMET relates to the third CTA analytical component. However, as stated by Franks and Cohen (2012), the SLO/-SLE is influenced by a multitude of factors, only some of which are related to technological traits. The local environmental and social contexts in which technologies are applied are equally important. Technologies and technological processes are also irretrievably linked to both the operation and the operator's behaviour (Franks and Cohen, 2012).

Several issues have caused opposition towards mineral exploration in Finland, and therefore resulted in a lack of the SLO, including the foreign ownership of exploration companies (resource nationalism), association with uranium, land use issues and poor corporate conduct (Lyytimäki and Peltonen, 2016; Eerola, 2017, 2021; Jartti et al., 2017; Lassila, 2018, 2020). The local context is important, as land use issues may be sensitive in mineral exploration, especially if related to nature conservation, reindeer herding and the Sámi homeland or tourism destinations (Eerola, 2017, 2021). For instance, the lack of communication and stakeholder engagement can be considered as poor corporate conduct. Therefore, consideration of these issues may also be important when reflecting upon the motivations of companies to communicate the SLO/SLE and NLIMET on their websites.

3. Materials and methods

To investigate the websites of CPMEF, the author obtained a list of companies holding or applying for valid mineral exploration permits and their applications from the Finnish Safety and Chemicals Agency (Tukes) on 31st March 2020. The total number of entities was 104. From these, companies exploring for metals, diamonds and phosphorus were selected, because the SLO/SLE debate in Finland has focused on these commodities (Eerola, 2017, 2021). This is because metal mines have major impacts and the projects have mainly been started by foreign companies since the commodity boom in the 2000s. The companies exploring for other commodities are mainly national and have been well established in their localities for decades or even over centuries. This resulted in 73 companies (Table 3, Appendix A). The company websites were searched for on the Internet using Google in April–May 2020. Quantitative data on the companies are presented in Table 3 and they are listed in Appendix A, together with their parent company nationalities, websites, sustainability reporting, the explored commodities, project locations and local contexts.

The companies with websites and sustainability reporting were quantified and selected for investigation (Table 3). The sustainability reports and websites were systematically reviewed, and content analysis was applied to find references to NLIMET and the SLO/SLE. Content analysis is a "technique for making inferences by objectively and systematically identifying specified characteristics of messages" (Holsti, 1969). It is used to investigate the presence of certain words and concepts within texts. Following Jose and Lee (2007), the content analysis method applied here was conceptual analysis, which involves selecting certain concepts for scrutiny in texts.

The company websites and their sustainability reports were reviewed using the websites' search engines or analogically. The concept of the SLO and related issues, such as social acceptance, collaboration, the community, stakeholders and engagement (see Thomson and Boutilier, 2011; Parsons et al., 2014), were used as key words. The application of NLIMET was investigated by using technology as the key word. The number and proportion of companies mentioning the SLO/SLE are presented in Table 3. Selected quotations from the websites were used to demonstrate the companies' discourses on the topics. The companies mentioning the SLO/SLE are listed with their activities, main projects and explored

Table 3
Quantitative data on the companies investigated, their websites, sustainability reports and their contents regarding new low-impact mineral exploration technologies (NLIMET) and the social license to operate/explore (SLO/SLE) in March 2020; N = number.

Criteria	March 2020	
	N	%
Companies	73	100
Company websites	53	72.60
Sustainability reporting	12	16.43
Reference to the SLO/SLE	20	27.39
Reference to NLIMET	9	12.32

commodities in Table 4, while Table 5 presents the companies mentioning NLIMET, together with their activities and main projects.

Finally, as the local context in which NLIMET are applied is important for the SLO (Frank and Cohen, 2012), this was also investigated. As explained in the theoretical section, operation in sensitive areas may affect the acquisition of the SLO/SLE. For this purpose, companies mentioning NLIMET were selected and their operation in nature conservation areas, the Sámi homeland, reindeer herding areas or tourism destinations, and their association with uranium exploration were scrutinized. This was done by examining the descriptions of the local contexts found on the company websites and literature. Possible motivations for mentioning the SLO/SLE and NLIMET on the corporate websites were speculated on from the viewpoint of local contexts. The companies are listed in Table 6, together with their activities, main projects, local contexts, and issues. The association of the explored deposits with uranium was checked from Pohjalainen (2015). Literature regarding these cases was considered to reflect the acceptance of the projects by the local people and stakeholders in the analysis. Other companies not mentioning the SLO/SLE and NLIMET were also considered by checking whether their permits overlaps with sensitive areas using ArcGIS, as well as their involvement in disputes with local communities based on the literature. These are listed in Table 7. The projects and localities mentioned in the text are presented on a map in Fig. 1, together with the most active mineral exploration localities.

Table 4
Companies referring to the social license to operate/explore (SLO/SLE) on their own/parent company's website, together with their own/parent companies' nationalities, activities, main projects and explored commodities. Elements in parentheses indicate an association with the main commodities. See Fig. 1 for locations

Company (own/ parent company's nationality)	Activities	Main project(s)/ deposits	Commodities
A.A. Sakatti Mining Oy (UK)	Mine development, mineral exploration	Sakatti	Ni, Cu, Au, PGE
Agnico Eagle Finland Oy (Canada)	Mining, mineral exploration	Kittilä	Au
Anglo American Exploration B.V. (UK)[a]	Mineral exploration	Sakatti	Ni, Cu, Au, PGE
Arctic Platinum Oy (UK)	Mine development, mineral exploration	Suhanko	PGE
Boliden (4 subsidiaries; Sweden)	Mining, mineral exploration	Kevitsa, Kuhmo, Kylylahti	Ni, Cu, Co, Zn
Karelian Diamonds Resources Oy (Ireland)	Mineral exploration	Kuhmo	Diamonds
Hannukainen Mining Oy (Finland)	Mine development, mineral exploration	Hannukainen	Fe, Cu, Au
Keliber Oy (Finland)	Mine development, mineral exploration	Länttä	Li
Kultatie Holding Oy (Australia)[a]	Mineral exploration	Satulinmäki	Au
Kultatie Oy (Australia)[a]	Mineral exploration	Satulinmäki	Au
Latitude 66 Cobalt Oy (Australia)	Mine development, mineral exploration	Juomasuo	Au, Co (U)
Mawson Oy (Canada)[a]	Mineral exploration	Rompas-Rajapalot	Au, Co (U)
Muon solutions Oy (Finland)	Mineral exploration	Ylivieska, Nivala	Ni, Co, Cu
Oy Fennoscandian Resources Ab (UK)	Mineral exploration	Heinävesi, Tuusniemi	Graphite
Pyhäsalmi Mine Oy (Canada)	Mining, mineral exploration	Pyhäsalmi	Cu
Rupert Resources Finland Oy (Canada)	Mineral exploration, mine development	Ikkari, Pahtavaara	Au
Sakumpu Exploration Oy[a] (Australia)	Mineral exploration	Aarnivalkea, Aakenusvaara	Au, Cu
Stonerol Oy (Germany)	Mineral exploration	Simo	Au
Terrafame Oy (Finland)	Mine, mineral exploration	Talvivaara	Ni, Cu, Co, Zn (U)
Yara Suomi Oy (Norway)	Mining, mine development, mineral exploration	Siilinjärvi, Sokli, Savukoski	P (Nb, U)

[a] Parent company website.

Table 5
Companies mentioning new low-impact mineral exploration technologies (NLIMET) on their websites, together with their project locations. See Fig. 1 for locations.

Company	Activities	Main project(s)	NLIMET
A.A. Sakatti Mining Oy	Mine development, mineral exploration	Sakatti, Sodankylä	Closed-circuit drilling
Anglo American Exploration B.V.[a]	Mineral exploration	Sakatti, Sodankylä	Closed-circuit drilling
Boliden (four subsidiaries)	Mining, mineral exploration	Kevitsa, Kuhmo, Kylylahti, Pieksämäki Joroinen	Deep-penetrating electro-magnetic survey
Latitude 66 Cobalt Oy	Mine development, mineral exploration	Juomasuo, Kuusamo	Drones
Magnus Minerals Oy	Mineral exploration	Several locations	Manual XRF analysis
Mawson Oy[a]	Mineral exploration	Rompas, Yli-Tornio	Drone, snow, and plant sampling
Muon Solutions Oy	Mineral exploration	Ylivieska, Nivala	Muography
Oy Fennoscandian Resources Ab	Mineral exploration	Heinävesi and Tuusniemi	Drones, 2–3D
Rupert Resources Finland Oy	Mine development, mineral exploration	Pahtavaara, Ikkari, Sodankylä	Drones

[a] Parent company website.

4. Results

Quantitative data on the examined company websites, sustainability reporting and reference to NLIMET and the SLO/SLE are presented in Table 3.

4.1. Reference to the SLO/SLE

Twenty companies mentioned the SLO/SLE directly or indirectly in the form of associated topics on their own or their parent company's website (Table 4). Reference to the SLO/SLE was found within the sustainability reporting and/or the websites' sections on company values, community, responsibility, sustainability, and governance. The companies mentioning the SLO/SLE are listed in Table 4 with their nationalities, activities, main projects, and commodities.

Most of the listed companies practice mining or mine development together with mineral exploration (12), while mineral exploration is practiced exclusively by a minority of them (8 companies; Table 4). Although the quantitative difference between these is not considerable, it indicates that mining and development companies communicate more about SLO/SLE-related topics than mineral exploration companies. Those practicing mining and mine development are major and mid-tier companies with more resources obtained from production and/or investors (Lyons et al., 2016). Most of the companies in Table 4 are of foreign origin.

The Swedish company Boliden, which conducts mineral exploration and holds and develops nickel, copper, zinc and cobalt mines in Finland

Table 6
Companies mentioning new low-impact mineral exploration technologies (NLIMET) on their websites, together with their activities, projects, explored and associated commodities and sensitive contexts and issues. See Fig. 1 for locations.

Company and activity	Main project(s)	Commodity	Sensitive context and issues
A.A. Sakatti Mining Oy, mine development, mineral exploration	Sakatti (Sodankylä)	Nickel, copper	Natura 2000, mire conservation, reindeer herding
Anglo American Exploration B.V.[a], mineral exploration	Sakatti (Sodankylä)	Nickel, copper	Natura 2000, mire conservation, reindeer herding
Boliden Finnex Oy, mineral exploration	Pieksämäki and Joroinen	Gold, copper	Groundwater area
Latitude 66 Cobalt Oy, mine development, mineral exploration	Juomasuo (Kuusamo)	Cobalt, gold (uranium)	Tourism, uranium, nature conservation, reindeer herding
Magnus Minerals Oy, mineral exploration	Joensuu, Kontionlahti and Ilomantsi	Eighteen commodities	Vacation homes, lake area, claim reservation size, nature conservation area
Mawson Oy[a], mine development, mineral exploration	Rompas-Rajapalot (Yli-Tornio)	Cobalt, gold (uranium)	Natura 2000, reindeer herding, uranium
Muon Solutions Oy	Ylivieska, Nivala	Nickel, copper	Nature conservation area
Oy Fennoscandian Resources Ab, mineral exploration	Heinävesi, Tuusniemi	Graphite	Saimaa Lake region, tourism destination, vacation homes, poor corporate conduct and reputation of its parent company

[a] Parent company website.

Table 7
Companies that do not communicate about the SLO/SLE and/or NLIMET on their websites and their sensitive contexts and involvement in disputes with local communities Eerola (2021).

Company, its activity, and nationality (or of its parent company nationality)	Sensitive context(s)	Dispute
Akkerman Finland Oy, mineral exploration, the Netherlands	Indigenous Sámi homeland	x
Aurion Resources Oy, mineral exploration, Canada	Nature conservation area	
BR Gold Mining Oy, mineral exploration, Canada	Lake region, vacation homes	x
Dragon Mining Oy, mining, mineral exploration, Australia	Illegal dump within the Orivesi mine, poor reputation, and corporate conduct	x
EMX Finland Oy, mineral exploration, US/Canada	Nature conservation area	
Hannukainen Mining Oy, mine development, mineral exploration, Finland	Close to a tourism destination and nature conservation area, reindeer herding	x
Norrbotten Exploration AB, mineral exploration, Sweden	Nature conservation area	
Nortec Minerals Oy, mine development, mineral exploration, Canada	Nature conservation area	
Suomen malmitutkimus Oy, mineral exploration, Finland	Lake region, vacation homes	x

through its four subsidiaries, Boliden FinnEx, Boliden Kevitsa, Boliden Kylylahti and Boliden Kuhmo (see Fig. 1 for localities), mentions the SLO/SLE directly as a term:

> *"The strategy is to act responsibly and to build trust with local stakeholders to get the social license to continue operations."* (Boliden, 2020b).

However, social acceptance is used as a synonym for the SLO/SLE by other companies. According to the Canadian company Agnico Eagle Finland Oy (2019), which operates the Kittilä gold mine and is conducting mineral exploration Lapland, northern Finland (Fig. 1):

> "As early as possible in the project development phase, we engage and partner with stakeholders to assess the levels of social acceptability and potential impacts of the project within the host community. Our exploration teams always assign a person with responsibility for community relations, regardless of the size of the project."

Social acceptance is also one of the topics of the Finnish company Keliber Oy's Sustainability Excellence System, adapted from the Global Reporting Initiative (GRI), which is promoted by

> "*open dialogue, community involvement and transparency,*"

and monitored by key performance indicators (Keliber, 2020). Keliber Oy is developing the Länttä lithium mine in the Kaustinen region of Ostrobothnia (Fig. 1).

Nevertheless, most of the companies refer to the SLO/SLE indirectly in the form of the company–community relationship and/or stakeholder engagement, such as A.A. Sakatti Mining (2020a), a subsidiary of British Anglo American plc, carrying out mineral exploration and developing the Sakatti nickel and copper deposit in Sodankylä, northern Finland (Fig. 1):

> *"We regularly share updates on our operations in informal public meetings and on social media and inform stakeholders immediately of any major events.* […] *we have had extensive cooperation with various stakeholders. Interaction with, for example, local and municipal authorities, landowners, reindeer herders and other land users is very crucial to us."*

However, on its parent company website, Anglo American mentions the SLO/SLE directly as a term (Anglo American, 2020). This is one of the monitored issues in its global operations.

More usually, companies provide general or positive comments about their company–community relationships or activities to support them. For example, the Australian company Sunstone Metals (2020), the parent company of Kultatie Oy and Kultatie Holding Oy, states that it

> "… maintains a policy of openness and transparency in its plans for the exploration and development of its projects. The Company will progress its projects in careful consultation with all of its stakeholders. The Southern Finland Gold Project is located in agricultural and forestry areas close to small townships. Stakeholder and community engagement are integral to our exploration programs."

The British company Arctic Platinum Oy, which is conducting the Suhanko PGE Project in the Tervola region, northern Finland (Fig. 1), states that

> *"… the project has strong support from local stakeholders."* (Arctic Platinum Oy, 2020).

This indicates that, according to the company, it has acquired the SLO/SLE. Indeed, the company also recognizes that its projects

> "… are not located near environmentally sensitive Natura 2000 areas",

implying that this may be important for the SLO/SLE.

The Finnish company Muon Solutions Oy (2020b), which is exploring for nickel and copper in the Ylivieska and Nivala regions in Ostrobothnia, northwestern Finland, states that it

> "is committed to safe work practices, environmentally sensitive field research and responsibility in community relationships."

According to the British company Oy Fennoscandian Resources Ab (2012a), which is exploring for graphite in the Heinävesi and Tuusniemi regions in southeastern Finland, it will

> "*fully support and shall follow the principles set out by the International Council of Mining & Metals.[ ] As a good corporate citizen, we respect the dignity and human rights of individuals and communities everywhere we operate. We strive to make a lasting contribution to the well-being of these communities while generating strong investor returns. Indeed, our long-term success depends on taking into account the needs of all stakeholders.*

The Canadian company Mawson Gold Ltd (2020), which is exploring for gold and cobalt in the Rompas–Rajapalot area in Ylitornio, northern Finland, by its subsidiary Mawson Oy (Fig. 1), and the parent company of Sakumpu Exploration Oy, the Australian S2 Resources (2020), list their stakeholder engagement practices in more detail, such as public meetings, benefit sharing, open days in the field and at offices and communication on their activities.

Frequently, the local communities or stakeholders are not defined on the websites. However, as Boliden (2020b) affirms,

> *"Stakeholder identification is also something that Boliden has identified as key to getting the Social Licence to Operate,"* being one of its sustainability reporting issues.

The Irish company Karelian Diamond Resources plc (2020), which is exploring for diamonds in the Kuhmo region, eastern Finland (Fig. 1), defines its stakeholders as

> "including employees, suppliers, communities and regulatory bodies."

Moreover, Mawson Gold Ltd (2020) argues that the company

> "*will ensure an appropriate level of contact and negotiations with all stakeholders including landowners, Sámi, community and hunting groups and regional authorities."*

The German company Stonerol Oy (2020) and S2 Resources (2020) also mention the municipality, media, residents of the nearby areas and reindeer herders.

The benefit-sharing activities mentioned on their websites include recruiting local people, purchasing local products and services, sponsoring sports and cultural events and associations, and granting scholarships for mining-related studies. Such activities are usually reported by the largest companies that operate or develop mines in Finland, such as Boliden, Agnico Eagle Finland and Sakatti Mining.

The Canadian company Rupert Resources, which operates the Pahtavaara gold mine and is conducting mineral exploration in Sodankylä, northern Finland (Fig. 1), associates its activities with CSR, presenting a community policy (Rupert Resources, 2020).

4.2. Reference to NLIMET

Nine companies refer to the use of NLIMET on their websites. These companies are presented in Table 5, together with their activities, main projects and NLIMET.

The list in Table 5 is slightly dominant by mineral exploration companies (5). Coincidently, the companies mentioning NLIMET also refer to the SLO/SLE on their websites, except for Magnus Minerals (Table 4). As can be seen in Table 5, the most frequently mentioned NLIMET are drones.

According to Table 5, four companies mentioning NLIMET operate in Sodankylä: Sakatti Mining, Anglo American Exploration, Boliden Kevitsa and Rupert Resources Finland. According to A.A. Sakatti Mining (2020b), closed-circuit drilling

> "… *enables drilling in a sensitive environment. The system has substantially reduced our waste and water use and thus minimized our overall environmental footprint.*"

Boliden (2020a) mentions the use of deep-penetrating electro-magnetic surveys developed by the company, while Muon solutions Oy, (2020a) uses the detection of cosmic ray impacts by muography to locate mineralisations (Table 5).

However, according to the websites, most of the companies appear to apply conventional methods of mineral exploration, such as geochemical till and ground geophysical surveys, trenching and drilling. Some companies may describe conventional methods as "new" or "modern" technology, such as geographical information systems, remote sensing and 2–3D geological analysis (Magnus Minerals, Latitude 66 Cobalt).

NLIMET are generally portrayed as effective for mineral exploration. According to Oy Fennoscandian Resources Ab (2012b):

> "Drones, manned aircraft, helicopters and high-altitude earth orbiting satellites are used to map geological structures, rock units and rock alteration to identify sites for mineralisation."

The Finnish company Magnus Minerals Oy (2020), with activities all over Finland, explains that

> "*Modern equipment facilitates the quick obtaining of directive results. Manual XRF analysers give quite exacts results, for example, for base metals in 1 to 2 minutes.*"

Other companies also emphasise their low environmental impact. For example, the Australian company Latitude 66 Cobalt Oy (2020), which is exploring and developing the Juomasuo gold and cobalt deposit in Kuusamo (Fig. 1), affirms that

> "*By using remote sense and drones in geophysical surveys, drilling can be targeted more precisely than before. This means lower stress on nature and more efficient use of resources than previously. Due to the technology, less drilling is performed, and it produces more information.*" *(In Finnish: author's translation).*

Mawson Gold Ltd (2021) mentions that it

> *"… invests in new exploration methods and techniques with less significant impacts"* and [ ] "*is involved in developing and testing new, more environmentally friendly exploration methods such as snow and biochemical sampling."*

4.3. Local context and sensitive issues

Of the twenty companies mentioning SLO/SLE on their websites, nine are or have been facing opposition from local and/or external stakeholders. These are Sakatti Mining, Anglo American Exploration, Boliden Finnex, Hannukainen Mining, Latitude 66 Cobalt, Mawson, Fennoscandian Resources, Terrafame and Yara Finland (see Eerola, 2021). This indicates that their SLO/SLE strategies are challenged. However, the focus here is on the companies referring to both their use of NLIMET and SLO/SLE-related topics (Table 5). Of these nine companies, only three mention their local sensitive contexts on their websites: Sakatti Mining, Latitude 66 Cobalt and Mawson. The contexts of the other five companies mentioning NLIMET and the SLO were obtained from the literature, media reports, and a GIS study of their license overlap with sensitive areas. These companies are presented in Table 6, together with their main projects, commodities, and sensitive contexts and issues. More detailed descriptions of the projects can be found on the respective corporate websites and in the references below.

Most of the projects are situated in northern Finland, which belongs to the reindeer herding area (Fig. 1). Moreover, Sakatti Mining, Anglo American Exploration and Mawson are conducting exploration within Natura 2000 areas (Table 6). Anglo American, the parent company of the

Sakatti Mining Oy, recognizes that

> *"Sakatti sits in a protected area, and some environmental NGOs are concerned about the potential development of a mine under a protected area."* (Anglo American, 2020) However, minor local opposition also exists (Lassila, 2020).

Furthermore, according to Mawson Gold Ltd (2021),

> *"certain areas of the Rompas-Rajapalot areas* [ ] *are defined as European Union Natura 2000 designated areas.* [ ] *Natura 2000 is the centrepiece of EU nature and biodiversity policy. It is an EU-wide ecological network* [ ] *established under the 1992 Habitats Directive. The aim of the network is to assure the long-term survival of Europe's most valuable and threatened species and habitats. Natura 2000 is not a system of strict nature reserves where all human activities are excluded."*

Mawson's exploration of the Rompas–Rajapalot properties appears to be broadly supported by local people in the municipality of Ylitornio (Beland Lindahl et al., 2021). However, it is opposed by an ENGO due to its operation in a Natura 2000 area and association with uranium (Eerola, 2021). The property of Latitude 66 Cobalt is also associated with uranium (Pohjalainen, 2015), located close to nature conservation areas and has faced long-term dispute regarding the project and nature-based tourism (Lyytimäki and Peltonen, 2016; Eerola, 2021, Fig. 1, Table 5). Nevertheless, Latitude 66 Cobalt Oy (2020) states that the company respects and considers tourism and wishes to co-adapt mining with it in the region. The license of Muon Solutions overlaps with a nature conservation area. However, the company is not involved in any dispute. Mineral exploration by Fennoscandian Resources in popular holiday home areas and the tourism destinations of Heinävesi and Tuusniemi in the Saimaa Lake region, southeastern Finland (Fig. 1), has been opposed by local communities (Leino and Miettinen, 2020). The company's stakeholder engagement and communication were initially poor, neglecting important stakeholders, such as the local monasteries (Leino and Miettinen, 2020). This can be considered as poor corporate conduct and is in contradiction with the company's website statement about its SLO/SLE-related strategies. In addition, Fennoscandian Resources is a subsidiary of the British company Beowulf Mining, which has a poor reputation following its dispute related to the Gallak project in Sweden (Persson et al., 2017; Beland Lindahl et al., 2018), and noticed by the Finnish press (Kallio, 2016).

Locals have been also concerned about the effect of gold and copper exploration by Boliden Finnex Oy on a groundwater area in Pieksämäki and Joroinen (Kosonen, 2019, Table 6, Fig. 1). Appeals were also made against the claim reservations of Magnus Minerals in Joensuu, Kontionlahti and Ilomantsi lake regions by vacation homeowners' associations (Sutinen, 2021, Table 6).

No sensitive issues or opposition were found regarding Rupert Resources. According to Suopajärvi et al. (2019b), the social and environmental performance of Sakatti Mining, Boliden Kevitsa and Rupert Resources has been quite positively evaluated by the local people in Sodankylä, although the latter company has been less communicative.

4.3.1. Situation of other companies regarding sensitive contexts and disputes with local communities

Although the focus here is on companies communicating about the SLO/SLE and NLIMET, a consideration of those companies not communicating about these issues may also be important. These 53 companies form the majority of CPMEF analysed here (see Table 3, Appendix A). It is observed that some of them also operate in sensitive contexts and are involved in disputes with local communities (Appendix A, Table 7). However, most of the CPMEF not communicating about the SLO/SLE and NLIMET are apparently not involved in any of these situations (Appendix A).

5. Analysis: NLIMET and the SLE

This survey on mineral exploration company websites provides the following picture in Finland: Most of the companies have websites, but environmental reporting is only presented on a small number of them. Twenty companies mention the SLO/SLE and nine refer to the use of NLIMET. Interestingly, the companies that refer to NLIMET also mention the SLO/SLE on their websites, except for Magnus Minerals Oy. As NLIMET are intended to reduce environmental impacts, reference to them together with SLO/SLE-related issues on company websites suggests environmental and social concerns. These companies are distinguished from most of the CPMEF by communicating both issues on their websites. However, there might also be companies that do not mention either of these topics on their websites, but nevertheless consider the SLO/SLE as important and which also use NLIMET. Of the companies that do not mention the SLO/SLE and/or NLIMET, nine operate in sensitive contexts, while five of them are involved in disputes with local communities (see Eerola, 2021). Most of them are mineral exploration companies of foreign origin. Overall, only a minority of the CPMEF analysed here operate in sensitive contexts or are involved in disputes. Although it is challenging to know why the majority of CPMEF do not communicate about the SLO/SLE and NLIMET based on the analysis of their website contents, this may be explained by their lack of need for such communication. Further enquiries or interviews with their representatives might shed light on this issue.

Based on the website content presented above, the companies directly mentioning the SLO/SLE as a concept or related issues associate the concept with trust and a good company–community relationship. Based on their website statements, most of these companies appear to engage with local communities. However, according to the concept of the SLO/SLE itself, the companies need to earn acceptance from the community to validate their activities. This is well exemplified by Boliden, suggesting quite a strategic view of the SLO/SLE as a tool for access to land. While Arctic Platinum appears to be certain of its SLO/SLE in its Suhanko mine development project and announces its operations as taking place outside Natura 2000 areas, only Anglo American has reported any stakeholder concerns regarding operation within such an area, regarding its Sakatti Project in Sodankylä.

As expressed by their websites, the companies aim to earn the SLO/SLE through communication, stakeholder engagement and benefit sharing, which follows the basic requirements for the SLO/SLE expressed in the literature. These were also commonly presented in the responsibility reports of Australian mining companies studied by Bice (2014).

The relationship between the use of NLIMET and the SLO/SLE remains obscure, as they are not interlinked on company websites. The only clue is that NLIMET are considered to reduce environmental impacts, as stated on the websites of Mawson, Latitude 66 Cobalt and Sakatti Mining. It can be speculated that they may be communicated for the sake of transparency and/or in order to create a positive impression of the companies as caring for the environment and seeking acceptance for their operations, especially in the sensitive areas in which they are involved (Table 6). However, more utilitarian views on the use of NLIMET are also presented. Magnus Minerals and Fennoscandian Resources only emphasise their efficiency in mineral exploration, while other companies also mention their cost saving.

Most of the companies listed in Tables 4 and 5 are of foreign origin, some of those communicating about NLIMET are exploring deposits associated with uranium, and most of them are exploring close to or within sensitive areas (Table 6). All companies that operate in sensitive areas have also faced opposition from local communities and/or ENGOs. This indicates that their SLO/SLE strategies are not entirely effective and earning of the SLO/SLE is challenged by their operation in sensitive contexts and/or poor corporate conduct. Therefore, it seems to be clear that, as recognized by Franks and Cohen (2012), acquisition of the SLO is dependent on many factors, of which the technology used is only one.

The local context and corporate conduct also matter. Earning the SLO/SLE within sensitive contexts may be challenging, despite the SLO/SLE strategies applied and the use of NLIMET. Furthermore, operation in such local contexts could be the reason for emphasizing the SLO/SLE and NLIMET on some of the company websites, suggesting attempts to promote a good relationship with stakeholders. This appears to be justified by the stakeholder, situational and resource dependency theories applied here under a broad CSR umbrella.

6. Conclusions

The websites of CPMEF were reviewed regarding their communication of SLO/SLE-related topics and NLIMET. Their conceptions and understanding of the SLO/SLE and reference to the use of NLIMET were scrutinized. The main contributions of this article are in revealing the ways in which these issues are communicated by CPMEF, their understanding of the SLO/SLE, the technologies communicated on their websites, the operational contexts of the companies and the corporate motivations to communicate such issues on their websites were speculated. The study was an application of the third CTA analytical component.

Of the companies with websites, less than half address the SLO/SLE and even fewer refer to the use of NLIMET. Mining/mine development companies refer to SLO/SLE-related topics more frequently than mineral exploration companies. NLIMET are mentioned slightly more often by mineral exploration companies. The NLIMET most frequently referred to is the use of drones.

The SLO is rarely mentioned directly as a term. Instead, it is mostly expressed as acceptance or indirectly as other related terms. Companies may also describe their stakeholder engagement actions and list their stakeholders. Of the twenty companies mentioning SLO/SLE-related topics, nine are involved in disputes with local communities and/or ENGOs. This indicates that their SLO/SLE strategies may not be effective enough to earn acceptance of their operations.

Most of the companies that refer to their use of NLIMET also mention the SLO/SLE. Although these issues are not interlinked on the websites, reference to both is suggested to be an indication of social and environmental concerns. However, most of the companies informing about the use of NLIMET are operating in sensitive contexts, such as reindeer herding, nature conservation, groundwater, or vacation or tourism destination areas and/or areas associated with uranium, and/or having poor corporate conduct. In fact, because of this, of the nine companies referring to NLIMET, seven have faced opposition from local communities and/or ENGOs. Therefore, the focus on NLIMET and the SLO/SLE by companies involved in such situations may reflect their attempts to gain acceptance by using and communicating about them and their stakeholder engagement practices. Beyond their efficiency and cost-saving properties, NLIMET can be seen as an attempt to adapt to stakeholder expectations with more environmentally friendly approaches, especially in sensitive areas. This is in accordance with the stakeholder and resource dependency theories. For instance, following the situational and resource dependency theories, this indicates that stakeholders influence companies, and companies in turn try to influence stakeholders by creating a more positive image. However, operation in sensitive areas challenges the stated SLO/SLE strategies, as revealed by opposition towards the companies.

The lack of communication about the SLO/SLE and NLIMET by the majority of the CPMEF is also interesting. This appears to indicate that online communication of these issues is not very important for most of them. The reason for this may be that only a tiny minority of them operate in sensitive areas and are involved in disputes with local communities. Therefore, it can be suggested that they might not perceive a need to communicate about these issues.

As technology is only one of the factors affecting the acquisition of the SLO/SLE, its introduction and communication on company websites may not alone facilitate local acceptance. Other factors, such as the project location, its associated land use, commodities, livelihoods, nature values and corporate conduct and reputation may be more important than the technologies used in earning the SLO/SLE. However, as was seen, companies operating in Sodankylä and Ylitornio appear to have the broad approval of local people, but ENGOs are concerned about their projects in Natura 2000 areas. Therefore, avoiding such contexts may be one of the ways to obtain wider acceptance of mineral exploration in Finland. Furthermore, communication about the CSR, stakeholder engagement and NLIMET should be followed up by their effective application in practice.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

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This dissertation examines different dimensions of the Finnish mining and mineral exploration disputes. It uses the sociopolitical geology, social license to operate, geosystem services, and geothics concepts in the analysis of related cases and especially, about the role of the Finnish mining-sceptical movement, corporate and activist conducts and land use issues in such disputes. The thesis critiques activist and corporate conducts in such disputes and recommends approaches to avoid them.

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