Norwegian University of Life Sciences
Department of International Environment and
Development Studies

Master Thesis 2014
30 credits

Mining in Greenland: the science-policy nexus in valuing the environment

Marie De Rosa

The Department of International Environment and Development Studies, Noragric, is the international gateway for the Norwegian University of Life Sciences (UMB). Eight departments, associated research institutions and the Norwegian College of Veterinary Medicine in Oslo. Established in 1986, Noragric's contribution to international development lies in the interface between research, education (Bachelor, Master and PhD programmes) and assignments.

The Noragric Master thesis are the final theses submitted by students in order to fulfil the requirements under the Noragric Master programme "International Environmental Studies", "Development Studies" and other Master programmes.

derosa.marie@gmail.com

Noragric
Department of International Environment and Development Studies
P.O. Box 5003
N-1432 Ås
Norway
Tel.: +47 64 96 52 00
Fax: +47 64 96 52 01
Internet: http://www.umb.no/noragric

Declaration

I, Marie De Rosa, declare that this thesis is a result of my research investigations and findings. Sources of information other than my own have been acknowledged and a reference list has been appended. This work has not been previously submitted to any other university for award of any type of academic degree.

Signature…….. Date……

Acknowledgements

Writing this thesis has been challenging, but also rewarding. I have learned a lot about a country that I find very intriguing, and that I believe will play an increasingly prominent role on the international environmental stage in the decades to come.

First and foremost I would like to thank my supervisor Brigt Dale. He has been of invaluable assistance to me the last few months, and has encouraged me to challenge my academic understanding of this very complex field of study. I am grateful that I was given the chance to contribute to the project "the Arctic as a Mining Frontier" initiated by the University of Nordland, and I would like to thank my previous supervisor Grete Hovelsrud who introduced me to this project in the first place, and my co-supervisor Thor Larsen who led me in the right direction when I first visited him at his office.

Lastly, I would like to thank my always-supporting and loving family and friends for their valuable input and encouragement, and my boyfriend for his prized patience.

Abstract

Ever since Greenland achieved self-rule from Denmark in 2009, the country has actively promoted its mineral wealth on the international stage and investors from all around the world have opened their eyes to this vast Arctic island. As the ice sheets are melting, the question of how the government ought to balance the need for economic growth against the need to protect the county's vulnerable ecosystems is becoming increasingly important. The purpose of this thesis is to study in what way the government of Greenland has valued the environment when granting licenses on mining operations from the 1st of January 2009 until the 1st of April 2014. I have performed a content analysis of the previous and present government's mineral strategies, consultation memorandums and expert assessments of mining activities as well as academic literature in order to analyse how state and non-state stakeholders value ecosystem services and landscape values vis-à-vis economic gains. I have furthermore considered how expert and non-expert knowledge about the environmental effects of mining informs decision-making on mining operations, and which actors are included or excluded from the policy processes. I have linked the issue of mining to the larger Greenlandic context and placed it within the frames of the concepts of sustainable development and sacrifice zones.

I found that the government attaches importance to both the intrinsic and the instrumental value of nature, but also that "expert" assessments of the environmental consequences of mining projects consistently downplay the negative effects of the project in question. The knowledge informing decision-making on the extraction of valuable minerals is mainly produced by a limited set of scientific institutions, and on several occasions the government has disregarded alternative interpretations of a mining project's environmental effects presented by citizens or civil society groups. Using the lifting of the zero-tolerance policy as an example, the government has failed to recognise the need to incorporate different types of knowledge when assessing new and modernised types of risk. Finally, I have identified a range of flaws connected to the present participatory process in Greenland, including the apparent lack of dialogue between local residents, government representatives and the mining companies. I argue that there is a need to establish new and participatory forums where ordinary citizens, scientific experts and decision-makers can come together and discuss what the country wishes to achieve with its mineral sector and what value it should place on protecting the environment versus stimulating the economy.

Contents

1.0. Introduction 1

1.1. Conceptual framework 4

1.1.1. Sustainable development 4

1.1.2. Sacrifice zones 7

1.1.3. Ecosystem services 9

1.1.4. Environmental valuation 10

1.2. Theory 13

1.2.2. Knowledge and power 14

1.2.3. Power is everywhere 16

1.2.4. Risk as socially constructed 17

1.2.5. Risk society 19

1.2.6. Public participation 20

1.2.7. Summary 22

1.3. Methods 25

2.0. Mining activities in Greenland 29

2.1. A brief history of mining 29

2.1.1. The very beginning 29

2.1.2. The road to home rule and self-government 30

2.1.3. The Mineral Resources Act 32

2.1.4. The Mineral Strategy 34

2.2. Environmental regulation 35

2.2.1. Environmental Impact Assessment 35

2.2.2. The planning and land use law 36

2.3. Mining activities today 36

3.0. Mining and the environment 39

3.1. Environmental consequences of mining 39

4.0. Mining and public participation 41

4.1. The socio-economic context 41

4.1.1. Social Impact Assessment 41

4.1.2. Participation, consultation or information sharing? 42

5.0. Analysis 45

5.1. Valuing the environment 45

5.1.1. Results 45

5.1.2. Discussion of the government´s approach to valuation 50

5.1.3. Sustainable development 55

5.1.4. Sacrifice zones 57

5.1.5. Concluding valuation 60

5.2. Knowledge in decision-making 60

5.2.1. Scientific vs. local knowledge 60

5.2.2. Science in politics 64

5.2.3. Analysing risk in Greenlandic mining policies 68

5.2.4. Concluding risk 73

5.3. Public participation 73

5.3.1. Results – the consultation process 74

5.3.2. Results – the mineral strategies 74

5.3.3. Results – consultation meetings 2012-2014 77

5.3.4. Discussion of the government´s approach to participation 79

5.3.5. Concluding participation 83

5.4. Ways forward 84

6.0. Conclusion 87

7.0. Literature 91

8.0. Appendices 105

8.1. Appendix 1 – Connelly´s sustainability triangle 105

8.2. Appendix 2 – Current exploitation licenses 106

8.3. Appendix 3 – Current exploration licenses 107

8.4. Appendix 4 – Maps of mining projects discussed in the thesis 114

8.5. Appendix 5 – Map of sensitive areas in Greenland 117

List of abbreviations

APNN – Ministry of Fisheries, Hunting and Agriculture

BAT – Best Available Technology

BEP – Best Environmental Practice

BMP – Bureau of Minerals and Petroleum

DCE – Danish Center for Environment and Energy

EAMRA – Environmental Agency for the Mineral Resources Area

EIA – Environmental Impact Assessment

ESS – Ecosystem Services

GA – Grønlands Arbejdsgiverforening (Greenland's Employer's Association)

GINR – Greenland Institute of Natural Resources

IBA – Impact Benefit Agreement

ICC – Inuit Circumpolar Council

KANUKOKA – De Grønlandske Kommuners Landsforening (Association of Greenland's Municipalities)

MEA – Millennium Ecosystem Assessment

MIMR – Ministry of Industry and Mineral Resources

MLSA – Mineral License and Safety Authorities

MRA – Mineral Resources Act

NGO – Non-Governmental Organisation

SIA – Social Impact Assessment

SIK – Sulinermik Inuussutissarsiuteqartut Kattuffiat (Employers' Association of Greenland)

ToR – Terms of Reference

WWF – World Wide Fund for Nature

1.0 Introduction

On the 12th of March 2013 the social democratic Siumut party won the general elections in Greenland, and the party leader Aleqa Hammond became Greenland's first female Prime Minister.[1] Hammond replaced Kuupik Kleist of the leftist Inuit Ataqatigiit party, who served as Prime Minister from 2009 to 2013. During the election campaign, the question of Greenland's mineral future was put at the forefront. Hammond and Kleist had very different perceptions on the matter, though both agreed that Greenland should become less dependent on Denmark. According to Reuters, Kleist was keen on opening up Greenland to foreign investors and his government had previously passed a law that allowed foreign workers to enter the country (Scrutton 2013). Hammond, on the other hand, promised to revise the law if she was elected, and also said that she would put more taxes or royalties on foreign mining companies (ibid.). The most controversial issue, however, concerned the mining of uranium. While Kleist and his government declared their wish to uphold Greenland's long-standing ban on the mining of uranium and other radioactive materials, Hammond and her followers were set on lifting the zero-tolerance policy (ibid.). Greenland has the world's largest known reserves of uranium, and as the world stock is rapidly decreasing, uranium could potentially become a very lucrative source of income for Greenland's struggling economy.

Shortly after Hammond and the Siumut party won 14 of the 31 seats in Parliament, the quarter-of-a-century old ban on uranium mining was repealed (Nuttall 2013:368). Following a heated debate on the 24th of October 2013, 14 of 15 members of the Greenlandic Parliament voted in favour of lifting the ban. According to Reuters, Hammond was quoted by the local newspaper Sermitsiaq during the debate as saying that: "We cannot live with unemployment and the cost of living increasing while our economy is at a standstill. It is therefore necessary that we eliminate the zero tolerance toward uranium now" (Reuters 2013). On the same day, the Minister of Industry and Minerals Jens Erik Kirkegaard granted a license to the UK-based company London Mining for an iron ore mine project at Isukasia in the northeast of Greenland (Nuttall 2013:368). The Isukasia project is expected to attract some 3000 foreign workers, mostly Chinese, and will cost around 15 billion US dollars to build (Arctic Journal 2013). According to Nuttall there has been a marked policy towards promoting mining as a major industry in Greenland over the recent years (2013:369). The marketing of Greenland as a new resource frontier is, as stated by Nuttall, based on a broad political agreement and rests

[1] The government has called for an election due to allegations of Hammond misusing public funds.

on the need for Greenland to create new jobs and business opportunities as alternatives to the traditional fishing sector (ibid.). One of the main reasons why the present government wishes to develop a viable mining sector is because of Greenland's financial and political dependence on Denmark. The self-government agreement acknowledges Greenland's ownership rights to the country's subsurface resources, but at present Greenland still depend on extensive financial support from Denmark. Furthermore, Denmark controls important policy areas such as the justice and police systems (ibid.). These will remain under Danish control until Greenland becomes completely autonomous, both financially and politically.

Developing the mineral sector in Greenland involves several important government challenges for the young democracy. Of particular concern is the protection of Greenland's vulnerable Arctic environment. As the climate is warming and the ice sheets are melting, the vast and mineral-rich country is becoming more accessible to major international players looking to get a slice of the pie. The influx of foreign investors offers a good opportunity for the Greenlandic government to increase its depleted budget, but will also put a strain on the country's natural resources – mineral as well as other. How does the government balance the need for quick cash against the urge to protect the environment? In this research project, I will study the way in which the government of Greenland has valuated the environment when granting licenses on mining operations since the introduction of self-rule in 2009. Through an extensive content analysis of mainly governmental documents, I will consider how ecosystem services and landscape values are perceived among different stakeholders – both state and non-state – and to what extent knowledge about the environment is incorporated into the decision-making processes guiding the extraction of minerals. I will furthermore assess which actors are included/excluded from the policy processes on mining, and ultimately whose knowledge counts when decisions are being made. The issue of mining will be analytically linked to the larger Greenlandic context and the country's history of resource extraction, and critically placed within the frames of the current debate on the concepts of sacrifice zones and sustainable development.

Several authors have addressed the growth and development within the Greenlandic mining sector over the last few years. Most notable among these are professor Mark Nuttall at the University of Alberta in Canada. Nuttall has written extensively about the mineral developments in Greenland, coupled with the rights of the indigenous peoples and their

relationship with nature.[2] Numerous reports have addressed the same subject, most often with reference to the lack of public participation in decision-making on mining activities in Greenland (Bjørn Aaen 2012, Langhoff 2013). None of these studies have, however, focused specifically on the *environmental* aspects of decision-making and public participation in mining projects. As mining involves a substantial interference with nature, I believe this to be important knowledge, especially considering that the citizens of Greenland to some extent still depend on the country's natural resources for a living.

The thesis is divided into five main sections. The first section presents and critically discusses three key concepts that are later used to shed light on how the Greenlandic governments have prioritised the environment vis-à-vis the economy in decisions on mining activities; sustainable development, sacrifice zones and environmental valuation. Following the conceptual framework is the theory section, where scholarly contributions on knowledge, power, the science-policy nexus, risk and public participation are introduced. These theories are subsequently put into a Greenlandic context in order to analyse what the decision-makers base their mining assessments on. After the methods section follows a background chapter that includes a brief history of mining in Greenland and the current status of mining operations, and a road map of the rules and regulations guiding present mineral extraction and public participation in Greenland. The analysis makes up the fifth and last section, where I have performed a content analysis of different types of documents in order to answer the following research questions:

I. How do Greenlandic decision-makers value the environment vis-à-vis economic gains when reaching decisions on mining operations?

II. In what way is knowledge about landscapes and ecosystem services incorporated into the decision-making on mining operations, and are local Greenlanders included or excluded when those decisions are being made?

I will start the following section by giving a short introduction to the concept of sustainable development, followed by a brief presentation of some of its main critiques. The discussions on sustainability is interesting to the topic of this thesis because it raises some fundamental

[2] See for instance Nuttall (2012): The Isukasia iron ore controversy: Extractive industries and public consultation in Greenland. In: Nuttall, M., Tervo-Kankare, K. & Karjalainen, T. (eds.) NGP Yearbook 2012. Negotiating resources, engaging people: Human-environment relations in the North. *Nordia Geographical Publications*, Vol. 41, Issue 5, pp. 23-34.

questions about mining activities; can we imagine a mineral sector that simultaneously promotes environmental sustainability *and* economic gains? Can we, in a strict environmental sense, speak of mining as something sustainable when the industry is built on a resource that per se is *unsustainable* – in the sense of being exhaustible? As the following debate on sustainability illustrates, the concept has throughout the years been linked to various societal goals – ranging from economic growth to social justice – which also has a bearing on how it has been related to the environment.

1.1. Conceptual framework

1.1.1. Sustainable development

The concept of sustainability has been contested ever since it was first introduced at the 1972 UN conference on the Human Environment in Stockholm. It was not until the Brundtland Commission formulated its definition of sustainable development, however, that the term really gained in popularity. Today, sustainability has become so mainstream that it has lost some of its original meaning, according to several authors (Kirsch 2009, Scoones et al. 2007).

Kirsch (2009) states that the notions of sustainability and sustainable mining have been adopted by the mining industry in order to whitewash its environmentally degrading activities – so-called "green washing". Accordingly, he finds that the mining companies have redefined sustainability into a corporate oxymoron – in the sense that sustainability and mining are incompatible – and that the industry uses the term primarily to refer to economic variables that can be used to support development after mining closure (ibid.:90). Because the international community still connote sustainability with something inherently positive, a strategic deployment of the term provides the mining industry with symbolic capital (ibid.: 91). Kirsch furthermore draws a distinction between weak and strong sustainability, claiming that mining companies adhere to the former (ibid.). Weak sustainability is seen as a situation where the value of natural and manufactured capital are equalised in that sustainability is achieved when the total stock of capital increases or remains constant. So if a mining company pollutes a river, the use of the river is still considered sustainable if the profits from the mine equals or exceeds the value of the polluted river. Strong sustainability, on the other hand, views weak sustainability as a category error and considers human and natural capital to be interdependent, but not interchangeable (ibid.).

Connelly (2007), on the other hand, problematizes the way sustainable development as an ambiguous concept has been forced into an academic straightjacket and argues that one should recognise the concept's ambiguity as something intrinsic and valuable (ibid.:260). By opening up to this recognition, those wishing to promote environmental sustainability will have a clearer understanding of the potential conflict between desirable goals and are able to set clear policy targets based on different understandings of what sustainability really means (ibid.). In following Connelly's line of thought, separating between weak and strong sustainability is problematic because it proposes a single, normative conceptualisation of sustainable development that in fact does not exist. In stead, Connelly proposes to unload the concept's ambiguities by "mapping the field". He draws up a continuous field in the shape of a triangle on which he locates three possible solutions to development – economic growth, social justice and environmental protection (see appendix 1). Sustainable development is placed at the centre of the figure. The corners of the triangle represent extreme positions, where for instance the "economic growth" corner refers to viewpoints that prioritise economic growth before both social justice and environmental protection. Between the corners lie positions that represent a more balanced viewpoint (ibid.:268-269). In this figure, sustainable development entails some sort of balance between economic, social justice and environmental protection concerns, which is also the position of the Brundtland Commission (ibid.).

Scoones et al. (2007) takes a similar approach, and sees sustainable development as a *normative* concept that should be recognised as such (ibid.:34). It refers to a rather vague set of social, environmental and economic values that are to be secured according to a certain societal standard. Following this line of thought, particular political structures and institutions are not ends in themselves, but rather means to achieving these normative goals (ibid.). Sustainability is not about choosing between different managerial positions that ultimately will lead to one coherent vision of the future. Rather, it is a contested resource that enables discussions about different pathways to different futures – it is a "boundary object" and inherently a *political* concept (ibid.). In following Scoones et al., what is needed is an opening up of the sustainability debate. The choice of which path to sustainability society should follow is not a simple, technical and scientific one. It requires debate among stakeholders with different views and understandings of the future, and an inclusion of multiple, non-scientific knowledge systems, supported by reflexive governments and with an attention to the power processes that still permeate democratic decision-making (ibid.:41).

In light of this discussion, I find the classic Brundtland definition of sustainability as "development that meets the need of the present without compromising the ability of future generations to meet their own needs" to be somewhat wanting. I have consequently chosen two different conceptualisations of sustainable development from resilience thinking that better reflect the non-linearity and complexity of natural systems, and that are easier to operationalize than the Brundtland one. Whereas the first definition reflects the general limitations of nature, the second captures the correlation of social and ecological system.
On a general scale, sustainable development is defined as the process of:

> "(...) not challenging ecological thresholds on temporal and spatial scales that will negatively affect ecological systems and social systems" (Folkes & Berke 2000:4).

And furthermore, sustainable development is defined as:

> "(...) an attribute of dynamic adaptive systems that are able to flourish and grow in the face of uncertainty and constant change. Achieving sustainability will require innovation, foresight and effective partnerships among corporations, governments, and other groups" (Center for Resilience 2014).

Implementing these notions of sustainable development in governance processes is not an easy task. It requires reflexive decision-makers who not only recognise the dynamic complexity of social, ecological and social-ecological systems, but also welcome it. The policy sphere must open up to different and competing notions of sustainability, scientific as well as non-scientific, and negotiate solutions to complex issues. There are no simple, objective and linear pathways to a desirable and sustainable future. As I will return to in later parts of this assignment, the inclusion of "lay" knowledge in policy processes requires the formation of new participatory forums where scientific and non-scientific knowledge systems are seen as complementing each other. These forums have, however, not yet emerged, or are still dominated by the scientific paradigm.

1.1.2 Sacrifice zones

Linked to the previous concept of sustainable development is the notion of sacrifice zones, defined as a landscape destroyed or damaged beyond repair in a foreseeable future.[3] A sacrifice zone cannot provide services to either humans or other living things, and are understood as "areas where industrial development and/or lack of intentionality in management have led to degradation beyond what is defined as environmentally sustainable" (ibid.). Defining certain zones as sacrificed and unsustainable does not, however, preclude the possibility of *sustainable development.* I will return to this point later on in the following discussion.

The concept of sacrifice zones has been a part of the environmental debate in the US for several years, and is most often related to understandings of environmental justice. In her work on nuclear waste in the Yucca Mountains in Nevada, Valerie Kuletz (1998) employs an eco-political approach to the issue of sacrifice zones. Taking the indigenous groups in Yucca as a starting point, Kuletz claims that government officials and historians are actively ignoring the presence of these tribes at nuclear testing sites, compromising their culture and way of life (ibid.:5). Kuletz sees this disregard for the inhabitants of Yucca as a recurring pattern of exploitation, going all the way back to the American expansion to the west in the 17th and 18th centuries. She describes Yucca as a nuclear landscape, ripened by sacrifice and plundered of its wealth (ibid.). According to Kuletz, the mapping of the nuclear landscape at Yucca can be linked to critical narratives on science, power, racism and cultural marginalisation, and she employs the concept of deterritoriality to describe the prevalence of sacrificed landscapes and the cultural imperialism it entails:

> "Once made visible, the zones of sacrifice that compromise these local landscapes can begin to be pieced together to reveal regional, national, and even global patterns of *deterritoriality* – the loss of commitment by modern nation-states (and even international community) to particular lands or regions" (Kuletz 1998:7).

[3] I relate the concept of sacrifice zones to the research project "The Arctic as a Mining Frontier" funded by the Research Council of Norway: http://www.forskningsradet.no/servlet/Satellite?c=Prosjekt&cid=1253992572704&pagename=miljo2015/Hovedsidemal&p=1224697848216

Julia Fox (1999) also employs the sacrifice zone-term when describing the coal industry's unjust commodification of nature and man in her study of mountain top removal in the state of West Virginia. According to Fox, West Virginia's regulatory regime contains some of the weakest environmental laws in the US, partly because the coal companies and the state are operating in a close partnership (ibid.:170). Furthermore, she claims that the rationalisation of mining operations is creating massive social dislocations. As the demand for coal increases, "West Virginia is thus being turned into an environmental-sacrifice zone, subject to horrendous environmental destruction to provide cleaner, less polluting coal for the nation" (Fox 1999:165). Both Fox and Kuletz thus relate sacrifice zones to thoughts about exploitation, deprivation of rights and lack of justice, with capitalist and economic concerns being a part of the problem rather than a part of the solution to sustainable development. In following Connelly (2007), I find it erroneous to believe that environmental protection equals social justice, as Fox justifies in her paper about coal production. Connelly claims that the linking of environmental protection with other concerns such as workers' rights and public participation is a political task and not an intellectual one. Consequently, the notion of sustainable development may contain any possible combination of environmental protection, social justice and public participation depending on the responsible party's political goals (2007:267). Connelly thus places the notion of sacrifice zones safely within the political realm, where environmental concerns have to compete for attention with other pressing issues, which I believe to be a more nuanced understanding of the concept.

If the concept of sacrifice zones is in fact a political one, how does it play out in the Greenlandic context? A recent study by professor Minik Rosing and others signal that the notion of environmental sacrifice zones is becoming increasingly more relevant in the mineral sector of Greenland (The Committee for Greenlandic Mineral Resources to the Benefit of Society 2014). According to Rosing (2014), Greenlandic citizens, mining companies and NGOs are currently discussing the possibility of separating the country into "go" and "no-go" zones where mining activities are actively promoted in the previous while discouraged in the latter, and where protected zones typically are characterised by an especially vulnerable environment or important cultural heritage sites. Such a zoning of the environment goes right to the heart of the previous discussion on sustainable development, where sustainability is seen as the task of balancing between different desirable goals. Stimulating economic development in "go" zones is combined with protecting the environment in "no-go" zones with overall sustainable development being the main target. In

the length of the foregoing debate, I will critically apply the concept of sacrifice zones onto the Greenlandic model of environmental policy-making. I will furthermore assess the current understanding of sacrifice zones as something inherently negative, and propose new ways of looking at the concept based on the multi-functionality of landscapes and the different ways of valuating them. Are all landscapes that are "destroyed" or "spoiled" necessarily sacrifice zones, or can they contain other forms of value that does not automatically fit with the sacrifice zone-term? These questions all relate to the concept of valuation and will thus enter into my analysis on how Greenlandic decision-makers value the environment based on their approval or rejection of different kinds of mining activities.

1.1.3. Ecosystem services

Social-ecological systems, understood as linked systems of humans and nature, can be described and valued in different manners. One approach to environmental valuation stems from the rather recent concept of ecosystem services (ESS), first introduced in the Millennium Ecosystem Assessment by the United Nations (UN) in 2005.

Daily (1997) has defined ecosystem services as:

> "(...) the conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfil human life. They maintain biodiversity and the production of ecosystem goods, such as seafood, forage, timber, biomass fuels, natural fibre and many pharmaceuticals, industrial products, and their precursors" (Daily 1997 in MEA 2005:53).

Ecosystem services can be grouped according to their function within the defined ecosystem, and consist of the following types of services: provisioning services (food, fuel, water etc.), regulating services (climate regulation, erosion control etc.), cultural services (cultural diversity, knowledge systems, aesthetic values etc.) and supporting services (primary production, nutrient cycling etc.) (MEA 2005:56-60). In this assignment, the three former kinds of services will be considered.

The ESS concept was first introduced as a new way of dealing with biodiversity loss, but has increasingly been advocated in other policy fields such as climate change mitigation and

sustainable water and land use. The success of the ESS framework, however, lies in its anthropogenic focus. It centres on the services that the environment provides for us as human beings, and promotes environmental conservation as something that ultimately benefits ourselves – in that the environment continues to provide us with its services. In such, the environment and its services (such as clean water or fresh air) is not presented as something valuable in itself, but rather gains its value from the effects it has on humans. Despite this human-centred focus, presenting the environment as something that consists of interlinked systems is quite useful because it illustrates the interdependencies that exist between different components of an ecological system. One cannot degrade one part of the system without it having negative consequences on other parts of the system, or on the system as a whole. I will consequently employ the ESS-term throughout this paper, but will use a broader concept of valuation – considering social, cultural *and* economic aspects of nature and natural resources – as a starting point for my analysis of how the government understands the environment in mining sites.

1.1.4. Environmental valuation

How we value the environment has an important bearing on how we use it. Since the beginning of time humans have lived in, off and with nature. Today, most natural resources are subject to restrictions by state and private actors or community networks, and these institutions influence how we value our surroundings. In modern times, putting a price on certain types of ecosystem services has been dominating the Western institutional way of valuing the environment. The trading of carbon-dioxide emissions under the Kyoto Protocol is an eminent example of this type of valuation mechanism, typical of the field of environmental economics. As stated by Chee, neoclassical economics – on which the field of environmental economics rests – is about allocating scarce natural capital as efficiently as possible in order to satisfy human needs or desires (2004:551). It encompasses an *instrumental* view on nature, in which the environment is valued according to its provision of something else that is valuable to humans – such as food, clothing, housing etc. This is contrary to the *intrinsic* approach to nature, where the environment is considered as valuable in itself (ibid.). Recently, the field of neoclassical economics has grown to recognise the non-use, indirect use and existence value of ecosystem services (ibid.:553). *Existence value* refers to the wish of preserving certain species or environmental services if their continued existence generates welfare for human beings, and implies that any source of welfare can be

substituted by alternative sources of welfare in a trade-off between the continued existence of the species/ecosystem service and other things that provide the same utility (ibid.) As such, nature is still perceived as a commodity that can be traded on the market.

The valuing of environmental goods and services is, however, not only about restricting human use of these resources. It is also about choosing between different, and often conflicting, ethical and practical principles. As stated by Vatn, market-based calculations are not able to capture all of nature's value dimensions (2000:496). Certain aspects of the environment are incommensurable, with ethical concerns offering a good example of this incommensurability (ibid.:496). For instance, many people consider nature to be a part of the human heritage. Consequently, we have a moral and ethical obligation not to degrade it beyond repair (ibid.:500). The commodification of natural goods and services furthermore ignores the *functional* aspects of environmental goods – meaning something that offers us important, but largely invisible services (Vatn 2000:498). In line with resilience thinking, the environment consists of a number of processes and feedback loops that all contribute to the system's internal and external balance. One cannot simply remove parts of this system and place it within the confines of the market while leaving other parts out, because the totality of the environment is worth more than its individual components (Vatn 2000:10-11).

Both Vatn and Chee find the solution to these valuation issues in the design of institutions. In keeping with Vatn, the interdependency that exists across individuals in the natural system necessitates some sort of social process to determine our values and preferences (2000:505). Vatn does not, however, specify how this social process or institution is to be constructed, other than pointing out that is should "be formulated in a way consistent with this insight" (ibid.). Chee, on the other hand, proposes to replace the top-down and technocratic economical approach to environmental valuation with a participatory approach focusing on uncertainty, context, deliberation, negotiation, value formation, risk assessment and reconciliation (2004:559). This deliberative process should, according to Chee, include mechanisms in which people are allowed to express their views on what sort of ecosystems they want. It should also facilitate learning about the issue at stake, and potential outcomes associated with the different options presented. Furthermore, the process must encourage discussion, deliberation and negotiation over trade-offs and evaluate options with the aim of finding compromise solutions (ibid.).

Environmental valuation is thus a subjective undertaking, and in line with the above discussion I have chosen to define it as "the process of determining the human impact on non-human life that rests on either instrumental and economic considerations, or intrinsic and socially constructed ethical, moral and cultural beliefs, or both." Valuing the environment according to the second part of this definition poses a significant challenge to the present managerial standing on natural landscapes. If valuation is seen as something belonging to the self, imbued with ethical concerns and dilemmas, it no longer makes sense to trade environmental services on a market or to place the valuation task within the confines of the state. Neither the market nor the state is able to fully capture all the value dimensions of a certain ecosystem or landscape because these institutions are located at the outskirts of people's everyday interplay with nature. Putting it simply, valuation is reduced to either a mathematical calculation or a political trade-off performed by a restricted number of "objective" actors. Rather, and as recommended by Vatn and Chee, valuing the environment beckons more local self-governance and participatory forums where ethical and cultural concerns are brought to the fore by the people who interact with nature, and where complex solutions to complex issues can be discussed, negotiated and compromised. In Greenland, the task of environmental valuation is, as we shall see, very much left up to private companies and state bureaucracy. Mining companies looking for a license to operate usually hire a consultant firm to evaluate the environmental consequences of a proposed project in accordance with technical government guidelines, and these consequences are subsequently analysed by "independent experts" and government bureaucrats. Before approval, the technical reviews are presented to the public who are given the chance to comment on them. As I will return to in the analysis, the democratic aspect of this participatory process is problematic on several accounts and does not leave room for alternative cultural and moral interpretations of the value of the Greenlandic environment. The process of valuation is furthermore related to the previously discussed concepts of sustainable development and sacrifice zones. Whenever Greenlandic decision-makers are calculating the worth of protecting the country's natural resources, they must compare it to the worth of *not* protecting these resources. Should a certain geographical area be conserved in order to promote sustainable development, or should it be opened up to industrial activities in order to promote the struggling economy? This is of course a rather basic representation of the issue at stake, and the task of valuation also depends on how the decision-maker in question understands sustainability versus sacrifice. For instance, if sustainable development is simply seen as not degrading an ecosystem beyond the point where it is no longer able to maintain its vital

functions, the outcome – both economic and ecological – will be quite different than if sustainable development is defined as maintaining an ecosystem within its present state. However, the process of valuation cannot be fully appreciated without recognising the conflict that often arises between protection – traditionally understood as sustainable development – and economic exploitation – often understood as sacrificing.

1.2. Theory

1.2.1. The scientific hegemony

The aim of this paper is to uncover whether or not the Greenlandic society is actively involved in decision-making on mining activities, and to assess whose knowledge those decisions are based upon. In order to answer these questions, I turn to Sheila Jasanoff – a prominent scholar on Science and Technology studies – and her forceful theories on scientific knowledge production and risk perception. Throughout this section, I will use insights from Jasanoff, Michel Foucault, Ulrich Beck and other scholars on power, knowledge and risk to demonstrate that knowledge is situated and subjective, and to disclose the links that exist between "experts" and "laymen", science and politics and nature and society. Later on, I will critically examine whether or not these links exist in the Greenlandic context.

I will start this chapter by briefly referring to Jasanoff & Martello (2004), whom in their book on Earthly Politics discuss how international organisations such as the UN and the World Bank have come to dominate the discourse on environmental protection. According to the authors, these organisations are constantly in need of reliable, scientific knowledge to support their authority. Thus, expert bodies such as the International Panel on Climate Change (IPCC) have been established to produce "universal truths" and globally accepted facts about the environment (ibid.:7). Not everyone has accepted these "truths" however, and several influential NGOs have created their own sources of counter-expertise in the environmental field. Nevertheless, Jasanoff & Martello claim that the international environmental regimes continue to devalue local and traditional knowledge in favour of "scientific knowledge" produced by IPCC and others (ibid.:12). The differentiation between different types of knowledge is evident also at the regional and local scale, and is closely connected to the exercise of power. This is the issue to which I now turn.

1.2.2. Knowledge and power

Having established that scientific representations of environmental issues have come to dominate global knowledge production, one important question remains unanswered: how do these representations gain their force? The answer, according to authors such as Jasanoff (2004[1]), Foucault (1977) and Pregernig & Böcher (2012), lies in the close relationship between knowledge and power. According to Jasanoff, a link exists between the ordering of nature through knowledge production, and the ordering of society through power and politics (ibid.:8). That does not mean that political institutions outrank science and technology, or that technology drives the historical developments of society. Rather, the two bodies reinforce each other, creating stability and change (ibid.). Both contribute to the establishment of different forms of authority and are indispensible in the production of power. As stated by Jasanoff, science and society are *co-produced* and none are given primacy over the other (ibid.:9).

So how does this knowledge-power nexus play out in practical terms? According to Pregernig & Böcher, there are three different ways of conceptualising the way that science and politics reinforce each other. The belief that science directly contributes to the effectiveness of political decision-making, that policy processes are objective and analytical and science is value-free, and that the two arenas are spatially separated, can be classified as an "instrumental" view on the science-politics relationship (ibid.:210). As stated by the authors, this perspective is still held high among many policy-makers and scientists today. Other scholars with a more "strategic" take on the science-policy nexus believe that expert knowledge is used by political actors to serve their own interests, and that politicians thus choose the advice that best serves their purposes (ibid.:211). The use of "green washing" to justify unpopular decision-making is an example of strategic deployment of scientific advice. At the other end of the scale is the constructivist approach. Constructivists acknowledge that the distinction between science and politics is not as clear-cut as one is led to believe, and that the demarcation between the two is filled with contingent circumstances and strategic behaviour (ibid.:212). Jasanoff, on the other hand, has divided the dominant Science & Technology studies into two main strands on the co-production of science and society: *constitutive* co-production and *interactional* co-production (ibid.:10). The first is mainly concerned with how certain states of knowledge are produced and held constant or

abandoned; whereas the other recognises that the discovery of new phenomena entails confrontations between different epistemologies. I will only discuss the latter.

The interactional model of co-production questions the assumption that science is autonomous and separated from other social activities (ibid.:34). As pointed out by Jasanoff, people seeking truths about nature are confronted with problems of credibility – whose claims should they trust? In times of so-called "scientific revolutions" it may not be possible to ascertain which claims are right and which are wrong without rearranging the authority of individuals and institutions (Jasanoff ibid.:32). "Doing science is doing politics" as stated by Jasanoff (ibid.). Science can be used to legitimise political actions, and the embeddedness of science in politics affects the degree of state sponsorship of scientific activities. The two spheres of knowledge and power interact and reproduce each other, and can never be fully separated. In following Jasanoff, the co-production of order in nature and society can happen along four different paths. First, by making identities. Identities enable people to make sense of disorder, and the production of knowledge provide these identities with meaning and power (ibid.:50). For instance, being identified as an "expert" also means that one is identified as a bearer of modernity and progress. Second, by making institutions. As with identities, institutions are instruments for putting things in order at times of disorder. Without institutions, co-production cannot take place. When environmental knowledge changes, new institutions emerge "to provide the web of social and normative understandings within which new characterisations of nature can be recognised and given political effect" (ibid.:52). The power of knowledge rests in the present institutions and social practices guiding environmental agendas, and the opening up of new discourses thus requires the formation of new arenas – or institutions – of knowledge. Third, by making discourses. According to Jasanoff, solving problems of order often entails creating new discourses. These discourses are used to find words for new phenomena or to modify old ones, or to build up scientific authority (ibid.:53). Finding a new language frequently means oversimplifying phenomena, but may also enable reasoned action. Fourth, by making representations. In science, historical, political and cultural influences affect representational practices. In the human and biological sciences, models of human agency and behaviour inform representation. And in society, actors absorb scientific representations. Through these processes, new socio-technological constructs, such as climate change, gain a cognitive and political standing in society (ibid.:54). Knowledge is taken up by social actors and is given meaning by affecting people's identities, making some into experts and others into laymen (ibid.:55).

1.2.3. Power is everywhere

The French philosopher and historian Michel Foucault views power as something transcending political structures and state boundaries. Power, according to Foucault, is conceptualised in the self as a socialised phenomenon and is as such "everywhere" (ibid.:119). Consequently, power is not only visible in political structures but also expressed through dominant discourses and knowledge forms. Foucault uses the term "power/knowledge" to illustrate that power is governed by accepted forms of knowledge and scientific understandings, and the term "regime of truth" to illustrate the pervasiveness of power/knowledge in society (ibid.:112). Foucault believes that these regimes are constantly negotiated and redefined through social practices and ideologies, and that there are certain pivotal moments where an old regime is replaced with a new one. According to Foucault, the rapidity of these regime changes signals that the very rules governing scientific "truths" are being modified:

> "This is not a change of content (refutation of old errors, recovery of old truths), nor is it a change of theoretical form (renewal of paradigm, modification of system ensembles). It is a question of what governs statements, and the way in which they govern each other so as to constitute a set of propositions which are scientifically acceptable, and hence capable of being verified or falsified by scientific procedures. In short, there is a problem of the regime, the politics of the scientific statement" (1977:112).

Hence, Foucault does not believe that the scientific battle for truth is about finding some one and absolute certainty. Rather, it is a battle about the rules governing the separation of true and false (ibid.:132). Every society has its own regime of truth, meaning the types of discourses that are accepted as true through mechanisms that enable one to distinguish between true and false statements. "Truth" is found in scientific discourses and the institutions producing them, under the control of a few powerful political and economic agents such as the university and the media. And yet, Foucault recognises that power is not only a repressive and negative force. What makes power acceptable is that it "induces pleasure, forms knowledge, produces discourse" (ibid.:119). It is a productive network running through the whole of society, and a key source of social discipline and conformity. Even though Foucault claims that power is everywhere, he still believes in the opportunity of

challenging it. According to Foucault, challenging power is not about searching for some universal truth, because truth is a socially produced source of power. It is not about changing people's consciousness or ascertaining the possibility of constituting a new politics of truth. The problem lies in the political, economic and institutional regime that produces the truth, and to challenge power is thus a task of "detaching the power of truth from the forms of hegemony, social, economic and cultural, within which it operates at the present time" (ibid.:133). Hegemonic discourses produce power, but it also exposes it and renders it open to contestation and disintegration.

To sum up, both the constructivist/interactional model of co-production and Foucault's postulates on power/knowledge emphasise the need to change the rules of the game in order to challenge hegemonic discourses on environmental issues. It is not sufficient to promote new scientific results or to launch new political agendas, because knowledge and power operate in a close relationship and reinforce the current status quo. What is needed is a disintegration of the two social structures in the form of new participatory forums, and I will return to this point later on in the theory review.

1.2.4. Risk as socially constructed

There is always an element of risk involved in decision-making on environmental issues, and calculating risk is an important part of managing natural resources. First, neither politicians nor scientists are infallible and wrong decisions have been made on several accounts throughout the history of environmental policy-making – some of the most prominent among these being the mismanagement of the Aral Sea in Central Asia, and the Chernobyl nuclear power plant accident in 1986 and the handling of its after effects. Second, one cannot fully control nature, and risk is part of human co-existence with its surroundings. As the German sociologist Ulrich Beck has pointed out, risk is both a part of the "natural" system – in the form of earthquakes, floods, hurricanes etc. – and the "social" system – such as the outbreak and spreading of pandemics or the emission of greenhouse gases. These risks can to a greater or lesser extent be identified and predicted, but not always avoided (Mythen 2004:16). The issue of risk is relevant especially when looking at policy-making in the mining sector, as mineral activities carry a real threat of harm both to humans and the environment. The harm caused by mining activities is not always visible – consider for instance the leakage of heavy pollutants into a river stream – making the risks associated with mining even more severe.

Bearing in mind that a significant proportion of Greenlanders still depend on natural resources for a living, and the general vulnerability of the Arctic climate, the importance of carefully calculating the risks involved in conducting mining activities is substantiated. How do Greenlandic policy-makers conceive of such risks, and whose perception of risks counts when decisions on mining activities are being made?

Jasanoff (1998) offers some interesting insights into the issue of risk in her article on the political science of risk perception. According to Jasanoff, there are several different models for relating risk perceptions to public policy. These differ in both their epistemologies and in their prescription for how to improve risk-based decision-making (ibid.:92). The first model, which Jasanoff terms the "psychometric paradigm", has been dominating the US debate on risk since the 1980s. The proponents of this model distinguish between "rational risks" as they actually are, and "irrational" risks as lay people perceive them (ibid.:91). Lay perceptions of risks are seen as distorted by factors such as strong prior beliefs, inability to think probabilistically and exaggeration of the unknown. Expert perceptions, on the other hand, are thought of as liberated from such distortions. Risk is thus treated as a topic in the sociology of error, in which people are thought to exaggerate false beliefs (ibid.:92). The goal is, according to Jasanoff, to enable policymakers to identify the causes of these misunderstandings and to replace them with "rational" and "unbiased" beliefs. Jasanoff rejects the psychometric paradigm and replaces it with a constructivist model of risk. According to this model, people's assessment of risk is affected by their perceived capacity to influence institutions (ibid.:93). Some risky situations may appear voluntary - such as driving a car - but even voluntary activities are conditioned by social relations and institutional commitments that are often taken for granted. Consequently, the constructivist model calls for empowering institutions and inclusive policy processes that contribute to enhancing people's sense of control and assessment of risk. Jasanoff sees risk as socially constructed and a product of historical, political and cultural processes (ibid.:95). According to Jasanoff, subjectivity permeates both lay and expert knowledge claims because both are based on a range of assumptions. As such, risk can neither be objectively measured or managed on the basis of expert judgements alone, but should be opened to interpretation by laypeople as well as experts (ibid.).

1.2.5. Risk society

Ulrich Beck (1993) has contributed greatly to current thinking about risk. In his early works, Beck introduced the concept of *risk society*, referring to the methods by which modern society controls the future consequences of individual and institutional decisions (Mythen 2004:15). In the age of modernity, risk is perceived as the organising principle and the dominant consciousness of society, but also a challenge that threatens to overwhelm it. Beck sees risk as the product of the modernisation process itself. According to Beck, society has always been exposed to risk, but the perceived sources of these risks have changed (ibid.:16). In pre-industrial times, risk was mainly associated with natural events such as hurricanes or volcanic eruptions. In modern society, however, risk has become the product of human forces – of society itself – through the production of for instance pollution or disease (ibid.). As stated by Beck, risk society "describes a phase of development of modern society in which the social, political, ecological and individual risks created by the momentum of innovation increasingly elude the control and protective institutions of industrial society" (993:28). Furthermore, risk no longer restricts itself within the borders of nationhood or time periods. Modern risks, such as global warming, are felt in virtually every society around the world. As these risks do not pay adherence to class boundaries, everyone is equally at risk. Social actors are "individualised" through risk, no longer belonging to a collective identity such as class. According to Beck, these processes have led to a re-ordering of society and a new cultural meaning of risk (ibid.:333). Similar to Jasanoff, Beck claims that risks are socially constructed events. But where Jasanoff sees risk as a product of historical, political and cultural processes, Beck conceives of risk as a projection of future events. According to Beck, risks are not real, but *become* real through the anticipation of catastrophe (ibid.:332). Without symbolic representations, risks are nothing. However, once risks are equated with threatening events, they produce a compulsion to act. And herein lies the irony, according to Beck. The desire to manage risks forces scientists, companies and governments to hand out a promise of security, when in fact they are contributing to increase these risks:

> "Finding themselves accused in public of countenancing risk, ministers jump into rivers or get their children to eat hamburgers, in order to 'prove' that everything is 'safe' and under control – from which follows as sure as night follows day that every doubt cast, every accident violates the bases of the unshakeable right to security which appears to be promised" (Beck 2006:332-333).

In modern risk society, science is drawn into a Janus-like position (ibid.:333). Through generating new discoveries and developing new technologies, science creates more risks. At the same time, science is the main institution for detecting and analysing these risks. This misalignment in science is increasingly being recognised by new, "individualised" actors, who associate themselves in social movements and reshape scientific and social institutions. The devolvement of the conscious collective and the concurrent critique of modern science, driven for instance by the green movement, has been termed "reflexive modernity". The reflexive modernity of risk society has, according to Beck, replaced the principle of compensation with that of precaution (ibid.:334). In industrial times, science considered the perils of risk to be acceptable as long as accidents could be compensated. In modern society, however, not all risks can be compensated – if the global climate has reached a threshold, it is irreversible. The logic of compensation thus had to be replaced with the notion of precaution through prevention, in which we are trying to prevent risks that we have yet to prove exist (ibid.).

So where does this discussion on risk leave us? Most certainly, neither Jasanoff nor Beck believes that risk is something that can be quantified or objectively analysed by detached scientists. Risks are socially constructed artefacts that come alive in the human mind, mediated by knowledge, experience, institutions, history and expectations. Similarly, both scholars see the role of institutions as pivotal in both explaining and challenging risk perceptions. According to Jasanoff, a rearrangement of the dominant risk discourse must be founded on empowering institutions where public and scientific knowledge is accepted and negotiated. In a similar manner, Beck sees the challenging of risk society as emancipating from below – through social movements that have the capacity to question the scientific representations of risk.

1.2.6. Public participation

So far we have learned that perceived barriers exists between science and policy, nature and society and experts and laymen. Jasanoff, among others, have tried to break these barriers by suggesting that science and politics co-produce each other, and that the merging of "traditional" and "expert" knowledge systems requires the emergence of new institutions. Yet, the current international environmental regimes continue to base their activities on what

they perceive as objective and neutral scientific advice. So how are we to break these artificial knowledge barriers?

The solution is increased public participation, according to authors such as Jasanoff (2004[2]), Hogl et al. (2012) and Bäckstrand (2003). As stated by Jasanoff, the on-going struggle for public participation in decision-making processes reached a peak in the 1990s with growing unrest in civil society, at times reaching global proportions (ibid.:91). The Rio Earth Summit in 1992 was a watershed in terms of inclusive governance. It brought together a global forum of NGOs who produced their own framings of environmental issues based on citizens' knowledge, and considerable efforts were made to reconnect the ordinary citizen with the state (ibid.). Jasanoff sees the events of the 1990s as a pivotal moment in the emergence of a global polity crystallised around the relations between science, technology and society. This new global polity is driven by the previously mentioned effects of co-production, where innovation in science and technology requires a corresponding capacity for social innovation. Specifically, scientific and technological progress reinvigorates questions about political inclusion/exclusion and the distribution of rights and obligations (ibid.). According to Jasanoff, public knowledge is a prerequisite for democratic legitimacy. Citizens evaluate institutions and their own ability to participate in decision-making according to their knowledge base, and it is thus a loss of credibility for governments to neglect public knowledge. This is especially important in a time where knowledge is decentralised, decisions are made under uncertainty and environmental issues are happening at a regional and global scale (ibid.:93).

Also Bäckstrand has made note of the participatory turn to scientific advice, epitomised in the important role assigned to non-state actors during the Johannesburg World Summit on Sustainable Development in 2002 (ibid.:24). According to the author, the ascendancy of the participatory paradigm is a sign of resistance towards the scientisation of politics, in which technical expertise is seen as more suiting to address political and social issues than democratic negotiation. Bäckstrand thus introduces the concept of *civic science*, which serves as an umbrella for different attempts to increase public participation in scientific knowledge-production. According to Bäckstrand, civic science can happen along three different lines (ibid.:28). First, civic science as *participation* focuses on bringing citizens into the very conduct of science through mechanisms such as consensus conferences, citizen juries and public scientific hearings. The rationale behind this version of civic science is to enhance

public understanding of science by improving communication and outreach, and thus enhancing transparency and accountability (ibid.:30). Second, civic science as *representation* aims at including "neglected" social groups such as women and indigenous people in the production of science in order to make it more representable. It acknowledges the limited, provisional and value-laden nature of scientific knowledge on global environmental risks, and calls for more pragmatic and inclusive decision-making processes (ibid.:32). The representational model to civic science can be traced back to Beck's theory on risk society, in which the emergence of incalculable mega-hazards requires a redefinition of the institutions and rules guiding decision-making. Finally, civic science as *democratisation* challenges the very structures of science with the aim of incorporating democratic principles into scientific institutions (ibid.). Several critiques have been raised against the deliberative approach to science, the most relevant being that it does not challenge the power structures underlying deliberation in the form of agenda-setting and decision-making procedures. Participatory models of democracy have been advocated as an alternative to the deliberative model, as it induces a more manifest critique of power (ibid.:35). According to both Hogl et al. and Jasanoff, the inclusion of NGOs in political processes offers a more promising path to public participation than involving *all* stakeholders and citizens. Because NGOs are situated outside the arena of official, state-sponsored knowledge production, they are more suited to question the contents of dominant expert framings (Jasanoff 1997:582). According to Jasanoff, scientific experts often protect their authority through the use of "boundary work" in which expert committees place the vast amount of scientific issues at one or the other side of the science-policy nexus. This is problematic because the ideal types of "pure science" and "pure politics" do not exist; both are subject to value judgments and bias. Consequently, NGOs are needed to question these artificial boundaries to allow for new knowledge to enter the science/policy field, and to monitor government decision-making in general (ibid.).

1.2.7. Summary

In concluding this section, I have primarily focused on how modern society – ranging from the local, regional and all the way up to the global scale – is seen as embedded with risk. New types of risks have emerged – with climate change constituting the present-day scarecrow – that demand innovative responses from nested layers of science, politics and citizenship. Traditional science and technology has not been able to carry out this task in a satisfying

manner, largely because of its unilateral focus on "expert" knowledge. And because of the entrenched co-production of science and politics, and the power hidden in this relationship, decision-makers have undermined their capacity to find new solutions to the increasingly complex environmental issues permeating the modern world. What is needed, then, is a renewed attention to the importance of "traditional" and citizen knowledge as a supplement to scientific expert knowledge. Public participation can be designed in different manners depending on the context in which it is situated, but the objective remains the same: a triangulation of scientists, citizens and politics in decision-making on environmental issues. This is best secured through the foundation of new, participatory forums. Because existing institutions are built upon what Foucault has termed the "power/knowledge" nexus, it does not suffice to build participatory mechanisms into these established structures. Initiatives originating in current institutions, such as citizens juries or public scientific hearings, do not address the underlying problem: the perception of science as superior, objective and value-free. Consequently, the rules of the game have to be changed by dissecting the hegemonic discourse on scientific knowledge and its co-production with political decision-making, and by building new participatory institutions that juxtaposes scientific and citizen knowledge.

Turning to Greenland, decision-making on the extraction of minerals need to be based on different conceptions of sustainability and the value of nature, including both lay and scientific perceptions. Because sustainability and valuation are both normative and contested concepts, they cannot be addressed in a meaningful manner without opening up the policy sphere to different opinions about the many possible routes to a future based on mineral wealth that Greenland may choose to follow. Sustainable development is about balancing between the political aims of environmental protection, social justice and economic growth - or "sacrifice" – and these choices cannot be made by an exclusive group of politicians alone. As I will discuss in the analysis, one of the possible routes to sustainability includes dividing the territory into "sacrificed" and "protected" zones, where mining activities are promoted in the former and prohibited in the latter. The task of assigning different parts of Greenland with a certain status might imbue a sense of control and security among both government officials and local residents, but does not eliminate the issue of risk. In the mining sector, risk is generally associated with *unknown* risks – how will heavy metals contained in a certain amount of tailings affect a specific fish stocks in a defined lake? These risks are quantified and substantiated by scientific experts in order to create an illusion of control, but cannot be fully accounted for. Moreover, these risks are largely a result of progress within the scientific

and technology spheres, opening up the possibility of even larger risks. For instance, the technological advancements leading to the construction of open-pit mines brought with it a range of new and unfamiliar environmental hazards such as acid mine drainage. These risks threaten to overrun the political quest for sustainability because new risks continuously reappear as the mining industry further develops. The capacity to find new and innovative solutions to modern risks requires the full utilisation of both traditional and other knowledge forms, and the realisation that risks are a constitutive part of any natural system. The meaningful participation of laymen and other relevant stakeholders in decision-making on mining in Greenland is, however, made difficult by the co-production of science and politics and the power embedded in this relationship, as proposed by Jasanoff, Foucault and others. In the Greenlandic context, power is largely vested in a small number of scientific institutions and expressed through the politicians' unilateral trust in these institutions' expert advice and in local stakeholder's failure to question the fundamental structures that decision-making on mining activities are based on. Questioning risk and facilitating a sustainable development of Greenland's mineral sector requires the formation of new, participatory forums, and the formation of new participatory forums requires a restructuring of the present reliance on traditional scientific experts and its close ties with political institutions.

1.3. Methods

The aim of this thesis is to assess how the government of Greenland *values* the environment in its decision-making on mineral resources, and to disclose what and whose *knowledge* these decisions are built upon. Seeing that both valuation and knowledge production are subjective tasks, I found a qualitative research approach to be the most suiting. I have chosen to perform a qualitative content analysis of primary and secondary sources, mostly official government documents. The analysis is both descriptive and theoretical, and I have mainly taken an institutional approach to the assessment of environmental impacts of mining activities. The institutional approach naturally follows from my choice of research questions and methodology, considering that most decisions on mineral activities are performed by bureaucrats and politicians. Throughout the analysis, I have collected and compared the viewpoints of a rather large sample of stakeholders, consisting of government officials, scientific experts, consultant firm representatives, NGO activists and local Greenlanders. The selection of stakeholders have for the most part followed the choice of documents, although some of the documents I have reviewed must be considered to represent the viewpoint of the government as a whole.

Bryman (2008) describes content analysis as "a searching-out of underlying themes in the materials being analysed" in which different methods of coding are used to categorise the chosen themes (ibid.:529). Regarding the first research question, I have measured valuation by searching the documents for descriptions of ecosystems and natural resources in Greenland and the importance attached to these by different stakeholders. I have furthermore checked for accounts of potential consequences of a certain mining project, and calculations – both scientific and other - of how these can be reduced. I also used the documents to detect the current rules, regulations and institutions guiding the mineral sector and the environment in Greenland. By disclosing what different stakeholders believe to be the most important environmental effects of a mining project and how these can be avoided, I was to a greater extent able to analyse what value the government attaches to both the country's natural resources and other matters of importance, such as economic growth. Turning to the second research question, I separated it into two distinct components in order to better operationalize the concepts of knowledge and participation. As for the measurement of knowledge, I started by identifying the main knowledge-producing actors in place in Greenland today and the importance attached to these by government representatives. I furthermore used the

documents to search out the dominant discourses on the environmental effects of mining and how these have changed with time, which contributed to my understanding of what the government perceives as more and less important sources of knowledge. Finally, I have measured participation by identifying the participatory mechanisms used by the government in mining issues, how these are being put to use, the level of public interest in participating and how the participatory mechanisms are assessed by especially local Greenlanders and NGOs. Seeing that most of the concepts that I have included in my research questions are quite abstract, I found them rather challenging to measure. This was especially the case with the concept of valuation, which relates to notions of tradition and sentiment that are hard to detect from a written document. The vagueness of the concepts might have contributed in making my analysis less valid.

According to Tove Thagaard, analysing documents differ from analysing data collected by the researcher him- or herself because the retrieved documents are written for a different purpose than the one intended by the researcher. The researcher must therefore be aware of the context in which the documents were produced (2009:62). My point of reference in choosing relevant documents for this paper was twofold. First, I have only looked at documents within a certain timeframe. I chose 2009 as a starting point because this was the year when Greenland achieved self-rule, and thus was granted full ownership over its natural resources. The 1st of April 2014 is the ending point of my analysis. Second, I have retrieved most of my documents from governmental institutions dealing with mining and the environment. I have gone through all the available literature on the Greenlandic government's website concerning mining issues, including environmental impact assessments, strategy documents and consultation memorandums [4], within the chosen timeframe. From 2009-2013 consultation meetings were conducted in connection with three major mining projects: The Tanbreez rare earth minerals project in 2013, the True North Gems' rubies project in 2013, and the London Mining iron ore project in 2012. Furthermore, public consultations were held on the 2014 Mineral Strategy and two law revisions. These form the basis of my analysis of participatory processes in Greenland. Also, I have reviewed the debate on mineral issues through examining articles from both Greenlandic and Danish

[4] Consultation memorandums are minutes from the consultation meetings (borgermøter) held on the mining projects that I have examined between the mining company in question, government representatives, local Greenlanders and other stakeholders. Consultation feedback refers to the comments made by the public and others on official mining-related documents published by the government.

newspapers, first and foremost Sermitsiaq and Politiken. From Sermitsiaq, which is the only newspaper in Greenland, I have reviewed all articles relating to public participation and consultation meetings on the three mining projects from the year 2011 to 2014. Unfortunately, Sermitisiaq's archives do not go further back than mid-2011, making my data material incomplete. In Politiken, I mainly searched for newspaper comments from Danish and Greenlandic politicians, researchers and the general public about the potential environmental and social consequences of mining activities in Greenland. The newspaper articles helped me gain a more complete picture of the public opinion, the democratic situation surrounding decision-making on mineral projects and not least the government's response to criticisms from NGOs and local citizens on the lack of civic involvement. Secondary literature and grey and white papers thus form the main basis of my analysis. Over the years there have also been conducted several scholarly evaluations of the Greenlandic policy processes surrounding mineral activities, and these have been an important scientific element in my thesis.

An often-noted advantage of doing research on documents is the *non-reactivity* of this type of material. Because official and other documents have not been created with the purpose of doing research, the issue of reactiveness (bias) can largely be discounted (Bryman 2008:515). In scientific work, subjective opinions are likely to influence the authors' evaluation of a certain issue. In the official documents that I have analysed, however, the content mostly consist of carefully formulated policy goals and law revisions. While policy documents certainly can bee seen as containing elements of subjectivity, the potential subjective elements are more easily revealed. This strengthens the validity of the data, but does not automatically secure its reliability. According to Bryman, four criteria should be employed when assessing the quality of documents as data; authenticity, credibility, representativeness and meaning (ibid.:516). The issues of authenticity and credibility are not relevant for the official documents that constitute the main part of my data, but in assessing newspaper articles I have carefully examined the trustworthiness of the source. Considering representativeness and meaning, not all documents included in my analysis are as straightforward as I had wished. Official documents are often written in a detached and bureaucratic manner, and revealing the underlying meaning of these sources of data is challenging. Furthermore, many of the documents that I reviewed contained "expert" assessments and technical phrases, which were hard to decipher. The aim of this paper is,

however, not to propose a technical revision of the factual consequences of mining, but rather to assess how the government perceive of these consequences.

As stated by May (2011), documents are particular readings of social events and can as such not be read in a "detached" manner. We must in stead approach them in an engaged fashion, and locate the document within a wider social and political context. According to May, we must be aware of what the documents leave out as much as what they include (ibid.:215). I have tried to follow up on these cautions by carefully outlining the policy framework, actors and institutions existing in the Greenlandic mineral context, and through looking at present and historical mineral developments. This has made me more equipped to reveal the socially constructed framings of official documents. Moreover, I have tried to make both my theoretical framework and my data trustworthy by examining different types of written material. I have looked at official documents produced by the government, expert-led assessments, and independent analyses of the participatory mechanisms in decision-making, as well as critical newspaper articles and NGO-led reviews of the mineral sector. However, two important shortcomings are worth mentioning. First, there are some gaps in my data material. In the analysis, I have compared the government's strategy documents on mineral activities from year to year, but in 2010 no strategy document was published. Furthermore, the consultation material only stretches back to the year of 2012. This might imply that these documents do not exist, or it could mean that they have for some reason not been published. The missing documents contribute to making my data material less reliable. In the consultation documents that I have analysed, the same government officials, civil society organisations and citizens tend to reappear. Consequently, there is a risk that my data material is somewhat biased or has left out important information from other civil society groups or stakeholders.

Ideally, measuring the valuation of environmental issues in decision-making on mineral activities should have included both an analysis of written documents and fieldwork. Doing my own research would have allowed me to gain better insight into the views and opinions of Greenlanders on the mineral issue, and would have complemented the other data that I have collected. Due to time constraints I had to exclusively focus on a qualitative assessment of existing grey and white papers and other written material, meaning that the potential for generalisation is rather limited. Furthermore, my analysis is to a large degree based on oral discussions that have been written down by government officials, and not on narratives that

have been told directly to me. The reproduction of the discussions might not be complete, making the data less reliable. Yet, I believe that the assessment of institutional performance on the mineral field in Greenland might contribute with some explanatory power in assessing the valuation of natural resources and public participation in decision-making.

2.0. Mining activities in Greenland

2.1. A brief history of mining

2.1.1. The very beginning

Mining in Greenland is not a new undertaking. During the 17th century, Danish voyagers travelling to Greenland showed great interest in the country's immense mineral wealth found in the mountains (Nuttall 2013:371). Two centuries later, the German geologist Karl Ludwig Giesecke surveyed and mapped Greenland's geology and mineral and hydrocarbon resources along the west coast on behalf of the Danish King. This sparked many more Danish expeditions to the island throughout the 19th and 20th centuries, and in 1854 the first organised resource extraction was initiated at Ivittut – a former mining city that is now abandoned (ibid.). According to Sejersen, the prevailing notion of the time was that mapping of an unknown territory legitimised colonisation of that area (2013:10). During the 18th century, several colonies were established along the west coast of Greenland, and from 1774 Denmark introduced a trade monopoly and put Den Kongelige Grønlandske Handel (The Royal Greenland Trade Company) in charge of managing it (ibid.:12). This was part of Denmark's endeavour to reaffirm its position in the North Atlantic. In 1935, Denmark was granted exclusive rights over Greenland's subsurface resources, without this causing any significant protests (ibid.:13).

From the 19th century until the Second World War, Danish colonial policy centred on teaching Greenlanders how to become independent, and the Trade Company consequently promoted and encouraged traditional hunting and fishing activities (Sørensen 2007:126). After the Second World War the policy changed completely. Now Greenland was to become a modern society, shaped in the Danish mould and crafted by Danish citizens. Many Greenlanders perceived this policy shift as remote management, and in the 1970s protests started emancipating in which Greenlanders were demanding equalisation with Denmark (ibid.:132). By that time, several political parties had been established and the general

attitude among Greenlanders were that Greenland should become more Greenlandic (ibid.:135). Meanwhile, the Mineral Resources Act had been introduced in 1965 with the purpose of putting mineral exploration at the forefront of economic activities (Sejersen 2014:15) Ever since Greenland had become a part of Denmark in 1953, public investments in mineral activities had far exceeded the revenues, and this had to change (Sinding 1990:226). Due to political pressure the Act was revised in 1969, this time allowing mining companies to be exempted from paying a range of different taxes and fees, stimulating an international interest in Greenland's subsurface resources (Sejersen 2014:15). At this point in time, the Greenlandic authorities seemed more preoccupied with providing favourable conditions to the mining companies than with regulating the industry. The mining workers were not guaranteed any training and local employees were paid less than foreign employees. Moreover, there were no environmental legislation in place, resulting in harmful industrial discharge and pollution. Eventually, resource-based conflicts aroused between the mining industry and local hunters and fishers in which the government did not get involved (ibid.:50-52).

2.1.2. The road to home rule and self-government

In 1979, a home rule agreement was introduced to Greenland in which Greenland assumed legislative power over administrative areas such as fishing and hunting, wildlife and agriculture, while Denmark retained control over matters concerning foreign policy, defence, criminal and civil law etc. (Sørensen 2007:151). According to Sejersen, one of the most important drivers behind the home rule agreement was the question of who should control Greenland's subsurface resources (ibid.:16). The international energy crisis in the 1970s put Greenland on the map, and Demark was keen to secure its supplies. Also, there were a lot of activities going on at the Maarmorilik mine at the time, and the prospects of profiting from these activities seemed alluring (ibid.). In the mean time, a schism was beginning to appear between the older and younger generations of the Greenlandic population, in which the younger groups wanted to become more independent from Denmark (ibid.:17). The social democratic Siumut party initiated a debate about mineral property rights, and the issue was brought to the Greenlandic Parliament in 1975. Here, several proposals were made stating that the mineral resources belonged to the Greenlandic people. However, Denmark was eager to recover parts of the vast sums spent on Greenland over the previous decades and did not wish to give up its ownership status. A compromise was made in which both countries were

granted veto rights and political influence over mining operations, classified as a "common concern" (ibid.:18-20). Also, a rather vague formulation was included in the home rule agreement, stating that the Greenlanders have "fundamental rights" to these resources (Sinding 1990:227). In 1988, the Mineral Act was revised. Up until then, all surplus revenue from resource extraction was used to reduce the Danish block grant to Greenland. With the revision, 50 per cent of the revenue went to Greenland without any reduction in the grant at all (Sørensen 2007:156). The previous year, resource management had been transferred to the newly established Råstofdirektoratet (The Directorate of Mineral Resources, my translation) of Greenland, administered within the home rule agreement (Sejersen 2014:22). At the next revision of the Mining Resources Act in 1991, a tax and a fee was put on mining licenses (Sinding 1990:229). The revision also allowed the government to specify to what extent Greenlandic labour was to be employed at new mines and to instruct that a general plan of operations, installations and mine closure needed to be approved before mining activities commenced (ibid.). Throughout the 1990s, there were no active mines in Greenland.

The introduction of self-government in 2009 marked a new position for Greenland, who had gone from not having ownership over its mineral resources, to having shared ownership with Denmark and finally to having full control over these resources (ibid.). Nonetheless, Greenland's economic ties to Denmark remain strong even today. An annual block grant of 3,55 billion DKK and other transfers make up almost 60 per cent of Greenland's budget revenue, even though the grant was frozen once the self-government agreement came into place (Nuttall 2013:370). As Greenland generates income from subsurface developments, the level of the grant will be gradually reduced by 50 per cent of the earnings from mineral or hydrocarbon extraction once they exceed 75 million DKK. The revenue from extractive industries will then be divided between Denmark and Greenland, while the block grant is being phased out (Bureau of Minerals and Petroleum 2009[1]:7). Today, the mining authorities of Greenland are divided into three main bodies. The Mineral License and Safety Authorities (MLSA)[5] is the administrative body for licensing issues and safety matters, including supervision and inspection (Bureau of Minerals and Petroleum 2013[1]). Up until the 1st of January 2013, the MLSA was called the Bureau of Minerals and Petroleum (BMP) and was tasked with granting licenses and promoting Greenland on the international market, as well as safeguarding the environment. Because this mixing of roles was criticised on several

[5] Råstofstyrelsen (previously Råstofdirektoratet)

accounts by the Greenlandic public and others[6], the government decided to spread the tasks across several institutions. Together with the Environmental Agency for the Mineral Resources Area (EAMRA)[7], the MLSA form the Mineral Resource Authorities of Greenland (ibid.). The EAMRA is the administrative authority for environmental matters relating to mineral resource activities, including protection of the environment, environmental liability and the Environmental Impact Assessment (ibid.). It is an agency underlying the Ministry of Nature and Environment, and cooperates with other environmental agencies such as the Danish Center for Environment and Energy (DCE) and the Greenland Institute of Natural Resources (GINR). Finally, the Ministry of Industry and Mineral Resources (MIMR) is responsible for strategy-making and policy-making, legal issues, marketing and socioeconomic issues relating to mineral resource activities, such as the Social Impact Assessment, the Impact Benefit Agreement and royalty schemes. The Ministry also deals with geological issues through the Department of Geology (ibid.). The mineral sector is furthermore regulated through a range of different rules, regulation, strategy documents, guidelines and requirements produced by the Mineral Resource Authorities. Two of the most important documents are the Mineral Strategy (MLSA), and the Mineral Resources Act. I will briefly present each of these documents.

2.1.3. The Mineral Resources Act

As previously mentioned, the enactment of the self-rule agreement in 2009 granted Greenland with exclusive rights over its subsurface resources. Consequently, the country needed to develop its own legal framework for the mineral sector. On the 1st of January 2010, the Greenland Parliament Act no. 7 of December 7, 2009, on mineral resources and mineral resource activities – The Mineral Resources Act (MRA) – came into force (Inatsisartut 2009). The MRA is the legal foundation for the granting of mineral licenses, but also aims to ensure that mining activities are performed according to requirements on safety, health and environmental and social sustainability, and according to international best practices. As stated by the Act, the MLSA is the overall administrative authority for all matters relating to mineral resources except environmental issues. In agreement with the Act, the government

[6] See for instance Bjørn Aaen, S. (2012): *Demokratisk legitimitet i høringsprocesser i forbindelse med storskala-prosjekter i Grønland.* Nuuk: Grønlands Arbejdsgiverforening

[7] Miljøstyrelsen for Råstofområdet

much each year present an account of licenses and a public report on minerals to the Parliament (ibid.). Licenses are granted through the MLSA on an exclusive basis for two periods of 5 years. The MLSA have the authority to stipulate the terms on which the license is based, and the license may be granted separately for exploitation and exploration activities respectively. All applications for licenses are directed to the MLSA, and the government makes the final decision on whether a license should be granted or not. If the holder of an exploration license finds deposits that he or she intends to exploit, the licensee is entitled to be granted with an exploitation license (Bureau of Minerals and Petroleum 2013[2]). An exploitation license can be issued to any legal entity in or outside of Greenland, whereas an exploration license may only be issued to companies based in Greenland. The licensee is required to formulate a development and a closure plan to be approved by the MLSA before activities commence. The licensee must also enter into an Impact Benefit Agreement (IBA) on social sustainability, and is required to submit an Environmental Impact Assessment (EIA) and a Social Impact Assessment (SIA) before approval of its activities (ibid.).

On matters of environmental protection, the Act is both rigorous and vague. The aim of the Act is to prevent, limit and combat pollution of the soil, sea, subsoil, water and air as well as adverse effects on the climate and vibration or noise nuisances. This is to be achieved by following a performance-based approach, wherein the mineral industry is expected to fulfil requirements regarding safety, health, resource utilisation and social sustainability. The Mineral Act places emphasis on preventive measures through the use of clean technology and the principles of Best Available Technology (BAT) and Best Environmental Practice (BEP) (ibid.). The localisation principle in the Mineral Resources Act regulates where mines can be operated and not. According to the Act, nature conservation areas of national and international importance need to be taken into account when considering mining locations, as with prioritised habitats and species (ibid.). If mining activities are still allowed in these areas, compensation zones need to be appointed. If mining activities cause any environmental damage, the responsible party is liable to compensate the damages (Inatsisartut 2009). Regarding public participation, the Act states that the general public is entitled to be given an opportunity to express its opinion on the expected impacts of a mineral project before approval *if* the government thinks it necessary. The Act does not stipulate in which situations the government should consider consulting the public, and it does not propose any alternative participatory mechanisms. If local residents and other stakeholders are simply to be informed or consulted on important matters regarding mining, they are not able to inform the

knowledge base on which these decisions are built. As such, the government risks missing out on important feedback from the public, and in the long run might delegitimise its decision-making capacity.

2.1.4. The Mineral Strategy

The Mineral Strategy is, as indicated by its name, a strategic document for the furthering of Greenland's mineral sector. It has been published by the government since 2009, and contains assessments of the current status of the mineral sector and future plans for attracting private companies to Greenland. The last strategy was published this year and expires in 2018. Whereas the previous strategy from 2009 focused on enhancing the general level of geological mineral occurrences, the present strategy wishes to strengthen the exploration of minerals that are currently in demand globally, such as iron, copper, gold, zinc and rare earth metals (Råstofstyrelsen 2014). Furthermore, the government wishes to double the number of exploration licenses, and to start up three to five new mines within 2018. This is a very ambitious goal, seeing that there is only one mine operating at present (ibid.). Also, the strategy wishes to ensure a better interplay between the mineral sector and other areas of society (such as the education and health systems), and to transfer the responsibility for environmental protection to an independent agency (ibid.). Other than that, the government proposes to put a royalty tax on mineral operations, and to establish a national research institution – GeoSurvey Greenland (GSG). The GSG will collect and store geological data, and will thus replace the existing Geological Survey of Denmark and Greenland based in Copenhagen (ibid.). As I will discuss more thoroughly in the analysis, the 2014-strategy is clearly distinguishable from the previous strategy documents on mineral activities. This might partly be explained by the fact that it is the first strategy published by the current government. The main difference lies in its strong focus on how the mineral sector is supposed to support the Greenlandic welfare society, and on its more pronounced emphasis on public participation and environmental regulation. Whereas the previous strategies mainly have promoted information activities such as public meetings and circulation of publications and booklets on mineral exploration activities, the present strategy wishes to include the public in mineral activities earlier and to formalise the consultation processes by inscribing it into the Mineral Resources Act. The emphasis on public participation can be seen as a result of a shift in the Greenlandic public debate, with more pronounced calls for local

involvement – especially in the aftermath of the lifting of the ban on uranium. I will return to this point later on in the thesis.

2.2. Environmental regulation

Today, the MRA and several more specific rules and regulations contribute in protection the Greenlandic environment from harmful mining activities. This has not always been the case. According to Mosbech, pollution from previous mining operations is still visible in certain parts of Greenland – either because the mining operations took place before environmental regulations were introduced, or because the environmental assessments were incomplete (2013:25). A telling example of the last can be found in and around the Maarmorilik lead-zinc mine, located in Qaasuitsup municipality in northwestern Greenland. This was the first mine for which an environmental impact assessment was performed, but the assessment turned out to be highly unsatisfactory. As a result, the discarding of tailings and waste rock in the close-by fjord contaminated the water sources long after the mine had closed, and the crushing of ore led to severe air-borne pollution of the surroundings. The environmental impacts were drastically reduced after the mine's operational procedures were improved, however, and continuous environmental monitoring has substantially helped recover the situation at Maarmorilik (ibid.).

2.2.1. Environmental Impact Assessment

The most significant environmental regulation in place in Greenland at present is the Environmental Impact Assessment (EIA). If a mining project is expected to have significant environmental consequences, the applicant is obliged to carry out an assessment of its potential effects from planning to beyond closure, and to propose ways of mitigating these effects. Upon completion, the EIA is presented to the public after which it is approved by the government (Bureau of Minerals and Petroleum 2011[1]). In addition to the EIA, the mining sector is regulated by a set of rules relating to exploration activities, feasibility studies and fieldwork. The rules concern travel by car, plane and boat, camping in the field and the management of waste[8], and aims to minimise the problems associated with mining-related traffic. According to Mosbech, this type of traffic is a pertinent source of disturbance to both vegetation and wildlife. A passing vehicle might disrupt the reindeer while calving and

[8] See Råstofstyrelsen for more on fieldwork and other rules: http://www.govmin.gl/index.php/minerals/terms-rules-laws-guidelines.

consequently affect the population stock, or cause direct damage to the landscape by degrading the permafrost layer (ibid.:9). Yet, the provisions laid out in the fieldwork rules are not always compatible with those laid out in the EIA. If a mining company is planning to build a road or a port in order to transport large amounts of ore, the fieldwork rules requires the company to apply for an approval from the government (ibid.). The rules do not, however, mention anything about the need to prepare an EIA, thus creating a kind of legal loophole.

2.2.2. The planning and land use law

The mineral sector is furthermore regulated by the planning and land use law. The law was passed by the Parliament in 2010 and relates to all activities conducted on Greenland's territory. As stated by Hansen, the planning and land use law and the Mineral Resources Law are currently on a collision course as the latter exempts licensed actors from certain requirements in the former. This means that the whole of Greenland potentially could be opened up to mining activities, according to Hansen, who proposes to divide the country into "go" zones – where mining is actively promoted – and "no-go" zones – where mining is prohibited (2013:5). The planning and land use law also allows the government to call for a so-called Strategic Environmental Assessment (SEA) prior to the implementation of large-scale mining projects. Such an assessment has never been issued, however, apart from in 2007 when the government was planning to establish an aluminium smelter (ibid.).

2.3. Mining activities today

Throughout the 1990s, there were no active mines in Greenland. In 2005, the country entered a new phase of mineral exploitation with the opening of a gold mine in South Greenland in 2005 and an olivine mine in West Greenland the same year (Mines Online 2014). By 2014, the mineral industry has returned to Greenland in full force with the planning of a range of new mining projects, including an iron mine near Nuuk, rare earth extraction on Killavaat Alannguat and rubies mining near Kuannersuit (Nuttall 2013:373). According to Statistics Greenland, the number of exploration licenses in Greenland has increased exponentially over the last years from 22 in 2004, to 68 in 2008, 75 in 2011, and 71 in 2014 (Mining.com 2012). In September 2013 there were 38 different exploration- and mining companies operating on exclusive licenses in Greenland, covering an area of 46 000 km^2. A group of ten companies own most of these licenses, mostly comprised of Canadian and Australian junior companies

(Rosing 2013:25). Up until now, Australia and Canada have been the chief participants in the mineral race for Greenland, but China has recently signalled its interest in Greenland's growing mineral industry. As of late 2013, there were only five exploitation licenses in Greenland and only one mine was operational, but closing (ibid.:26)[9] (see Appendix 2).

Because of its rather unusual geological history, Greenland possesses many different kinds of minerals, ranging from basic minerals such as iron and copper to precious metals such as gold and platinum. The known mineral deposits in Greenland at present include gold, molybdenum, nickel, rare earth minerals, tantalum and niobium. Economic growth and new technologies have during the recent decades led to an increased demand for both traditional minerals and elements that were previously considered to be of little interest. The economically most important minerals today are iron, copper, zinc and gold. These minerals constitute around 75 per cent of world trade on minerals (ibid.).

The Greenlandic government is currently facing several issues that need to be addressed in order to manage the mining industry in a way that will create ripple effects for the community and prevent environmental degradation. First, the political system of Greenland is rather new of date, and according to Borch lacks the necessary capacity for managing the mineral industry (2013:16). Even though Greenland is a rather small country and the decision-making processes are relatively speedy, there is a lack of consensus on large-scale projects and the government is missing a clearly formulated industrial strategy. As for technology, there is a shortage on know-how and skilled workers, and Greenland's financial situation is an obvious challenge. In following Borch, the government income is limited, the public sector is inflated and there is a general lack of governmental funding (ibid.). The country's reliance on Denmark is, as previously mentioned, also a significant obstacle to financial independence.

[9] Note the difference between *exploration* and *exploitation* license. Whereas an exploration license is given to a company still performing studies on the project area, an exploitation license is given to a company that is starting up the actual mining activities. The holder of an exploitation license is entitled to an exploration license, but the number of exploitation licenses offers a better picture of the level of mining activities going on in a certain country at a certain point in time.

3.0. Mining and the environment

3.1. Environmental consequences of mining

The territory of Greenland consists of ecosystems that are quite unique in their character, inhabited by animal populations that are of significant importance both nationally and internationally, such as the polar bear and the musk ox. According to Mosbech, the environment is both used and treasured by the local inhabitants and is currently not under notable pressure from mining operations (2013:5). Yet he lists three principal environmental challenges that might pose serious challenges to the Greenlandic environment in the future. First, heavy pollution from mining activities might seriously harm the fishing sector. Fishing and hunting are important activities in Greenland, not only for employment and supply of food, but also culturally. Fishing constitutes 80 per cent of the country's export sector, and is very important for the local economy (ibid.). Consequently, pollution of important waterways will compromise not only biodiversity, but also the national and local economy. Second, pollutants transported from the industrialised world are a significant environmental issue in Greenland. Mosbech states that several marine mammals have such a high concentration of pollutants in their fatty tissue that it poses a threat both to themselves and to the humans consuming them. Third, global climate change and warmer temperatures causes ice and snow to melt, and increasingly so in the future. This will have profound effects on the Arctic biodiversity, the oceanic currents, the seasonal rhythms of plants and animals and the food chains (ibid.). Adding to the complexity of the Arctic is it's particular vulnerability to climate change, explained by the fact that plants and animals grow slower than in temperate regions. Accordingly, the breakdown of pollutants happens at a slower rate (ibid.:7). We know less about the ecological processes taking place in Arctic regions than in other regions, so when considering the environmental impacts of mining activities one should keep in mind that the ecosystems are already under pressure from other sources of pollution and that the impacts may last longer than expected.

As for the concrete consequences mining activities have on the environment, two issues are especially pertinent. The most important environmental issue related to mining is, according to the DCE, the production of large amounts of waste (2012:83). Mining operations involve the refraction and crushing of ore. The ore that contains valuable minerals is crushed into tiny particles and processed into a concentrate, after which the concentrate is shipped off to other

countries. In certain instances, the concentrate is processed chemically on the spot before being shipped, and these chemicals may recognisably have a negative effect on the environment (Mosbech 2013:23). A notable example is the use of cyanide in the processing of gold. The fractioning of ore also leads to the production of "waste rock" in the sense of cuttings that need to be removed in order to expose the mineral deposits. The ore that is not processed into a concentrate is called "tailings", and is also considered a waste product (Danish Centre for Environment and Energy 2012:83). Normally, the waste rock and the tailings are disposed of in a nearby lake or land facility where they may release hazardous pollutants. If the fractioned minerals contain sulphide, the disposed tailings will release heavy metals as the sulphide reacts with water and fire (acid drainage). The second-most important environmental consequence of mining is the spreading of dust. Dust is produced both in the fractioning and crushing of rock and ore, and in the transportation of the mineral concentrate, and may contain polluting heavy metals (ibid.).

4.0. Mining and public participation

4.1. The socio-economic context

Like any country, Greenland's socio-economic context is very much relevant to its potential for economic development in the years to come. I will briefly address some of the most basic features of the Greenlandic society as it is today. First, the population of Greenland is small – 56.000 inhabitants in 2012 – with slightly more males than females (Merrild Hansen 2013:5). The population is scattered across Greenland's 17 towns and 60 smaller settlements along the coastline, but in recent years the country has experienced a notable urbanisation process in which people are moving to the capital of Nuuk. Coupled with the tendency for young people to seek education and employment abroad, this poses a challenge to the small communities of Greenland (Departementet for Erhverv og Arbejdsmarked 2010:8). It might also have implications for the mining sector. If the younger generation does not return to Greenland upon completing its education, the country will experience a brain drain and will thus have to import skilled workers from elsewhere. This is already a worry for many Greenlanders, who fear that a large influx of Chinese workers will lead to issues of social dumping (Velling 2013). Furthermore, the population is ageing – especially in the southern municipalities – and the disbursement of retirement pensions and other benefits will accordingly become a larger expense on the public budget in the future (Departementet for Erhverv og Arbejdsmarked 2010:12). Coupled with the fact that traditional hunting and fishing activities are becoming less important as sources of income for the younger generation, the economy of Greenland is likely to experience some considerable changes in the not too distant future (ibid.:32).

4.1.1. Social Impact Assessment

As the mineral sector further develops, the Greenlandic society is likely to notice its presence in a more profound way than today. Settlements that are located close to a mine will gain first-hand experience with the effects of mining, even though the extent of these effects will vary according to the location of the mine, its size and type (open pit or closed), the timing, the employment opportunities it offers and so on (Merrild-Hansen 2013:8). Mining not only requires the use of common-pool resources such as water and land, which may lead to relocation and resettlement, but it inevitably also entails some sort of intervention with nature (ibid.). Roads need to be built, provisional barracks need to be put up and the extraction process itself produces noise, dust and potentially pollution. In order to avoid negative

impacts from occurring, the government of Greenland has instructed all mining companies working on larger-scale projects to prepare a Social Impact Assessment (SIA) before activities commence. In the SIA, the applicant must identify potential impacts of a mining project on the human environment and propose measures that will mitigate these impacts. The human environment includes aspects such as employment, income, land use, health, education, infrastructure and social-cultural features. As part of the SIA process, the mining companies are also expected to prepare an Impact Benefit Agreement (IBA), meaning a contract outlining the possible impacts of the project, each party's responsibilities and the way in which the local community will share the benefits of the project. The IBA is then negotiated and agreed upon by the company, the government and the municipality in which the mine is situated. As with the SIA and EIA, the IBA is negotiated on an isolated basis, and no formal requirements exist on the preparation and use of IBAs (ibid.:14).

As stated in the Mineral Resources Act and the Mineral Strategy, local Greenlanders and other local actors are expected to be involved in the SIA/EIA processes. According to government guidelines, mineral companies are obliged to present their project to local stakeholders (NGOs, municipalities, other interest groups), who are given the chance to provide the company with critical feedback (Bjørn Aaen 2012:53). The EIA/SIA are distributed to the relevant stakeholders by the authorities, and the stakeholders present their comments to either the EAMRA (environmental impact assessments) or the MIMR (social impact assessments) after having scrutinised the report. Based on the comments from the public, the company prepares a white paper in which it evaluates and elaborates on the critique. The white paper is then approved by the EAMRA/MIMR (ibid.). The company is furthermore required to organise a town meeting both before and after the impact assessment is approved. The meeting is held in the municipality where the company is planning to conducts its activities, and should contain a presentation of the project and its potential environmental/social impacts. Also, the meeting should allow for questions from the audience and a critical discussion of the project among the attendees (Bjørn Aaen 2012:56).

4.1.2. Participation, consultation or information sharing?

In theory, the SIA/EIA processes facilitate public participation and stakeholder involvement. In practice, however, participation often seems to be confused with information sharing and several actors – most notably the civil society – have questioned the democratic legitimacy of these consultation processes (Merrild-Hansen 2013:16). According to Nuttall, both civic

action groups, the Inuit Circumpolar Council (ICC) and the Employer's Association of Greenland have initiated debates about the apparent lack of participation in large-scale mining projects (2013:376). One of the most prominent figures in the Greenlandic debate – the chair of the environmental organisation Avataq, Mikkel Myrup – has strongly criticised what he sees as an "extra-societal" partnership between the government and the industry in which the government has made legislative changes to further the interests of the industry (ibid.:379). Myrup and others especially point to the current government's lifting of the ban on uranium mining as a grim example of how laws are being changed without involving the public. A report by Bjørn Aaen points to some of the same participatory issues. First, time is an important negative factor in the consultation processes. When the EIA/SIA report is handed out to local stakeholders, the stakeholders only had six weeks (now eight)[10] to read the material and to provide feedback. As the reports are often very long (400 to 600 pages) and highly technical in their character, and the local interest groups are low in manpower and expert knowledge, many of the stakeholders are struggling to comply with the deadline (2012:53). The same goes for the town meetings. The meetings are too short, and the company usually fills most of the time with presenting and explaining the project and its impacts. Often, there is no time left for questions from the attendants or for group discussions (ibid.:56). It is also somewhat problematic that the companies themselves are in charge of arranging and hosting these meetings, as they are not impartial actors. The consultation processes are further complicated by the fact that the EIA/SIA-reports often are written in English, and only English, thus excluding the locals that are not fluent in this language. According to government guidelines, the reports are expected to contain a non-technical resume in English, Danish and Greenlandic. However, the resumes are frequently poorly translated and have been criticised for leaving out information of vital importance (ibid.:70). The Greenlandic government does, however, seem to have taken note of some of the most rampant criticism. One of the most problematic issues concerned the organisation of the mineral sector. As previously mentioned, one single administrative body – the BMP, now the MLSA – was in charge of both granting licenses, attracting foreign companies, approving the EIA/SIA reports and overlooking the consultation processes (ibid.:45). A lot of power was

[10] In 2012, when Bjørn Aaens report was written, the public only had six weeks to provide feedback on consultation material. As described in Bjørn Aaen's report, this was heavily criticised by both citizens and NGOs. Consequently, in 2013 the government proposed to extend the consultation period with two weeks. Today, the public has – at least on paper – 8 weeks to read through and give comments on consultation material publicised by the government (Bureau of Minerals and Petroleum (2013[3]).

concentrated in a few hands, and there was a very potent risk of role confusion within the BMP. From the 1st of January 2013, the government thus conducted several organisational changes with the purpose of separating decisions regarding environmental issues from the mineral resource authority, and separating license approvals from strategy and marketing. As of today, the MIMR is in charge of marketing, mineral resource strategies and legislation, industry and labour issues, social impact assessments and impact benefit agreements. The MLSA remains a one-door authority to the industry and is in charge of administering licenses, inspections and approvals of field activities. And finally, EAMRA is solely responsible for the handling of environmental impact assessments (Minex 2013).

As outlined in the previous sections, Greenland is facing some important challenges that are likely to affect the rate of mining developments in the years to come. Most important among these challenges are the lack of institutional capacity, the budget deficits, the ageing population and the downgrading of the traditional hunting and fishing sectors. Regarding the environmental consequences of mining, a lot has been achieved over the past few decades. In the 1970s, environmental regulation of the mineral sector was in its infancy. Today, the Mineral Resources Act and the Environmental Impact Assessment provide thorough guidelines for the handling of environmental externalities, but pollution from tailings and waste rock still offers a significant threat to the vulnerable Greenlandic ecosystems. Considering public participation, the EIA/SIA-process and the IBA-negotiations constitute the most fundamental participatory tools employed by the government. These tools have, however, been found wanting by researchers, NGOs and citizens alike. Over the years, the Greenlandic public debate on mineral developments has been characterised by calls for more genuine participatory processes, and to a certain degree the government has tried to counter these criticisms. Nevertheless, and as I will thoroughly describe in the next few sections, participation is often restricted to pure and simple information sharing.

5.0. Analysis

In the following sections, I will address my research questions by comparing different government documents on mineral strategies, public consultations on large mining projects and newspaper articles from the time period 2009 – 2014. Analysing these different types of documents has enabled me to gain a fuller picture of Greenlandic public institutions on environmental and mineral matters. Furthermore, it has allowed me to better understand the decision-making processes on mineral projects, and the role of politicians, mining companies, consultant firms and citizens in these processes. Moreover, I have learned how the participatory model currently applied in the mineral sector works, and the public's perception of this model. I will start by examining the way in which the government, the mining companies and the public value the environment in a broad sense, including ecosystem services, landscape values, and functional, cultural and ethical values. The valuation-section will be analytically linked to the concepts of sustainable development and sacrifice zones as outlined previously. Next, I will employ the theories on knowledge, power and risk to assess in what way knowledge about landscapes and ecosystem services are incorporated into decision-making on mineral activities, and where this knowledge comes from. Lastly, I will consider which actors are included and excluded from the decision-making processes by employing theories on public participation. I begin the analysis by giving a short description of the main tools used for environmental valuation in Greenland today, followed by a discussion of what these tools offer in terms of the previous definition of valuation.

5.1. Valuing the environment

5.1.1. Results

The most significant valuation mechanism applied by the Greenlandic government today is the Environmental Impact Assessment (EIA). The EIA is prepared by the company in charge of the featured mining project, and must follow certain guidelines set by the government; it should describe all the environmental impacts the project is expected to cause, propose mitigation measures and outline a closure plan (Bureau of Minerals and Petroleum 2011[1]). It must also describe how the company intends to inform and involve the public in the project. According to the Mineral Resources Act, the preparation of an EIA is only required if a project "must be assumed to have significant impact on the environment" (Inatsisartut (2009:24). What is meant by "significant" remains unclear. As such, it is up to the

government and the Danish Center for Environment and Energy (DCE) to consider whether or not an EIA is required for a specific mining project (Råstofstyrelsen 2014:24). The mining companies do not prepare the EIAs themselves. Rather, they hire a consultant firm, such as Rambøll, to do the job. The final report often consists of several hundred pages with technical descriptions of the levels of different pollutants, the composition of dust resulting from breaking of ore etc. Based on these data, the different environmental impacts resulting from the specific mining project are classified as being "low", "moderate" or "high." It is not clear which variables these categories are based upon. The EIA also contains a non-technical resume intended for non-experts (Bureau of Minerals and Petroleum 2011[1]).

The EIA and all other procedures relating to mining and the environment are governed by the Mineral Resources Act (MRA). The Act was passed in 2009, and revised in 2012 when the previous Bureau of Minerals and Petroleum was divided into three different agencies. In 2013, several specifications were included in the Act concerning public consultation and participation. Other than that, the MRA has not been altered since its enactment. According to the government, the Act contains regulations that in certain instances are stricter than the international standards (Bureau of Minerals and Petroleum 2011[2]:6). While this might be true, the Act is nevertheless somewhat vague. It aims to "prevent, limit and combat pollution" caused by activities that endanger human health, damage animal or plant life or cultural values, obstruct the rightful use of natural resources or impair recreational values. It furthermore aims to limit the use and waste of raw materials and to promote clean technology and recycling (Inatsisartut 2009:17-18). The Act does not stipulate what specific activities are allowed or prohibited, the threshold values for different types of pollution or the like. The vagueness of the MRA has been criticised by several NGOs and other interest groups, among these the Grønlands Arbejdsgiverforening (Greenland's Employer's Association, GA). In a consultation feedback to the 2014-2018 Mineral Strategy published by the government this year, GA problematizes the way in which the MRA as a "framework law" has left the bureaucracy with too large a room for interpretation (Grønlands Arbejdsgiverforening 2014:3). According to GA, the lack of a more specific regulatory framework has allowed the bureaucracy to impose its own, more or less relevant, requirements to the mining companies, and thus appears as a negotiator on behalf of the government (ibid.). This fits well with Jasanoff and Foucault's perspectives on power and knowledge, in which the two different forms of authority are seen as intertwined and reinforcing, and carried out by politicians, scientists and bureaucrats who gain their power from accepted regimes of truth. In this case,

the bureaucracy uses its "expert" knowledge to impose its own interpretation of the truth within the loose frames of the Mineral Resources Act, and as such strengthens its own standing within the conglomerate of powerful governmental actors. This can perhaps be viewed as an expression of a capped and tedious battle of truth between a specific part of the state apparatus and civil society, in which the former exercises its power through enforcing the Mineral Resources Act on its own terms, while the latter is trying to put the spotlight on the bureaucracy's manifestation of power in order to challenge it.

Although GE does not specify what "bureaucracy" means in this case, it is very much likely that it is pointing at the newly established Environmental Agency for the Mineral Resources Area (EAMRA). The EAMRA is, as previously mentioned, in charge of all environmental matters relating to mineral resource activities, including the environmental impact assessments (Bureau of Minerals and Petroleum 2013[3]). Many NGOs and civil society groups, among these Greenpeace, Inuit Circumpolar Council (ICC), Transparency Greenland and the Greenlandic environmental group Avataq, have welcomed the establishment of the EAMRA as an independent environmental agency. Nonetheless, EAMRA has also been criticised for being weak and incompetent. Avataq has on several occasions called the establishment of the EAMRA a "cosmetic change" with no real implications (Avataq 2012:1). In its consultation feedback to the 2013 law change that separated the former BMP into three agencies, Avataq claims that there are some serious issues related to openness and ethics in the handling of the mineral sector, and that the government's one-door policy is part of the problem (Avataq 2012:1). The one-door policy implies that the mineral sector only has to deal with one administrative body when applying for an exploration/exploitation license, which is meant to ease the mineral companies' entrance into Greenland. Transparency Greenland, on its part, has questioned the seemingly close ties between the EAMRA and the Mineral Resources Authorities. According to Transparency, the fact that the EAMRA has been placed outside the rest of the environmental authorities of Greenland acts to reinforce these unfortunate ties and makes EAMRA appear opaque (Løvschall-Wedel 2013). Greenpeace Greenland has also joined the debate on the Mineral Resources Authorities, and claims that the EAMRA simply serves as a "dispatch office" for environmental assessments performed by others (Greenpeace 2013[2]:1). Whenever the Mineral Resources Authorities receives a case relating to the environment, it forwards the specific case to the EAMRA with a request for a statement. The EAMRA then asks the DCE and/or the Greenland Institute of Natural Resources (GINR) to perform a scientific assessment of the particular issue. The

assessment is processed and remarked by the EAMRA, who passes it on to the government for final processing (Bureau of Minerals and Petroleum 2012[2]:34). Consequently, the EAMRA does not make it owns evaluations of the issue in question. The government claims that this procedure ensures a scientific and independent assessment of environmental issues (Bureau of Minerals and Petroleum 2009[1]:8). It is, however, questionable whether the DCE and GINR can bee considered independent agencies as they are financed by the Greenlandic government.

The government is currently planning to make some significant changes to the Mineral Resources Act. As described in the Mineral Strategy 2014-2018, it wishes to draw clearer lines between the environmental protection authorities and the licence authorities (the EAMRA and the Mineral License and Safety Authorities (MLSA) respectively) and to separate the environmental protection authorities from the general mineral resources sector by placing it within the Department for Environment and Nature (Mineral Licence and Safety Authorities 2014:12). Moreover, the government is planning to strengthen the GINR by transferring expertise and knowledge from the DCE to the GINR, and to develop new rules for environmental protection in mining projects. The government does not, however, specify what these new rules will contain or when they will be enacted (ibid.). The restructuring of the Mineral Resources Authorities to some extent counters the criticisms from Greenlandic NGOs and other interest groups, but fails to recognise the need for independent actors to evaluate the environmental consequences of mining activities. Today, the MLSA is in charge of both monitoring mining activities and granting licenses to new mining companies. There is thus a risk of bias entering into MLSA's assessments of the environmental impacts of a certain mining project. Furthermore, Greenpeace Greenland, Transparency Greenland and others have called for an independent appeal authority on environmental issues.[11] As of today, complaints about a decision reached by the EAMRA or the Mineral Resources Authorities are passed on to the government, who reaches a final decision on the matter. This is a step forward from previous times, when complaints were exclusively dealt with by the

[11] See for instance Transperancy International (2012): Statement to the Bureau of Minerals and Petroleum. *Forslag til: Inatsisartutlov om ændring af inatsisartutlov nr. 7 af 7. december 2009 om mineralske råstoffer og aktiviteter af betydninger herfor (råstofloven).* Consultation feedback,1st of September 2012. Available at: **http://naalakkersuisut.gl/~/media/Nanoq/Files/Hearings/2012/Inatsisartutlov%202012/Answers/Horingssvarer/Transparency%20Greenland.pdf**

same authority that the complaint was directed at (Bureau of Minerals and Petroleum 2012[2]:2). However, the government cannot be deemed independent from its underlying agencies, and bias may consequently enter into the processing of the complaint on each level.

Other than the EIA, the MRA, the EAMRA and the DCE/GINR, environmental protection is secured through several specific rules related to fieldwork activities and the protection of especially vulnerable areas and archaeological relics. I will not discuss these in any detail, as they occupy a less dominate position in the government's valuation of the Greenlandic environment. Furthermore, the environmental authorities of Greenland include Geo Survey, who is in charge of collecting and analysing geological data. As part of the geological mapping of Greenland's (sub) surface, the Strategic Impact Assessment offers a way for the government to compare geological data for a certain area over a prolonged period of time. Such an assessment has only been produced one time since Greenland assumed the rights to control its mineral resources (Hansen 2013:5). Also, the planning and land use law from 2010 has certain effects on the mineral resources area by granting the municipalities the right to control land use planning within the municipal border. The Mineral Resources Act, however, exempts the holder of a license from requirements on land use within and outside the licensed area for the purpose of constructing buildings and installations related to the mine (ibid.:4). The Act also grants the licensee with a right to carry out activities covered by the license. Consequently, the ordinary planning and land use law does not cover activities enacted in accordance with the Mineral Resources Act (ibid.). According to Hansen, the incoherency between the two laws means that the whole area of Greenland potentially could be opened up to mining activities, as I have discussed earlier in this thesis.

The government is currently planning to establish a consultation fund that will ensure a broader participation of citizens, communities and NGOs in the consultation processes on mining activities (Råstofstyrelsen 2014:92). As described in the 2014 Mineral Strategy, the fund will provide means for people seeking independent expert advice on issues relating to a concrete mining project, and an autonomous supervisory board will process all applications directed to the fund. According to the government, the fund will be financed by the public and by different actors belonging to the mining sector (ibid.). The strategy does not specify who is entitled to apply for these means or the estimated size of the fund. Moreover, the fact that the mining companies are expected to finance the fund might undermine its role as an independent and self-regulating agency. The government has furthermore developed a

mineral resources fund similar to the Norwegian oil fund, where income from mining activities are aggregated and amassed in order to protect the society from economic fluctuations and "Dutch disease" (Råstofstyrelsen 2013). Because this fund does not directly relate to environmental protection and valuation, I will not discuss it in greater detail.[12] The same applies for the previously mentioned Social Impact Assessment (SIA) and Impact Benefit Agreement (IBA). Even though the SIA and IBA have great bearings on the socioeconomic conditions in Greenland, and the socioeconomic conditions restrict or rectify the scope of mineral activities, it is beyond the scope of this paper to evaluate these social mechanisms.

5.1.2. Discussion of the government's approach to valuation

In light of the above analysis of valuation mechanisms, what can we say about the Greenlandic government's approach to and evaluation of the environment? Following the theoretical discussion on environmental valuation, the government seems to employ both an intrinsic and an instrumental view on nature. It acknowledges the tight bonds that exist between people and nature, as can be read for instance in the 2011 Mineral Strategy: "The Arctic climate is vulnerable, and the Greenlandic culture and professions are to a large extent tied to the environment and nature" (Bureau of Minerals and Petroleum 2011[2]:8, my translation). Similar statements can be found in both the preceding and following strategy documents. The government also appear to consider traditional subsistence activities such as fishing and hunting to be of lesser importance to future Greenland than the more profitable sectors of mining- and oil exploration. While this may very well be true, fishing and hunting has constituted the spinal cord of the Greenlandic economy for decades, and the value of these activities to Greenlanders seem to stretch beyond what they offer in monetary terms. At the same time, it seems as though the government relates environmental concerns to economic concerns and consequently takes an instrumental approach to nature. In the 2014 Mineral Strategy, it says: "As long as the mineral resources remain in the subsurface, they offer no value to Greenland. An active mineral sector and/or oil- and gas extraction will, however, create favourable conditions for more jobs, supplies and increased state revenue"

[12] See Parliamentary Law no. 6 of the 5th of December 2008 on Greenland's Mineral Resources Fund for more on this: http://lovgivning.gl/Services/Soegeresultat.aspx

(Mineral Licence and Safety Authorities 2014:19, my translation). In this sense, mineral resources are not perceived as valuable as long as they are not employed as an instrument for economic gains. Obviously, traditional hunting and fishing activities can also be considered an instrumental way of economically utilising natural resources. The difference, however, lies in the value hunting and fishing has in shaping the Greenlandic identity. Perhaps the future Greenlanders will identify themselves in terms of belonging to a mining country, but as of today the mineral sector is still too underdeveloped to offer any sense of belonging. The main challenge for the present government thus appears to be in finding a balance between nature conservation and the use of nature for economic gains. At present, the latter seems to have gotten a better end of the deal than the former. For instance, the government expects that the expansion of the mining sector will increase Greenland's emission of CO2 and other greenhouse gases in the years to come (Mineral Licence and Safety Authorities 2014:73). Consequently, Denmark and Greenland have entered into a deal wherein Greenland has been exempted from Denmark's obligation to reduce its emissions in accordance with the Kyoto Protocol. As stated by the Greenlandic government, compelling the mining industry to buy expensive CO2 quotas will "increase the country's competitive disadvantage" (ibid.). To compensate for the greenhouse gas-pollution produced by the mining sector, Greenland wishes to utilise alternative and environmentally friendly sources of energy, such as hydropower, whenever possible. However, several of the major mining companies[13] currently operating in Greenland consider the development and use of hydropower as uncompetitive, either because it is too expensive, too time consuming or both (see for instance Bureau of Minerals and Petroleum 2012[3]).

When considering the government's valuation of the environment versus the economy, it is important to keep in mind that Greenland still considers itself to be a "frontier country." The mineral sector is underachieving, and mining companies looking to earn a good deal must adhere to rather strict environmental regulations, a harsh climate, an underdeveloped infrastructure and a low-educated population. Consequently, the government has over the years developed a rather lax regulatory framework with less strict tax regulations and no royalty payments in order to attract business (although the current government has in fact introduced royalties on the London Mining iron ore project) (Mineral Licence and Safety

[13] I refer to True North Gems' exploration license for rubies and sapphire at Fiskenæsset, Tanbreez' exploration license for rare earth minerals at Kringlerne and London Mining's exploitation license for iron at Nuuk.

Authorities 2014:54). The present government has in its Mineral Strategy outlined a rather ambitious goal of five active mines in Greenland within five to ten years, and states that this goal "requires hard work, patience and that we do not fall for the temptation of a short-term tightening of the regulatory framework" (ibid.:7, my translation). Some benefits – in this case income from taxes – have to be sacrificed for the greater good that comes with a thriving mining sector. But who gains from the growth in mining incomes? Obviously, a healthier economy will enable the government to offer better services to its citizens. The question is whether this will make up for the loss of access to natural resources experienced by local communities situated close to a mine. If a fisherman is cut off from the water source he or she uses to catch fish, will the ripple effects from the growth in mining activities make up for his or her decline in income? Even though traditional occupations are becoming less prominent in Greenlandic society, hunting and fishing still constitute essential side businesses for many communities.

Looking at the environmental impact assessments, they carry with them a scientific and technological valuation of the environment. The EIAs contain careful analyses of nature's limit values and measurements of the expected impacts of a certain substance on the fish in a certain lake and so on. Environmental resources are transformed into calculable quantities and adverse impacts on nature are accepted as long as they can be controlled or kept within a specific threshold, or as long as the project provides something else of importance – most often in the form of income or employment opportunities. Considering for instance the London Mining iron ore project, both the EIA and the DCE's comments to the EIA point to several adverse impacts that the project will have on its surroundings. Noise and traffic will affect the reindeer that migrate through the area, the ship traffic in Godthåbsfjorden will increase significantly, carrying with it the risk of oil spills and other pollutants, and the overall traffic increase will lead to higher CO2-emissions (DCE 2012). Some of these effects can be reduced or avoided completely, while others – such as the disturbance of reindeer or permanent scars inflicted on the landscape – are unavoidable. Nevertheless, the government granted London Mining with an exploitation license in the fall of 2013. This does not imply that the Greenlandic authorities continually devaluate the environment and give precedence to economic concerns. The mining companies must adhere to a set of environmental regulations, and their activities are continuously monitored by government agencies. Also, the establishment of an industrial economic activity such as mining or oil extraction is sure to entail some degree of risk of adverse environmental impacts. Yet, the EIAs tell us something

about the degree of importance that the government attaches to environmental protection relative to that of economic gains. Throughout the EIAs that I have considered in this paper (see footnote 11), the consultant companies preparing the assessments have consistently presented a less gloomy picture of the environmental consequences of the mining project than both the public and NGOs and other interest groups. Taking the Tanbreez rare earth mineral project as an example, the EIA prepared by the consultant firm Orbicon describes the possible negative effects of depositing tailings into Fostersø. According to Orbicon, using Fostersø as a disposal site could potentially lead to pollution from heavy metals being released from tailings. These heavy metals would then be transported to the connecting Lakseelven, where there are known populations of trout fish (Orbicon 2013:3). In order to account for the consequences of heavy metal pollution in Fostersø, Tanbreez has conducted a range of experiments with tailings being placed in a container of water. As stated by Orbicon, the experiments show that metals are in fact released from the tailings when in contact with water. However, as stated in the EIA: "Measurements show that the concentration of metals in Fostersøen will increase the first years, and stabilise in the course of approximately five years. Except for lead, the concentration of all other metals will remain below the Greenlandic limit values" (ibid., my translation). Several actors, including Greenpeace, the municipalities Kujalleq and Sermersooq and De Grønlandske Kommuners Landsforening KANUKOKA (the Association of Greenland's Municipalities) have questioned the statement that the concentration of lead will stabilise with time. Sermersooq has described Orbicon's claim as "outright untrustworthy," referring to the grave lead pollution resulting from the last century's Maarmorilik mine (Kommuneqarfik Sermersooq 2014:3). Another issue related to the environmental impact assessments are their limited geographical scope. In general, the EIAs only account for the areas in close proximity to the physical placing of the mine. However, and as I have discussed earlier in this paper, nature consists of interlinked and feedback-oriented systems. These systems do not necessarily adhere to community borders, and it is difficult – if not impossible – to predict how the alteration of one part of the system will affect another part of the same system. In order to protect the environment from negative consequences of mining activities, it is thus necessary to employ a holistic take on nature that acknowledges its complexity and unpredictability as well as its functional values.

How does the public value the environment vis-à-vis mining activities? On a general level, Greenlandic citizens seem sympathetic towards the *aim* of developing a viable mineral sector. The public is, understandably, aware of the country's considerable socio-economic

challenges, and appears to agree with the government that the solution to these challenges is found in exploiting the mineral resources. Nevertheless, the citizens that I have included in this thesis – that is, the citizens attending public consultation meetings on mining issues from 2009-2014 – also seem sceptical to whether or not the income from mining activities will accrue to them. Drawing on past experience, Greenlanders repeatedly bring up the question of who will benefit from the mining activities during public consultation meetings. The three meetings held in conjunction with True North Gems' license application in 2013 serve as a good example of this scepticism. Throughout the meetings, several of the attendees claimed that rubies had unlawfully been transported out of Greenland the past few years, and wondered how True North Gems would ensure that this activity came to an end.[14] In the consultation meetings related to the London Mining iron ore project, the same sense of distrust surfaced among the public. An attendee made the following remark during the fourth public meeting in Nuuk: "By looking back in history, we have heard of mining companies operating in 20 years without producing any profit. Can the government guarantee against this, or does London Mining know when it will generate a profit?" (Jeremiassen 2012:14, my translation). The public also draws on past experience and local knowledge when assessing the environmental consequences of a certain mining project. In several instances, the participants in the consultation meetings have opposed the conclusions made by consultant firms on issues relating to pollution of air and water, CO2 emissions, ship traffic and so on. During the same meeting in Nuuk, one of the participants stated the following:

"Remember that we have been here through thousands of years and have lived off and in respect for nature. We as citizens consider the project to have negative consequences for the reindeer, even though we are not experts, but we do know the area. Does London Mining appreciate this?" (Fencker 2012:17, my translation).

The government representatives subsequently refuted this claim, but it serves to illustrate the public's occasional distrust in the government's, companies' or the consultant firms' evaluation of environmental impacts from mining activities. Following the public scepticism towards official interpretations, several citizens have called for expert opponents to evaluate the environmental costs of a certain mining project. In most cases, the government has dismissed these calls by claiming that the DCE and the GINR offer just this kind of

[14] See for instance the consultation meeting (borgermøte) in Paamiut the 27th of August 2013. Available from the government website: http://naalakkersuisut.gl/da/H%C3%B8ringer/Arkiv-over-h%C3%B8ringer/2013/~/media/7CC0E05EA3934C2DAAB47BF614755B20.ashx

independent expert advice.[15] The present government has, however, proposed to establish a consultation fund where citizens can request the financing of independent environmental advice. Based on the data I have collected, I claim that the public appears to be more preoccupied with the user value or functional value of nature than the government. This naturally follows from the Greenlander's longstanding utilisation and appreciation of natural resources. Many citizens seem to worry that the continued establishment of new mines will compromise their way of living, and offer different – and often conflicting – interpretations of the environmental consequences of mining than that of the consultant firms or other experts. This does not mean that the public is blind to the positive effects that the mining sector will have on society, but rather indicates that the ethical aspects of environmental valuation are more prominent among the citizens than among most politicians.

5.1.3. Sustainable development

We now turn to the contested issue of sustainable development. In the beginning of this thesis, I introduced the question of whether or not we can imagine a mineral sector that simultaneously promotes environmental sustainability and economic gains, and if mining in itself can be considered a sustainable activity. While the answers to these questions are far from straightforward, I will attempt to analyse *if* and *how* the Greenlandic government pictures a sustainable mining future.

In the five mineral strategies that have been published as of date, the government does not specifically define what it means by sustainable development.[16] It is nevertheless possible to relate the government's use of the concept to certain societal goals. In 2009, sustainable development is associated with the vulnerability of the Arctic climate and the need to protect traditional occupational activities that depend on natural resources (Bureau of Minerals and Petroleum 2009[1]:10). Two years later, in 2011, environmental and social sustainability is about securing the society a fair share of the income from mining activities and ensuring that as many locals as possible are employed at the mines. Sustainable development is furthermore linked to public participation in mining projects and the protection of Greenlandic values (Bureau of Minerals and Petroleum 2011[2]:35). In the most recent strategy

[15] See for instance the consultation meeting (borgermøte) at the University in Nuuk 24th of September 2012 on London Mining's iron ore project. Available from: http://naalakkersuisut.gl/~/media/Nanoq/Files/Hearings/2012/London%20Mining%20ISUA/Referat%203%20dansk.pdf

[16] The concept is employed in the 2009, 2011, 2012 and 2014 mineral strategies

document, the government aims to develop the mining sector in a broad sense of sustainability, including environmental, societal and economic concerns (Råstofstyrelsen 2014:12). The strategy aims to integrate infrastructural expansion, the labour market, the education system and the health sector with the development of the mining industry, and believes that this will minimise the potential risks associated with the development of the mining sector (ibid.). Even though all of the strategies mention the environment in one way or the other, the issue of environmental protection seems to be overshadowed by other economic and societal concerns. Still, I believe the classic Brundtland definition of sustainable development and Connelly's sustainability triangle fit well with the Greenlandic government's understanding of the concept. Because the government mainly relates sustainable development to income, health care, education and employment, it leans towards both the economic growth-corner and the social justice-corner of Connelly's triangle and away from the environmental protection-corner, but the development of the mining sector can still, in my view, be characterised as sustainable if the definitions of the Brundtland Commission and Connelly (cited above) are employed. This is because sustainable development, in Connelly's understanding of the concept, entails some sort of balance between economic, social justice and environmental protection concerns. It is about choosing between conflicting political goals, which is just what the government of Greenland is trying to achieve. The issues that are currently most pressing in Greenlandic society, at least from the government's point of view, are those of unemployment, a low level of education and budget deficits. These problem areas need to be addressed both in order to achieve social sustainability and to reach the overall objective of economic independence.

I would, however – as would Scoones et al. – claim that sustainable development is not only about striking a balance between contesting and desirable political goals as suggested above. It is also about facilitating a broad discussion about different pathways to different sustainable futures. This requires a recognition of the non-linearity and complexity of social-ecological systems, and a government that engages with different problem framings and that negotiates solutions to complex issues (2007:21). In this respect, the efforts of the Greenlandic government fall short. As far as my review of strategy documents, consultation memorandums and newspaper articles reveals, the government has not attempted to facilitate a public discussion about what the Greenlandic society wishes to achieve with the mineral sector, or how this is to be realised in a sustainable manner. As such, we must assume that the understanding of sustainable development as put forth in the strategy documents belongs to

the government alone. This lack of an inclusive dialogue about the different pathways to a sustainable mining future has produced somewhat of a paradox. The government is trying to ensure a sustainable development of the mining sector by focusing on the social-ecological issues that it believes to be the most important, but risks compromising the very sustainability of mining activities by not taking into account the different and conflicting conceptions of what sustainable development means. As the definition of sustainable development that I have employed in this thesis illustrates, achieving sustainability requires innovation, foresight and effective partnerships among corporations, governments and other groups. These partnerships appear to be missing in Greenland today. The public consultations that are carried out in relation to specific mining projects do not address the fundamental questions of what sustainable development means, and how economic sustainability should be balanced against environmental and social sustainability. The present government has to a certain degree tried to bridge the gap between the politicians and the public by opening the 2014 Mineral Strategy up to unrestricted scrutiny. This has never been done before. Nevertheless, receiving feedback from the public and incorporating this into a strategy document is not the same as negotiating between conflicting conceptions of sustainability and the different paths to a mining future that these sustainabilites entail. As I will return to in the last section of the analysis, the government needs to enter into a reciprocal partnership with the Greenlandic citizens and facilitate discussions through establishing new participatory forums.

In the following section, I will assess how well the notion of sacrifice zones - as presented earlier in this paper - fits with the Greenlandic context, followed by a discussion of what the parting of Greenland into distinctive zones says about the different ways of valuing the environment.

5.1.4. Sacrifice zones

Today, the physical placing of a mine is regulated by the aforementioned localisation principle inscribed in the Mineral Resources Act. The Act states that: "In the choice of location, allowance must be made for the nature of the area, including the present and planned future utilisation as well as for the possibilities of appropriate disposal of waste water, waste and other polluting substances and materials" (Inatsisartut 2009:18). If a mine is expected to have negative consequences on an especially vulnerable area, the government can appoint a so-called "compensation area". For instance, the exploration license granted to

Malmbjerg Molybdenum A/S in 2009 included a part of the Greenlandic Ramsar-area[17] called Heden (see Appendix 3). Consequently, the government selected an equivalent Ramsar-area in the northeast of the licensed mining belt to be protected from negative externalities produced by the mine (Bureau of Minerals and Petroleum 2009[2]:13). However, the previously noted incoherency between the Mineral Resources Act and the planning and land use law means that the whole area of Greenland potentially could be opened up to mining activities. Several Greenlandic NGOs and other civil society and political actors have made note of this incoherency, and have consequently called for a separation of Greenland's territory into "go" and "no go" zones. In its consultation feedback to the 2014 Mineral Strategy, the Ministry of Fisheries, Hunting and Agriculture (APNN) claims that mining companies can be granted with an exploration license anywhere in Greenland, independent of the area's vulnerability or cultural significance (Ministry of Fisheries, Hunting and Agriculture 2014:2). The companies are, according to APNN, required to follow certain restrictions, but are nonetheless entitled to exploit the mineral resource that it has discovered through its exploration license. In order to avoid vulnerable areas being degraded by mineral activities, APNN requests the government to develop special terms of mineral exploitation in areas that are of considerable environmental, cultural and commercial value (ibid.). The Ministry suggests a model with three different types of zones. The first zone covers the majority of Greenland's territory, and is subject to similar legal provisions as those of present. The second zone consists of areas that are of such great environmental, cultural and commercial value that mineral exploration is prohibited. And finally, the third zone covers the same type of areas, but exploration is allowed as long as it offers particularly valuable economic or employment opportunities. According to APNN, this type of zoning is necessary in order to avoid a situation where "short-term, unprofitable mines destroy the basis for long-term employment and revenue within the hunting trades and other professions that utilise natural resources in a long-term and sustainable way" (ibid., my translation). As such, the APNN displays a concern for the unnecessary use and sacrifice of important natural resources. The APNN also emphasises the need to involve local communities and NGOs when designing these zones. The zoning suggestion presented by APNN is a response to the 2014 Mineral Strategy's aim of opening up the very northern parts of Greenland – beyond 81 degrees - to mineral exploration and exploitation (Mineral Licence and Resource Authorities 2014:43). In the strategy document, the government envisages a kind of zoning practice in

[17] The Convention on Wetlands of International Importance, called the Ramsar Convention, is an intergovernmental treaty that promotes the conservation and wise use of wetlands and their resources.

which “independent experts” appoint areas that are worthy of special protection. This model is of much less detail than the APNN one, and assigns no role to the general public (ibid.).

I suggest that the repeated calls for dividing Greenland into “go” and “no go” zones offers interesting insights into how the public and politicians value environmental protection versus economic gains. As mentioned earlier, Greenlandic citizens seem to appreciate the need for both services, and separating the territory into zones could be seen as one way of achieving environmental *and* financial sustainability. Considering APNN’s suggestion, in the second type of zone environmental considerations surpass economical ones, suggesting that greater value is attached to the environment than the economy. In the third zone, however, the relationship is reversed, and greater value is attached to the economy than the environment. This does not imply that the mining companies are dealt with a free hand in the “go” zones. They still would have to comply with Greenland’s environmental regulatory framework. Rather, it represents an alternative way of protecting and preserving the environment – one that takes into account the significant challenges that Greenland currently is facing in terms of a vulnerable Arctic climate and a struggling economy. “Sacrificing” certain zones thus offers something else of importance to the Greenlandic society – namely that of income and a well-developed welfare state. More importantly, however, dividing the country into different zones might actually imply *not* sacrificing the environment. As pointed out by APNN and others, the whole of Greenland – including the most vulnerable areas - could potentially be exposed to mining activities without the development of zones. Establishing zones will consequently help protect the environment in areas of pronounced importance, while encouraging economic activities and producing a much-needed revenue in more robust environmental areas – even though government regulations still apply in all zones. As such, the functional and ethical values of nature are to a larger degree appreciated in the former type of zone, while in the latter zone the environment is valued against the Greenlandic society’s need for income and welfare.

Concluding, the concept of sacrifice zones appears to be highly relevant in an analysis of modern day Greenland, although with a different and more reflexive analytical content than most commonly employed when considering sacrifice issues. Sacrifice zones do not necessarily relate to issues of social justice as proposed by Kuletz and Fox (1998, 1999). Though the establishment of new mines potentially might deprive people of natural resources on which they depend, the use of zones seems a rational choice in a country characterised by

a vast and largely uninhabited territory, a vulnerable and somewhat unknown environment and an underachieving economy. With traditional economic activities becoming less and less pronounced in society, the Greenlanders depend on the development of other sources of income for their welfare. Yet, the government should ensure that the citizens are involved when, if and where such zones are established.

5.1.5. Concluding valuation

In this part of the analysis, I have argued that the government of Greenland and the general public valuates the environment in both an intrinsic and an instrumental manner. Nevertheless, the NGOs and the citizens seem to recognise the ethical aspects of nature to a larger degree than the government. Furthermore, I have described how the current development of the country's mineral sector might very well be characterised as sustainable, but also that the government risks undermining the sustainability it is trying to ensure by not opening up the policy area to negotiations about different pathways to a sustainable mining future. Finally, I have suggested that the zoning of Greenland's territory might in fact help protect the vulnerable Arctic environment, depending on the way in which the government involves the public in the zoning exercise.

5.2. Knowledge in decision-making

In the former section of the analysis, I identified the main tools used for environmental valuation in Greenland today. The value and meaning that we attach to living and non-living resources is informed by our knowledge about these resources, and in the following section I will assess the way in which the production of knowledge about landscapes and ecosystem services is incorporated into the Greenlandic government's decision-making on mineral activities.

5.2.1. Scientific vs. local knowledge

As stated by Jasanoff & Martello (2004), scientific representations of environmental issues have come to dominate global knowledge production. This also seems to be the case in Greenland. Knowledge about the environmental consequences of mining is primarily constructed by consultant firms through the environmental impact assessments, or by "expert" bodies such as the DCE. The scientific knowledge produced by these institutions is,

in most instances, accepted as true by the government. Moreover, it is accepted as *more* true than the knowledge produced by ordinary citizens. By examining the consultation meetings held in connection with three different mining projects between 2009 and 2014, I found that the knowledge claims propagated by the local residents attending these meeting continuously were refuted by government officials and scientific experts with reference to the "truths" produced by consultant firms and the DCE or the GINR. I have already mentioned a few examples of this in the previous section, but I will nevertheless refer two more. The first is from the consultation meetings held on the London Mining project in 2012. Throughout all the four meetings in Nuuk, several attendees questioned the company's decision to use diesel-generated power instead of hydropower when performing its mining activities.[18] London Mining responded by saying that the company did not have the right to use the water sources in the project area, and that the construction of a hydropower plant would be too expensive and too time consuming. According to the company, calculations done by hydropower experts within the engineering firm SNC Lavalin showed that establishing a hydropower plant would cost the company between 680 million and 1,5 billion US dollars (3,7 – 8,3 billion DKK) and only cover 50-75 per cent of the project's expected energy demand (ibid.). In the aftermath of the meetings, several citizens and NGOs dismissed the calculations made by London Mining's hired experts as untrue and pointed to the increased CO2-emissions a diesel generator would produce. For instance, the Greenlandic civil engineer Flemming Hybholt claimed in his consultation feedback to the project that a hydropower plant would in fact have sufficient power potential to supply the mine, that it would take 2-3 and not 7 years to build and that it would save the country for 450.000 tonnes of CO2-emissions per year.[19] London Mining acknowledged many of the objections, but

[18] See for instance the consultation meeting (borgermøte) at the University in Nuuk 7th of September 2012 on London Mining's iron ore project. Available from: http://naalakkersuisut.gl/~/media/Nanoq/Files/Hearings/2012/London%20Mining%20ISUA/Referat%202%20dansk.pdf

[19] See for instance Hybholt, Flemming. Statement to Bureau of Minerals and Petroleum. *Offentlig høring om rapporterne Vurdering af Virkninger på Miljøet og Vurdering af Samfundsmæssig Bæredygtighed, som er udarbejdet i forbindelse med London Mining Greenland A/S' ansøgning om udnyttelsestilladelse til et jernmineprojekt ved Nuuk.* Consultation feedback, 19th of October 2012. Available at: **http://naalakkersuisut.gl/~/media/Nanoq/Files/Hearings/2012/London%20Mining%20ISUA/Answers/Hoeringssvar/Flemming%20Hybholt%202.pdf**

justified the use of diesel generators by referring to Greenland's low emission rate compared to other countries. Calculations done by experts on behalf of London Mining showed that the diesel generator would increase emissions by 89 per cent a year, but according to the company Greenland at present only contributes with 0.0038 per cent of the total world emission stock (London Mining 2013:10). In the end, the company was granted with an exploitation license in the fall of 2013 without any requirements from the government on the use of hydropower. As it is, the government is not entitled to demand the use of a certain source of electricity in mining projects, but it can instruct the mining companies to evaluate and calculate how much the production of green energy will cost them. In this specific case, the government found the arguments presented by London Mining to be more relevant than the multiple and opposing calculations performed by citizens and NGOs. This is further illustrated by the fact that the government did not request an independent evaluation of the accurate cost of constructing a hydropower plant, and the exact amount of CO2-emissions a diesel generator would produce. The second example of how citizen knowledge is seen as less significant than scientific knowledge stems from a consultation meeting held in Nanortalik on the Tanbreez project in 2013[20]. At the meeting, one of the attendees asked how a future mine would affect the reindeer and musk oxen, which he claimed that there were a great many of in that specific area. The DCE simply refuted his claim by responding that these animals were not present. Similar examples can be found in other consultation meetings on the same project, and also in meetings on other projects, where local citizens express their concerns about the effects of a certain project on the fish stock in a nearby lake or on the nesting grounds of a specific bird population. Most often, government or company representatives dismiss these concerns, claiming that the animals do not live in that area or that they will not be affected by the project at all. This might of course be true, but the recurrence of these concerns and how they are repeatedly refuted suggest that the knowledge produced by ordinary citizens are granted with less significance than the knowledge presented by others.

Examining the mineral strategies produced between the years 2009 and 2014 leaves the same impression. In several of the strategies, the government underlines the need for *scientific*

[20] See for instance the consultation meeting (borgermøte) at Nanortalik 18th of November 2013 on Tanbreez'rare earth minerals project. Available from: http://naalakkersuisut.gl/~/media/Nanoq/Files/Hearings/2013/Tanbreez/Answers/Horingssvar/Referat%20hringsmde%20Nanortalik%2018112013GRLDK.pdf

advice on matters such as biodiversity, climate protection, ecosystems and different species' habitats and migration routes. Taking the 2011 strategy as an example, the government states that it wishes to modify the Mineral Resources Act in order to ensure that environmental regulation is performed by an *independent* authority (Bureau of Minerals and Petroleum 2011[2]:8): "In this connection, the government wishes to confirm that advice on environmental matters are based on independent scientific evaluations" (ibid., my translation). Despite the apparent one-sided focus on scientific knowledge in the strategy documents, the government does seem to recognise the value of locally produced knowledge, as the following statement from the 2013 strategy illustrates: "The public might possess knowledge on practical matters (for instance on roads and road conditions) that serves to improve a mineral project, or to minimise the disturbance on citizens living close to the mine" (Mineral Licence and Safety Authorities 2013:6, my translation). This is, however, the only reference to the value of local knowledge that I was able to find in the documents. Moreover, the previous statement illustrates the secondary status assigned to this type of knowledge. Locals might help improve a project in *practical* terms, like the physical placing of a road, but not on more comprehensive issues, such as the overall effect of a mine on an area or if roads should be built altogether. As such, local knowledge is excluded from the very decision-making on mining projects as WWF pointed out in a comment to the 2014 Mineral Strategy: "The strategy describes how, through information and early participation, one can ensure that the public gains a 'balanced understanding of the mineral sector (and) ... more realistic expectations to sustainable mineral development. The strategy is somewhat blind to the fact that citizens and users of an area might possess insight and knowledge that could serve to inform decision-making" (WWF 2014:3, my translation).

As proposed by Jasanoff & Martello, the boundary between science and knowledge is socially and politically constructed, and it is an error to perceive of science as detached from social meaning (2004:13). The scientific assessment of the consequences of a certain mine on its surrounding is as much a subjective undertaking as it would be if an ordinary citizen performed the same assessment, and this is something the present government seems to have failed in understanding. However, the emphasis put on public knowledge – simply understood as knowledge produced and reproduced by local Greenlanders – should not be exaggerated. Ordinary citizens can, as the examples presented above illustrate, possess valuable knowledge on ecosystems and natural resources that might be of great use to both the mining companies and the government. Yet, the scientific and other experts included in

this thesis are likely to have some sort of training or experience that qualifies them to inform the mining projects on a different level than most citizens. Because of the experts' more specialised kind of knowledge, they might be better prepared to directly assist Greenlandic policymakers in reaching well-versed decisions. What I am suggesting is that the government contributes in making the debate about mining less nuanced when local voices are repeatedly trivialised. If the decisions made by the government are not founded on an inclusive debate and well rooted in the general population, the policymakers risk delegitimising their own decisions. Inversely, challenging the notion that all scientific knowledge is objective and detached while citizen knowledge is subjective and biased might create more support for the mineral developments so important to the country's economy. This is not to say that the scientific, verifiable and carefully tested propositions about reality that the experts of Greenland produce should be completely disregarded. Rather, citizen knowledge can be used to challenge these proposition and thus force the government to consider all options available – not only on practical matters such as a certain species' migratory patterns or nesting grounds, but also on more principal matters such as the value Greenland should assign to the environment versus the economy.

5.2.2. Science in politics

The scientific and environmental knowledge produced by consultant firms, the DCE and others serves to inform governmental decision-making. The Environmental Impact Assessment (EIA) is an important prerequisite for the granting of exploitation licenses, and the assessment of different environmental issues within the Environmental Agency for the Mineral Resources Area (EAMRA) largely rests on advice given by the DCE. This is in line with theories on knowledge and power as presented by Jasanoff (2004[1]), Pregernig & Böcher (2012) and Foucault (1977). The government depends on the consultant firms and the DCE to produce scientific "truths" about the environment-mining relationship, the DCE depends on the government for funding, while the companies depend on the government for granting them licenses on mining operations. The scientific sphere, consisting of the DCE and the companies through their consultants, co-produce knowledge about the environmental consequences of mining with the policy sphere, consisting of the Greenlandic government with its different ministries and politicians, and together the scientific and political spheres attach power and meaning to these truths.

The power of scientific knowledge on the environmental consequences of mining and its effects on the policy sphere can be found at two levels. First, in the labelling of the DCE, the consultant firms and the GINR as "scientific experts." According to Jasanoff, making identities enables people to make sense out of disorder, and the production of knowledge provides these identities with meaning and power (2004[1]:50). Identifying consultant firms through the EIA and the DCE/GINR as "experts" provides a means for the government to make sense out of the complex and shifting Arctic climate, and serves as a tool to predict the environment's reactions to mineral activities. As acknowledged by the government in the 2014 Mineral Strategy: "There are still a lot of areas in Greenland in which knowledge about nature and the environment is limited (...). With a relatively high level of exploration activities, the mining companies significantly contribute to increasing the knowledge on nature, the environment and correlations that are of great value to Greenland" (Mineral Licence and Safety Authorities 2014:44, my translation). The government sees the consultant firms and DCE/GINR as producers of knowledge on the environment-mining relationship, and identifying them as experts also means identifying them as bearers of truth. Greenland wishes to progress into the future by turning the mineral sector into a cornerstone of the economy, and the scientific experts contribute in making this vision of the future more probable by serving a recipe on how the mining sector can develop without compromising the environment.

Second, the power of the science-policy nexus is found in the hegemonic discourses on the environmental consequences of mining that the aforementioned actors produce. In following Jasanoff, new discourses are created in order to find words for new phenomena or to modify old ones, or to build up scientific authority (2004[1]:53). Finding a new language frequently means oversimplifying phenomena, but may also enable reasoned action (ibid.). In Greenland, the hegemonic discourses on mining activities and its impacts on nature have been formed through years of experience with mining. As described earlier in this thesis, environmental regulation on mining did not exist in the first half of the 19th century. After having experienced the negative effects of mining activities on the environment, however – with the Maarmorilik mine serving as a good example of this – the government of Greenland started focusing on mining-induced pollution. Over the years, the legislative framework guiding mineral exploitation has become ever more fine-grained, with the enactment of the Mineral Resources Act constituting the high point of this development. The scientific knowledge base guiding the advancement of environmental legislation has also changed with

the disposal of tailings and waste rock being identified as the main source of pollution from mines. Today, the dominating discourse on the environmental consequences of mining involves efforts to prevent pollution and to keep the environment within certain defined thresholds through the use of modern technology. Both the EIAs and the Mineral Resources Act emphasise the limits of nature – how heavy metals from the disposal of tailings and waste rock can be kept within certain pre-defined limits of what nature can absorb, how dust pollution can be kept within a geographical limit and how the noise from mining activities and traffic can be kept within a limit so as to not disturb animals (see for instance Orbicon 2013). These limits are set by scientific experts, put to use by the government and complied by the companies through the employment of precautionary measures and clean technology. The developments within Greenland's environmental regulation of mining activities correspond with international discourses on precaution and risk, which I will discuss in greater detail in the following sections. However, two points are worth noting in this regard.

First, the precautionary principle gained its global force from the realisation that nature is uncontrollable. Neither scientists nor politicians are able to fully predict its behaviour, and consequently we have to learn to live with this uncertainty. In the case of Greenland, however, there appears to be somewhat of a schism between the employment of the precautionary principle and the companies' and the government's wish to control nature. Through the EIAs, the companies are obliged to follow the precautionary principle by identifying the possible environmental consequences of its activities, and by proposing ways of mitigating these. And yet, as I have already discussed, the mitigation measures often consist of trying to keep the influences on nature within certain pre-defined thresholds. This might certainly be a viable option of trying to limit environmental harm, but the development of new mines often entail identifying *new* sources of pollution. Even though Greenland has a history of mining, it does not have a history of *all* types of mining. Identifying these new sources of pollution and predicting their consequences are often done by scientists in isolated laboratories where a small amount of the pollutant is tested on small amounts of natural resources, such as water, in a limited scope and a for a limited amount of time. In the natural environment, however, the pollutant is likely to exist for several years, and the exact amount of the discharge and how it will react with other living and non-living resources is not always predictable. Second, Greenlanders have lived with nature for centuries. Most likely, they possess extensive knowledge on different species' general behaviour. Incorporating these insight into the scientific assessments of environmental consequences of mining could be of

value to both the scientists and the government. In practical terms, this entails involving ordinary citizens before, during and after the preparation of environmental impact assessments. This is not to say that the government today completely disregards the value of local knowledge. As I will return to in the following section, the current government has taken some important steps in terms of ensuring the participation of citizens in decision-making on mines. Nevertheless, the participation is limited to consultation meetings *after* the companies have finalised the EIA, and scientific knowledge is still perceived as being truer than local knowledge – as I have provided several examples of in the preceding sections. The government has taken what Pregernig & Böcher calls an instrumental view on the science-politics relationship, in which science is seen as directly contributing to the effectiveness of political decision-making and political decision-making is thought of as spatially separated from scientific knowledge production (2012:210). As previously mentioned, scientific assessments performed by consultant firms and the DCE directly inform decision-making on mining activities, and the independence of these institutions is frequently mentioned in the government's strategy documents.

The dominating discourses on the environment-mining relationship do not, however, go unchallenged by the public. As exemplified throughout this thesis, local residents frequently use the opportunity offered to them at consultation meetings to oppose various scientific claims about the environmental impacts of a certain mining project. As described by Foucault, every society has its own regimes of truth, meaning the types of discourses that are accepted as true through mechanisms that enable one to distinguish between true and false statements. Foucault believes that these regimes are constantly negotiated, resulting in cognitive rearrangements of truths and the replacement of old regimes with new ones. This does not mean that the content of the dominating discourse is modified, but rather that the very rules and structures governing the production of scientific "truths" are being altered (1977:112). In Greenland, two such regime changes can be identified. The first occurred when Greenland achieved self-rule in 2009 and subsequently was granted the right of governing its subsurface resources. At this point in time, new rules of environmental governance were enacted through the Mineral Resources Act, but the Danish DCE was upheld as the main source of scientific knowledge. The second regime change took place in 2013, when the former Bureau of Minerals and Petroleum was divided into three independent agencies. This change was partly a result of the public and NGOs exerting pressure on the government to separate the environmental and licensing authorities. Nevertheless, the main

valuating institutions – the EIA and the DCE – remained intact. So did the fundamental belief that mining offers the only option for Greenland to secure the future welfare of its citizens. Perhaps a third regime change will occur within the next few years. Responding to widespread criticism from civil society, the current government is trying to design new mechanisms for participatory decision-making. However, challenging the very power invested in dominating scientific discourses on mining and the environment requires a more profound change. According to Foucault, it is the task of social investigation to detach the power of truth from the forms of social, economic and cultural hegemony within which it operates (1977:133). Increasing public participation is a step in the right direction, but it needs to be accompanied by a critical assessment of the scientific "truths" produced by consultant companies and the DCE, and by establishing new structures of inclusive decision-making.

5.2.3. Analysing risk in Greenlandic mining policies

Turning now to the issue of risk, I will use the controversies surrounding the lifting of the zero-tolerance policy on uranium mining to illustrate how the government and the public conceive of mining-induced risks.

Mining generally, and especially the mining of radioactive elements, involves a genuine threat of pollution to both the environment and the human population. As previously mentioned, the government of Greenland has practiced a zero-tolerance policy on uranium mining since 1988, when the country was still under Danish rule. In 2010, however, the government opened up for companies – among those Greenland Minerals and Energy – to conduct feasibility studies on potential mining projects containing traces of uranium in order to "increase knowledge on the mining of radioactive elements and its effects on health, safety and the environment" (Råstofstyrelsen 2013:10, my translation). The same year, representatives from the Greenlandic government visited Canada – which is the world's second biggest producer of uranium – in order to learn more about the mining of radioactive elements (Bureau of Minerals and Petroleum 2010). Three years later, in the beginning of 2013, the Danish government appointed a special commission to assess the potential consequences of uranium mining. The commission concluded that the possible exploitation and exportation of radioactive elements should happen in close collaboration with the Danish government (Albrechtsen 2013). And yet, on the 24th of October that same year, the current government voted in favour of lifting the uranium ban without consulting the Danish

government or the Greenlandic population. According to the mining company Greenland Minerals and Energy, Kvanefjeld contains the world's largest deposit of rare earth minerals. In order to gain hold of these minerals, however, Greenland Minerals and Energy also needs to extract uranium. The zero-tolerance policy put a limit on 60 grams of uranium per ton of extracted ore, and according to GEUS the ore in Kvanefjeld contains 350 grams of uranium per ton (DR.dk 2013).

The government's rapid policy shift was heavily criticised by Greenlandic NGOs and local residents, who found it unjust that the government had not consulted the public before repealing the zero-tolerance policy.[21] Danish politicians claimed that the mining of uranium touched upon foreign-, defence- and security policy issues and consequently should be handled by the Danish as well as the Greenlandic government. Greenland, on its part, made reference to the Self-Rule Act, which states that the Danish government is not entitled to interfere with Greenland's mineral policy (DR.dk 2013). Both before and after the zero-tolerance repeal, several NGOs and Greenlandic citizens expressed their worries about the environmental consequences of uranium mining. Several protests were organised in Nuuk and other cities across Greenland, and a range of NGOs – consisting of Avataq, Transparency Greenland, WWF, ICC Greenland among others – formed a coalition with the aim of improving public participation in decision-making (Josefsen 2013[1]). Furthermore, Avataq, NOAH Denmark and the Ecological Council sent a resolution to the Greenlandic premier Aleqa Hammond and the Danish prime minister Helle Thorning-Schmidt where the NGOs asked the politicians to uphold the uranium ban (Broberg 2013). According to the organisations, the extraction of uranium is highly unnecessary because rare earth minerals are found in pure form elsewhere in Greenland.

[21] See for instance Qvist, N. O. (2013): Narsaq-borgere demonstrerer mod uranudvinding. Sermitsiaq, 8th of October 2013. Available at: http://sermitsiaq.ag/narsaq-borgere-demonstrerer-uranudvinding

As stated by the chairman of Avataq, Mikkel Myrup:

> ”The planned extraction of uranium in Kuannersuit (Kvanefjeld) will leave behind millions of tons of tailings that contain some of the most polluting radioactive minerals that exist. The waste will remain radioactive for thousands of years causing an extensive radioactive pollution, which - because of its health risks - may necessitate a ban on agriculture, fisheries, hunting and livestock breeding in large parts of southern Greenland, as well as pose a health risk to the people living there” (quoted in Broberg 2013, my translation).

A recent report published by Willem Storm van Leeuwen, an expert on technology assessments and life cycle analyses of energy systems at Ceedata Consultants in the Netherlands, confirms Avataq’s gloomy outlook on the Kvanefjeld mine. According to the report, the mine will be placed on top of a mountain, and will be constructed as an open pit (Arctic Journal 2014). This will, as stated by the report, cause water and dust pollution and will heavily contaminate the water source in which tailings from the mine are being disposed (ibid.). Greenland Minerals and Energy, on its part, claims that the extraction of rare earth minerals at Kvanefjeld could be conducted in a responsible and environmentally friendly manner. The company furthermore expects that the Kvanefjeld deposit may become one of the world’s most important sources of rare earth minerals (Langhoff 2013:15). In the end, the government seems to have attached greater importance to the testimony given by Greenland Minerals and Energy than that given by Avataq and others. The fact that no referendum was held on the issue of uranium mining serves to strengthen this impression.

As touched upon in the theory part of this thesis, Beck believes that the emergence of new and modern risks necessitated the replacement of the principle of compensation with the principle of precaution. Certain types of risk – such as radioactive pollution from uranium mining – cannot be fully compensated. The toxic waste resulting from uranium mining might degrade the environment for decades, and also poses a real health threat to humans. Furthermore, uranium is used in the production of nuclear weapons and is as such also a security threat. Up until 2013, the Greenlandic government adhered to the precautionary principle by putting a ban on the mining of all radioactive elements. And because the precautionary principle has a strong footing in present international thinking on environmental protection, and as such has become a part of the common perception of how nature should be handled, lifting the ban represented a threat not only to the environment but

also to present thinking about risk. Of course, the criticisms against the zero-tolerance repeal were funded on the fact that the government had not consulted the Greenlanders when reaching its decision. But on a more profound level, the repeal also contributed in undermining the principle of precaution on which most environmental civil society groups rest. The precautionary principle furthermore offers some sense of security by representing a way of preventing risks that we have yet to prove exists. As proposed by Beck, risks are not real. They come alive in the mind as an expectation of something catastrophic. In the chaotic existence of modern day society, the precautionary principle represents a sort of environmental anchor. If risks are not real, and cannot be controlled or compensated, we might at least minimise the perceived threat of uranium mining or terrorism or global warming by adhering to the principle of precaution. The word precaution in itself offers a sense of comfort. If we follow certain predefined guidelines, we automatically reduce the chance of having to deal with the perils of a certain threat. It naturally follows that departing from the precautionary principle reinforces the perceived risk of being exposed to the same threat. When the Greenlandic government lifted the ban on uranium mining, which had been the prevailing policy for decades, it simultaneously deprived the Greenlanders of the comfort of not having to relate to the perils of being exposed to radioactive materials. Because the environmental and health related consequences of uranium mining in Greenland is a matter of dispute, the uncertainty that the removal of the precautionary principle created was reinforced, contributing to the conflicts arising between the government and the mining company on the one hand, and the NGOs on the other. This is not to say that the mining of radioactive materials is not harmful to humans or to the environment, but I suggest that the uranium controversies extend beyond a disagreement about the factual environmental consequences of uranium mining.

In March of 2014, Greenland Minerals and Energy signed a so-called Memorandum of Understanding with China Non-Ferrous Metal Industry (NFC) on the Kvanefjeld project. With the help of NFC's experience and capacity, the two companies will cooperate in extracting rare earth minerals from Kvanefjeld (Proactive Investors Australia 2014). This leads us to another risk issue associated with the uranium controversies in Greenland – namely that of globalised and modernised risks. As stated by Beck, risk is the product of modern day society. Modern risks produced by humans, such as global warming or terrorist attacks, have surpassed the thresholds of nation-states and social class, and are felt in virtually every corner of the world (Beck 2006:333). Beck believes that these risks are the

product of science and technological advancements. Through generating new discoveries and developing new technologies, science creates more risks. At the same time, science is charged with the task of detecting and analysing these risks (ibid.). This misalignment is, according to Beck, increasingly being recognised by new, "individualised" actors who associate themselves in social movements and reshape scientific and social institutions. The extraction of radioactive elements can certainly be seen as a product of modern society. New scientific and technological developments have not only allowed mining companies to extract minerals efficiently and cost-effectively, but have also contributed in producing the risks involved in the scientific-technological extraction of these minerals. In the case of uranium mining, the risks produced include the potential pollution of living and non-living resources as well as humans, and a threat of the radioactive elements falling into the wrong hands. As uranium constitutes a critical component in the production of nuclear power and nuclear weapons, the extraction of uranium is a security issue for Denmark, for Greenland and for the globe. As proposed by Beck, the scientists contributing to this development are not able to control the risks outlined above. First, they cannot fully predict what the environmental consequences of radioactive pollution entail – both because their knowledge may be incomplete, but more importantly because they are unable to control nature's response to radioactive pollution. There is also the risk of accidents occurring, with unknown environmental consequences to follow. Second, because the scientist cannot decide where and by whom the uranium is put to use. This is a matter for the government to decide through its export policies, but either way the radioactive elements might end up in unintended places – especially considering that the resource is becoming globalised through the formation of international partnerships.

As previously mentioned, Greenlandic civil society has resisted the development of uranium mining by forming coalitions that have challenged both the government's policies on the mining issue, but also the democratic deficit found in the repeal of the zero-tolerance policy. This coincides with Beck's thoughts on reflexive modernity, in which modern society's discovery of science as inadequate has lead to a resurgence of new green movements. In Greenland, the mining controversies most certainly prompted the formation of collaborations between Greenlandic NGOs, who provided an important corrective to the information on the environmental consequences of uranium mining produced by government agencies and the mining company. Yet, in Greenland the battle of truth between the NGOs and the government and the company also revolved around issues of public participation – both as a

result of the general call for inclusiveness in decisions on mining activities, but especially because of the way in which the government bypassed the Greenlanders when lifting the zero-tolerance policy. It remains to be seen whether the Greenlandic NGOs are able to challenge the government's legitimacy on the uranium issue, or if the regard for economic growth wins through. Either way, the emergence of new, globalised and human-induced risks such as that of uranium pollution requires the participation of a multitude of stakeholders. The complexity and globosity of these issues, coupled with the cognitive limitations of scientific knowledge, suggests that they cannot be managed by experts and scientists alone. Including different types of knowledge in evaluating these mega-hazards implies that decision-making can be performed in a more effective and legitimate manner.

5.2.4. Concluding risk

In this section, I have claimed that the production of knowledge on the environmental consequences of mining are mainly performed by independent "expert" institutions such as the DCE, and that this knowledge directly informs Greenlandic decision-making. I have furthermore suggested that the dominating discourse on the environment-mining relationship at present is that of keeping nature within certain pre-defined thresholds, and that the lifting of the zero-tolerance policy on uranium mining involved taking a step away from the precautionary principle, which has increased the public's sense of being exposed to risk. Finally, I have claimed that uranium mining represents a modern, complex and globalised risk that need to be countered by a multitude of different stakeholders, both scientific and non-scientific.

5.3. Public participation

As aforementioned, the relative weighing of scientific versus local knowledge has repercussions on governmental decision-making – but it also affects the *way* in which decision-making is carried out. In the final section of this analysis, I will study the participatory mechanisms currently in place in Greenland and assess how these mechanisms are considered by the public and by government officials. By employing theories on public participation, I aim to identify which actors are excluded and included in the decision-making processes related to mineral activities in Greenland.

5.3.1. Results - the consultation process

The most significant participatory tool currently in place in Greenland is the consultation meeting. Consultation meetings are held on the basis of EIA/SIA reports, and proceeds as follows: First, the company applying for an exploration or exploitation license conducts feasibility studies and gathers baseline data in the area where a mineral occurrence has been detected. Second, a project description and a non-technical resume of the planned project are sent on a preliminary consultation for 35 days. During this time, the public can apply for support from the consultation fund in order to finance independent assessments of issues related to the mining project. Third, the company develops a Terms of Reference (ToR) document based on the project description and the comments from the public. The ToR contains more detailed descriptions of the time frame and economy of the project. Fourth, a complete EIA/SIA report is sent on a second public consultation, and the government arranges one or several meetings in the locations it considers to be most affected by the mining project. Minutes from the meetings are subsequently published on the government website. Fifth, the company develops a white paper in which relevant feedback that has been brought up during the consultation process is (further) commented. The white paper is not published. In the case of SIA reports, the sixth step entails IBA-negotiations between the company, the government and the municipality in which the project is located. When the feedback included in the white paper is incorporated into the EIA/SIA report, the final exploration application is presented to the government who reaches a final decision on whether the project is accepted or not (Departementet for Erhverv, Råstoffer og Arbejdsmarked 2014:8-15). Public consultation meetings are arranged by the government, and differ from other types of meetings organised by the mining company. The mining company is authorised to arrange citizens meetings or stakeholder meetings (often focus groups) where the aim is to include the public in the project, or information meetings where the company briefs the attendees about the status of its project (ibid.).

5.3.2. Results - the mineral strategies

The consultation procedures have not always looked like this, however. Ever since Greenland achieved self-rule in 2009, the participatory process has gone through some important changes, reflected in the previous and present government's mineral strategies. Beginning with the 2009 Strategy, the government's main aim was to "secure local insight and knowledge about mineral activities" through the publication of different booklets and fact

sheets on mining projects, and by upholding the traditional mineral hunt Ujarassiorit (Bureau of Minerals and Petroleum 2009[1]:26). The government also focused on assembling consultation meetings in the 2009 strategy, stating that the public "takes great interest in these type of arrangements where they can ask questions about and gain practical knowledge on geology, minerals and projects" (Bureau of Minerals and Petroleum 2009[1]:23, my translation). The focus was very much on stimulating the public's interest in the mineral sector and to expand citizen's knowledge about mineral activities through information activities. In 2011[22], the focus was still on securing local insight and knowledge, but with a reference to the importance of developing the mineral sector in cooperation with the public (Bureau of Minerals and Petroleum 2011[2]:45). The 2011 Mineral Strategy further mentioned the SIA-process as a means to strengthening public participation, and stated the importance of involving the public on the matter or uranium mining through information activities (Bureau of Minerals and Petroleum 2011[2]:45-48). The following year, in 2012, the government again brought up the issue of uranium mining in the strategy document, stating that there had been several information meetings and consultation meetings over the years where citizens had been further informed about this type of mining (Bureau of Minerals and Petroleum 2012[1]:9). Additionally, the government had completed a range of different activities focusing on information sharing, cooperation, experience exchange and building of partnerships and had produced six information films about current mineral projects (Bureau of Minerals and Petroleum 2012[1]:26-28). In the 2013 Mineral Strategy – the first strategy developed by the current government – the contribution local knowledge might add to a mineral project was recognised for the first time (Mineral Licence and Safety Authorities 2013:6). The stated aim of the government in 2013 was to "develop the mining sector through a constructive interplay between the mining company and the public" (ibid, my translation). This was to be achieved by strengthening the dialogue between the company, interest groups and the public, by developing the consultation process and by consolidating the public debate on mining projects. The government furthermore wished to include the citizens in its efforts to improve the participatory processes, and stated that the companies should involve the citizens in their project on an earlier stage. As for the specific participation activities the government had conducted in 2013, the strategy refers to different types of meetings that had been held, as well as focus groups, interviews and more general information sharing (ibid.). Turning to the present Mineral Strategy, the government proposes

[22] No Mineral Strategy was published for the year 2010.

a range of changes to the previous participatory model. It wishes to compose new EIA/SIA guidelines that more specifically address how the public should be involved in the consultation processes (Mineral Licence and Safety Authorities 2014:91-92). Furthermore, the government proposes to formalise the consultation procedures by inscribing them into the Mineral Resources Law, and to facilitate earlier consultations as described above (preliminary consultations). Additionally, the government suggests that the consultation period be extended from six to eight weeks, and that minutes from the meetings are published online. Finally, it wishes to strengthen the municipality's role in the IBA-negotiations, and to establish a consultation fund (ibid.). Several of these changes have already been implemented, as can be read from my description of the EIA/SIA process above. In the 2014 strategy the government does not, however, describe what type of participatory activities it has conducted throughout the year.

Overall, the earlier strategies seem more preoccupied with marketing Greenland's mineral potential on the international stage than with securing the genuine participation of its citizens in decision-making on mineral activities. The extent of the government's marketing activities can perhaps be seen as a response to Greenland being granted with the right to control its mineral resources in 2009 and the wish to promote its mineral wealth in order to generate income. As for participation, the early strategy documents were mainly preoccupied with information sharing, with the aim of strengthening the public's interest in and knowledge about mineral projects. With the change of governments in 2013, the focus on marketing activities was greyed out and rather targeted at facilitating a more genuine participatory process. Through establishing preliminary consultations, expanding the consultation period and establishing a consultation fund, the government seemed more set on involving rather than informing the public. During the election campaign leading up to the present government's victory, the ruling Siumut party repeatedly gave promises of strengthening the participatory process on mineral projects (Josefsen 2013[2]). Once in power, however, the government disregarded the public when reaching its decision on uranium mining, and the present government's consultation strategies have been criticised equally as much as the previous government's strategies. In the following, I will present all the consultation meetings that have been held in connection with mineral projects and law changes from 2009 to 2014 in order to illustrate how the government's participatory model has evolved, and how stakeholders and debaters have perceived it.

5.3.3. Results - consultation meetings 2012-2014

Starting with the consultation meetings held in connection with London Mining's iron ore project in 2012[23] (see Appendix 3), the consultation format was somewhat different than it is at present. Instead of an open meeting where government officials, the consultant company and London Mining answered questions from the participants, the government had compiled a panel consisting of different scientific experts, politicians and the mining company. A range of predetermined questions was discussed in groups, and the questions were subsequently addressed in writing in the company's white paper. According to the government: "opinions are often distorted in debates, and consequently there will be no debate tonight. Instead, opinions from the public will be noted and collected" (Bureau of Minerals and Petroleum 2012[4]:2, my translation). During the four meetings, several attendees criticised the scarce time frame of the consultation period. This has throughout the years been one of the most rampant criticisms directed at the Greenlandic participatory process. At the first meeting in Nuuk, one of the attendees asked why the 8000 pages long EIA had been published on the government website only 14 days before the meeting. The government responded by saying that it did not expect the public to have read the entire document, and that this was a task for the politicians and not the citizens (Bureau of Minerals and Petroleum 2012[5]:2). There were furthermore several questions about the conflict of interest between local fishers and hunters and London Mining in the licensed area, to which the government responded that there would still be good opportunities for locals to fish and hunt outside of the licensed area and that the revenue from the project was important to Greenlandic welfare (ibid.). On a general basis, the participatory process was critiqued for not facilitating a genuine discussion among the attendees, who were not allowed to ask follow-up questions, and for resembling more of an information meeting than a consultation meeting.

Moving to 2013, four meetings were held on Tanbreez' rare earth minerals project and three on True North Gems' rubies project (see Appendix 3). At all of the meetings, participants claimed that they had not been sufficiently informed about the projects and their environmental consequences. Considering the Tanbreez project, several NGOs and civil society organisations claimed that the EIA did not address all relevant environmental issues related to the project and questioned the statement from Tanbreez that pollutants from the depositing of tailings in Fostersø would stabilise with time. Greenpeace, among others,

[23] No consultation memorandums have been published for the years 2009, 2010 and 2011.

asserted that it did not support the project due to the lack of information and the problematic consultation processes (Greenpeace 2013[1]:3). In the True North Gems' consultations, the conflict between the local stone pickers and the mining company emerged as the most prominent issue. The Association of 16th of August, which is an organisation consisting of private stone collectors, as well as WWF and ICC Greenland claimed that the rubies conflict was the first genuine conflict between small-scale users and commercial interests for several years, and requested that True North Gems initiate a dialogue with the local users (Foreningen 16. August 2013). In 2013, a public consultation was also held on the amendments to the Mineral Resources Act suggested by the government in the Mineral Strategy of the same year. Numerous NGOs and other interest groups commented the proposal, among which were Transparency Greenland, WWF, KANUKOKA and Sermersooq Municipality. WWF criticised the government for not involving others in the decision on where consultation meetings should be held, and furthermore claimed that the meetings resembled meetings among experts rather than meetings among citizens (WWF 2013:18). Sermersooq Municipality, on its part, questioned the lack of guidelines on how feedback from the meetings should be incorporated into the continued EIA/SIA process, and several of the associations called for a better organisation of the consultation meetings with more dialogue and discussion (Kommuneqarfik Sermersooq 2013:5).

In 2014, the Mineral Strategy was put out on public consultation for the first time. This resulted in a myriad of responses from civil society organisations, ordinary citizens, ministries and interest groups, and one of the most rampant critiques against the strategy came from the Employers' Association of Greenland Sulinermik Inuussutissarsiuteqartut Kattuffiat (SIK). SIK started off its consultation feedback by stating "there has been a confusion between the concepts of 'genuine participation' and 'consultation' the last few years" (Sulinermik Inuussutissarsiuteqartut Kattuffiat 2014:1, my translation). It continued by asserting that NGOs and other civil society groups should be more involved in the EIA/SIA process, and that the government ought to establish an independent agency to assess the participation processes (ibid.). This would, according to SIK, contribute to the government's democratic legitimacy. SIK furthermore claimed that the strategy is too vague, only mentioning "consultations" as a way of including the citizens in decision-making (ibid.). The second Employers' Association of Greenland, Grønlands Arbejdsgiverforening (GA), called the consultation process "unserious" in its feedback to the government, stating that "in stark contrast to the general wish of improving democratic participation, GA is worried that many

of the constructive consultation feedbacks are not taken into account by the political decision-makers, and GA is convinced that the quality of political decision-making thus remains inadequate" (Grønlands Arbejdsgiverforening 2014:2, my translation). WWF, on its part, stated that the consultation process is unsatisfactory and opaque, and denounced the formulation in the strategy document that early consultations with the public will create goodwill on behalf of the mining company. According to WWF, "participation is not about creating goodwill on behalf of the companies, but to secure a healthy and critical debate in the public" (WWF 2014:3, my translation).

The criticisms presented above point to several important shortcomings with the current participatory process in Greenland. Even though the present government has suggested several improvements in its Mineral Strategy, the consultation meetings are still too short, civil society is not included in the development of the EIA/SIA reports, new conflicts have arisen between the mining companies and the public, and the meetings are in need of more dialogue and less monologue on behalf of scientific "experts" and government officials. Moreover, the attendance at the meetings seem to increase proportionally with the amount of time since the publication of an EIA/SIA report, implying that it takes time for the government and the company to create awareness among the public on a certain mining project. Consequently, the public should either be involved on an earlier stage or they should be given more time to familiarise themselves with the project in question.

5.3.4. Discussion of the government's approach to participation

What can be said about the government's approach to participation from the above discussion on the consultation process? According to Jasanoff, innovation in science and technology requires a corresponding capacity for social innovation. Specifically, scientific and technological progress reinvigorates questions about political inclusion/exclusion and the distribution of rights and obligations. In Greenland, the quest for public participation started in 2009, when the government took over the responsibility for the country's mineral resources. Since then, the consultation process has been driven to progress by NGOs, civil society groups and ordinary citizens. It was not until the present government was elected, however, that the participatory process went through a larger transformation. The question of participation has, nevertheless, been a part of the public debate in Greenland for several years and especially in relation to scientific-political developments. This was nowhere more visible than in the debate following the government's decision to lift the ban on uranium mining, as

discussed above. Even though the government followed up on its promises to improve the consultation process in the wake of the uranium question, the political decision not to hold a referendum on the uranium issue might nevertheless have contributed in undermining the government's democratic legitimacy. As pointed out by Jasanoff, citizens evaluate institutions and their own ability to participate in decision-making according to their knowledge base, and it is thus a loss of credibility for governments to neglect public knowledge (ibid.). This is especially important in a time where knowledge is decentralised, decisions are made under uncertainty and environmental issues are happening at a regional and global scale (Jasanoff 2004[2]:93). During the uranium controversies, the government put more trust in the mining company's evaluation of uranium mining than in the public's and the NGO's knowledge on the same issue. This might have weakened the public's belief in its own ability to contribute when important decisions are being made, and leaves the impression that the government is more preoccupied with rushing through decisions on mining in order to earn money rather than with securing the public's participation in decision-making. Despite the noticeable lack of public consensus on the uranium issue, the calls for increased participation seem to have continued unabated in the Greenlandic society. On the 26th of March 2014, the previously mentioned NGO coalition presented a document to the government with recommendations for how the consultation process could be improved (Josefsen 2014). Among the recommendations were the establishment of an independent appeal authority and an improved appreciation of international conventions such as the Aarhus Convention.[24] Throughout the years, several NGOs have underlined the importance of obtaining the public's free, prior and informed consent in decisions on mineral projects, to which the government has responded that Greenland's right to decide over its own mineral resources is an application of just this requirement. If the government is to improve public participation in decision-making on important mining project, it needs to involve the public not only in evaluating the EIA/SIA, but also in evaluating the participatory process itself.

[24] The UNECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters entered into force on 30 October 2001 and has been ratified by 46 states and the European Union. The Convention states that the public has a right to information, public participation and access to justice in governmental decision-making on matters concerning the local, national and transboundary environment.
http://www.unece.org/fileadmin/DAM/env/pp/documents/cep43e.pdf

Only then can the government make the transition from what Bäckstrand has termed civic science as participation to civic science as representation or democratisation.

In following Bäckstrand, *civic science as participation* brings citizens into the conduct of science through participatory instruments such as consensus conferences, citizen juries and public scientific hearings (ibid.). The aim is to enhance public understanding of science by improving communication and outreach, and it is based on the assumption that public sentiments towards science are based on irrationality and ignorance (ibid.:34). As such, it correlates with the psychometric paradigm on risk as presented by Jasanoff earlier, and the instrumental take on the science-policy nexus as described by Pregernig & Böcher. To a certain degree, the participatory model employed by the current and previous governments of Greenland resembles civic science as participation. Especially in the early years, the focus was very much on enlightening the public through different information activities, and less on directly involving the citizens in science-policy collaborations. Although the present government seem more intent on making the participatory process more genuine, the consultation meetings are still not characterised by meaningful discussions and negotiations on an equal footing. Furthermore, and as discussed in great detail above, scientific knowledge is held to be truer than the knowledge produced by the public, and the same applies for the diverging perceptions of risk. These elements fit well with an understanding of civic science as participation.

Bäckstrand presents two alternative models to participation; civic science as *representation* and civic science as *democratisation*. The first acknowledges the limited, provisional and value-laden nature of scientific knowledge on global environmental risks, and calls for more pragmatic and inclusive decision-making processes. The second questions the artificial borders between science and non-science, and challenges the very structures of scientific knowledge making with the aim of incorporating democratic principles into these institutions. In Greenland, the transition from civic science as participation to civic science as representation would require the government to make some important changes to the current participatory process. Following the advice given by several civil society groups, the government could - by way of example - open up the EIA/SIA process to the public, allowing citizens to contribute in the development of these reports. This way, every aspect of the project in question and its impacts on the environment would be duly illuminated. Allowing the public to participate throughout the whole EIA process would also give the citizens a

better basis for understanding, discussing and negotiating different solutions to the project in question during the consultation meetings. Extending the EIA process would, however, require more time, which subsequently might scare off investors and mining companies and compromise the government's efforts in attracting the mining industry to Greenland. And yet, securing the public's consent on large-scale mineral projects might enable both the government and the mining company to avoid costly conflicts and exposure to social risk.

Nevertheless, and as I will discuss in greater detail in the very last section of this analysis, the representational model does not challenge the power structures on which the current scientific and political institutions are founded. As presented earlier, both Jasanoff and Foucault see knowledge and power operating in a close relationship, reinforcing the current status quo. Consequently, challenging the hegemonic discourses on environmental issues and promoting genuine participation requires the disintegration of the two social structures in the form of new participatory forums. These observations fit better with the notion of civic science as democratisation, in which the underlying power structures of scientific institutions are scrutinised. Employing the democratic participatory standard in Greenland would require a radical restructuring of the whole political system, at least if the aim is to adhere by the participatory democratic model. Following the deliberative democratic approach to decision-making is perhaps a more realistic option. Regardless of democratic model, civil science as democratisation would involve a profound reformation of Greenland's scientific institutions, including the DCE and the GINR. Turning these institutions into vehicles of democratic decision-making also means opening them up to ordinary citizens, and "scientific" assessments would have to be based on lay knowledge as well as expert knowledge. Moreover, the production of scientific recommendations would have to be preceded by negotiations between citizens, civil society groups, scientist and others with the aim of choosing the best recommendations, just as in an ordinary election. This process is undoubtedly more democratic and perhaps more legitimate as well, and it could help reinforce the status of non-expert knowledge. However, it would also be more cumbersome and slow and it is probably a less realistic alternative. It is difficult to imagine a situation where knowledge produced by educated experts is to be replaced by or equated with knowledge produced by ordinary citizens without this kind of knowledge. Such an option might not be desirable, either. Local knowledge is, however, not without relevance or value, and perhaps the aim should not be to employ a pure and ideal model of civic science as presented by Bäckstrand, but to incorporate certain elements from one or two. Either way, the

transition to a more democratic participatory process would most likely be driven forward by NGOs as much as citizens. As previously noted, Greenlandic civil society groups are constantly pressing for more participation in mining issues, and in many ways they seem critical towards the very structures guiding participatory decision-making in Greenland today. The NGOs are calling for an independent consultation fund and independent experts to evaluate specific mining project, and have recommended the government to establish an independent appeal authority. This constant call for independency could be interpreted as a sign of mistrust towards the mineral authorities and the governmental procedures on mineral licensing, and might push Greenland towards a more democratic participatory model. The Greenlandic NGOs have taken a prominent place in the public debate on participation, and will most likely continue to do so in the years to come. By forming coalitions and offering advice on participatory decision-making to the Greenlandic government, they have to a certain extent assumed the role of a watchdog. If the coalitions grow stronger in the years to follow, there is a valid chance that the current participatory model will undergo significant changes. How these changes will play out remains to be seen.

5.3.5. Concluding public participation

In this section of the analysis, I have argued that the main tool for participatory decision-making currently in place in Greenland – the consultation meeting – is found to be wanting by both citizens and civil society organisations. I found that the Greenlandic participatory model resembles what Bäckstrand has termed civic science as participation, and that the transition to an alternative version of civic science requires the restructuring of scientific institutions – first and foremost the DCE and the GINR. Finally, I suggest that Greenlandic NGOs are pressing for change to the current participatory model, and that this might lead to a much-needed reformulation of the science-policy nexus.

5.4. Ways forward

Throughout this thesis, a recurrent theme has been presented and argued for - namely, the need for Greenland to establish new participatory forums. The reasons for this are manifold, but four arguments stand out. First, the Greenlandic society should come to an agreement about what it wishes to get out of the mineral developments. Should it prioritise economic gains or environmental protection, or both? As the previous discussion on sacrifice zones has shown, the two are not necessarily mutually excluding. Second, achieving the goal of developing a sustainable mining sector requires a broad debate among scientists, politicians and citizens about the different pathways Greenland can take to different sustainable futures. As proposed by Connelly, sustainable development is about balancing between different conflicting goals, and this balancing act should not be left up to scientists and politicians alone. Third, the emergence of new and globalised risks – such as that of uranium mining – reveals the cognitive limits of scientific experts and suggests that different types of knowledge should be involved when identifying solutions on how to manage these risks. And finally, new participatory forums are needed to break down the constructed barriers between "expert" and "laymen," and traditional knowledge and "pure science."

One might ask why these participatory mechanisms cannot simply be incorporated into existing Greenlandic institutions. As the previous discussion has shown, the consultation meetings are the single most important participatory mechanism or institution in Greenland today, and it falls short on several accounts. First, it does not facilitate discussions and negotiations among the participants one the one hand, and among the participants, the government and "experts" on the other. Rather, the meetings serve as a way for the citizens to air their concerns, and for the government and experts to refute them. Second, the meetings do not acknowledge the value of traditional and local knowledge. This is seen in the way the government and mining companies respond to local knowledge with scientific "truths," and how locals as bearers of "traditional" knowledge are considered as recipients of the more correct and trustworthy scientific knowledge. More importantly, however, the science-policy nexus – as proposed by Jasanoff and Foucault – suggests that knowledge and power operate in a close relationship and reinforce the current status quo. If the status quo is deemed unsustainable, it does not suffice to incorporate certain participatory elements into existing institutions. The science-policy nexus will simply continue to undermine the attempts in order to sustain itself. If policy-makers and the public alike are not able to question the very

structures of scientific knowledge production, traditional knowledge will still be considered less true than scientific knowledge, and public perceptions of risk will still be seen as less rational than expert perceptions of risk. In the case of Greenland, we can imagine three different scenarios depending on the government's will to establish new participatory forums, and the public and civil society's efforts to challenge the hegemonic scientific discourses on mining and the environment produced by the DCE and others.

A) The government continues the present participatory model with only small, cosmetic changes. This will lead the Greenlandic NGOs to keep pressing for change, but the dominating discourse on the environmental consequences of mining remains intact. New and unfamiliar mining risks will continue to appear, and the government will keep responding to these risks by leaning on the advice given by scientists, who contribute in advancing the mineral sector and thus producing more risk.

B) The government implements certain and more profound changes to its participatory model, for instance by allowing its citizens to partake in the development of environmental impact assessments. The traditional knowledge offered by the participants is, nevertheless, considered inferior to the knowledge produced by experts, and the dominating discourse on the environmental consequences of mining is only slightly altered, with the same results as above. The NGOs will continue pressing for more change.

C) The government incorporates elements from one or two of the participatory models presented by Bäckstrand, recognising the value of expert as well as non-expert knowledge and merging the two knowledge forms into more democratic participatory institutions. The result is more legitimate and realistic responses to the emergence of new, mining-related risks, and the development of a more sustainable mining sector based on a common understanding.

Of the three scenarios presented above, the second is perhaps the most likely to unfold within the next few years. The government is already planning to make some changes to the participatory model, but the superior role assigned to scientific knowledge will probably remain unopposed. In my opinion, questioning the dominance of the DCE and the EIA is the greatest challenge to governmental decision-making in Greenland as of date, and I believe the NGOs have an important role to play in tipping the scales towards the second or third scenario.

6.0. Conclusion

Overall, I found that the present and previous governments of Greenland value the environment both in terms of its intrinsic and instrumental worth when reaching decisions on mining operations. However, the government seems to attach more importance to exploiting natural resources for economic gains than does the general public. Even though Greenlanders appear sympathetic towards the aim of developing the mining sector, they continuously question who will benefit from these developments. Because of their longstanding relationship with nature, Greenlanders also seem more aware of the functional value of nature and there appears to be somewhat of a schism between the decision-makers and the Greenlanders in the valuation of the environment. This schism should not be exaggerated, but points to the need for the government and the public to reach an agreement on what the country wishes to achieve with the development of its mineral sector.

The government's approach to the mining-environment relationship seems to fit well with both the classic Brundtland definition of sustainable development as "development that meets the need of the present without compromising the ability of future generations to meet their own needs" and Connelly's sustainability triangle. Sustainable development is, according to Connelly, about striking a balance between the desirable and often conflicting political goals of environmental protection, social justice and economic growth, and this is seemingly what the present government is trying to achieve by addressing important problem areas such as unemployment, a low level of education and budget deficits. Nevertheless, and as stated by Scoones et. al, sustainable development is also about facilitating a broad discussion about the different pathways to different sustainable futures that any society might choose to follow, and on this account the present government falls short. I suggest that separating the Greenlandic territory into "go" zones – where mining is actively promoted – and "no go zones" – where mining is consistently prohibited could be one way of achieving a sustainable development of the mining sector. Several different scholars, civil society groups and governmental agencies have promoted this solution, and I propose that it represents an alternative way of preserving the environment while simultaneously promoting economic growth. Because the whole of Greenland potentially could be opened up to mining operations, assigning a "no go" status to certain vulnerable areas might actually imply *not* sacrificing these areas. Conversely, "sacrificing" other areas that are environmentally more

robust, offers Greenland the opportunity of generating some much-needed revenue – even though government regulations still apply in all types of zones.

Turning to the issue of knowledge and power, I found that decisions on mining operations to a large degree are based on expert knowledge produced by a few scientific institutions and consultant firms. This knowledge seems to be valued higher by the government than knowledge produced by ordinary citizens. Exemplified by the public's call for hydropower in mining projects, the government attached greater importance to the testimony given by the company experts who found green energy too expensive and time consuming, than the opposing calculations made by citizens and civil society groups. I also found that the dominating discourse on environmental protection among Greenlandic decision-makers today is that of keeping nature within certain predefined threshold, and that the identification of these thresholds is an illusionary task performed by detached scientists. In line with Foucault's theory on knowledge/power, I identified two important regime changes within Greenlandic society that has challenged the hegemonic discourses on the environmental consequences of mining, but has failed to oppose the basic value-making institutions.

Considering risk, the government's lifting of the decade-long ban on the mining of uranium without consulting the public strengthens the impression that Greenlandic decision-makers attach greater importance to scientific assessments than those performed by citizens or civil society. The uranium controversies also undermined the value of the precautionary principle, further reinforcing the perceived threat posed by uranium mining among the public. In line with Beck's theory on risk society, I have identified uranium mining as a new and modernised risk produced by technological and scientific advancements, and I suggest that this risk has contributed to the formation of coalitions between different Greenlandic civil society groups. The complexity of the uranium issue suggests that these new coalitions should be included in the identification of possible solutions to the risk posed by uranium mining.

Lastly, a review of all the public consultations held in connection with important mineral projects over the last five years revealed several shortcomings with the present participatory model in Greenland. Among the most prominent ones were the short time frames of the consultation meetings, the lack of dialogue between government representatives and local residents and the failure to address conflicts that had arisen between Greenlanders and mining companies. I suggest that the Greenlandic NGOs have an important role to play in pushing

the government towards a more representational model of participation, and that one way to start would be to include the public in the development of environmental impact assessments, which is the most important tool used for valuing the environment in mining projects in Greenland today. In conclusion, the government needs to establish new participatory forums that challenge the constructed barriers between scientists and laymen, and expert and traditional knowledge. These forums should facilitate discussions about what Greenland wishes to achieve with its mineral developments, how the environment should be valued vis-à-vis the economy and how the Greenlandic society should deal with new and modernised risks such as that of uranium mining.

I hope that this thesis has offered some explanatory power in assessing the valuation of natural resources and public participation in decision-making on mineral projects in Greenland. However, I suggest that further research is needed on the possible environmental impacts of mining in the Arctic. As revealed in this thesis, the government relies heavily on the assessments made by scientific institutions that in many ways fall short of being independent. Consequently, I believe that a more technical and impartial evaluation of the vulnerability of the Greenlandic environment and the potential adverse effects of mining operations is needed. More importantly, however, I believe that a study of what Greenlanders themselves perceive to be the effects of mining on the environment and on their way of life would result in some interesting academic insights. As the Arctic climate is rapidly changing, and the traditional occupational groups in Greenland are becoming less and less prominent, an analysis of the current status quo of mining operations and tales of local residents' longstanding relationship with and knowledge about the Greenlandic environment would be interesting not only to the present academic society, but also to future researchers in the field of environmental studies.

7.0. Literature

Albrechtsen, K. (2014): Danmark og Grønland skal samarbejde om uran-udvinding. *Berlingske Nyhedsbureau*, 7th of October. Available at: http://www.b.dk/politiko/danmark-og-groenland-skal-samarbejde-om-uran-udvinding. Accessed 2nd of May, 2014.

Arctic Journal (2014): New report confirms that the Kvanefjeld mining project is not sustainable. *Artic Journal*, 26th of April. Available at: http://arcticjournal.com/press-releases/579/new-report-confirms-kvanefjeld-mining-project-not-sustainable. Accessed 2nd of May, 2013.

Arctic Journal (2013): Greenland approves $15bn iron mine. *Arctic Journal* [online]. 24th of October. Available at: http://arcticjournal.com/oil-minerals/210/greenland-approves-15bn-iron-mine. Accessed 22nd of April, 2014.

Beck, U. (1993): Risk Society and the Provident State. In: Lash, S., Szerszynski, B. & Wynne, B. eds. (1996): *Risk, Environment and Modernity. Towards a New Ecology.* London: Sage Publications Ltd.

Beck, U. (2006): Living in the world risk society. A Hobhouse Memorial Public Lecture given on Wednesday 15 February 2006 at the London School of Economics. *Economy and Society.* Vol. 35, No. 3, pp. 329-345

Bjørn Aaen, S. (2012): *Demokratisk legitimitet i høringsprocesser i forbindelse med storskala-prosjekter i Grønland.* Nuuk: Grønlands Arbejdsgiverforening

Borch, O. J. (2013): *Greenlandic natural resources – how to improve regional value creation and ripple effects.* Background paper prepared for the Committee for Greenlandic Mineral Resources to the Benefit of Society. Available at: http://nyheder.ku.dk/groenlands-naturressourcer/rapportogbaggrundspapir/Greenlandic_natural_resources___how_to_improve_regional_value_creation_and_ripple_effects.pdf. Accessed 15th of March, 2014.

Broberg, H. (2013): NGOer: Står fast på nul-tolerancen. *Sermitsiaq*, 27th of April. Available at: http://sermitsiaq.ag/ngoer-staa-fast-nul-tolerancen. Accessed 12th of May, 2013.

Bryman, A. (2008): *Social Research Methods*. New York: Oxford University Press

Bäckstrand, K. (2003): Civic Science for Sustainability: Reframing the Role of Experts, Policy-Makers and Citizens in Environmental Governance. *Global Environmental Politics* [e-journal]. Vol. 3, No. 4. Available at: http://sciencepolicy.colorado.edu/students/envs_5100/backstrand.pdf

Center for Resilience (2014): Risk management and sustainability – two ends of the resilience continuum [online]. Ohio State University. Available at: http://resilience.osu.edu/CFR-site/concepts.htm. Accessed 29th of April, 2014.

Chee, Y.E. (2004): An ecological perspective on the valuation of ecosystem services. *Biological Conservation* [e-journal]. Vol. 120, pp. 549-565. Available at: http://www.epa.gov/nheerl/arm/streameco/docs/Chee2004.pdf

Committee on Assessing and Valuing the Services of Aquatic and Related Terrestrial Ecosystems, Water Science and Technology Board, Division on Earth and Life Studies & National Research Council (2004): *Valuing Ecosystem Services: Towards Better Environmental Decision-Making.* Washington, DC: The National Academies Press

Connelly, S. (2007): Mapping Sustainable Development as a Contested Concept. *Local Environment* [e-journal]. Vol. 12, No. 3, pp. 259-278. Available at: http://www.ftf.lth.se/fileadmin/ftf/Course_pages/Faff15/Filer/Connelly_2007.pdf

DR.dk (2013): Det handler uran-dramaet mellem Danmark og Grønland om. *DR.dk*, 25th of October. Available at: http://www.dr.dk/Nyheder/Politik/2013/10/25/064752.htm. Accessed 2nd of May, 2014.

Folkes, F. & Berke, C. (2000): Linking social and ecological systems for resilience and sustainability. In: Folkes, F., Berke, C. & Colding, J. (2000): *Linking Social and Ecological Systems. Management Practices and Social Mechanisms for Building Resilience*. Cambrige: Cambridge University Press

Foucault, M. (1977): Truth and Power. In: Gordon, C. ed. (1980): *Power/Knowledge. Selected Interviews and Other Writings 1972-1977*. New York: Pantheon Books

Fox, J. (1999): Mountaintop Removal in West Virginia: An Environmental Sacrifice Zone. *Organization Environment* [e-journal]. Vol. 12, No. 2, pp. 163-183. Available at: http://oae.sagepub.com/content/12/2/163.abstract

Hansen, K. G. (2013): *Notat om Zoneinddeling*. Addition to background papers prepared for the Committee for Greenlandic Mineral Resources to the Benefit of Society. Available at: http://nyheder.ku.dk/groenlands-naturressourcer/rapportogbaggrundspapir/zoneinddeling.pdf. Accessed 15th of March, 2014.

Hogl, K., Kvarda, E., Nordbeck, R. & Pregernig, M., eds. (2012): Conclusions: effectiveness and legitimacy of environmental governance – synopsis of key insights. In: *Environmental Governance.* Cheltenham: Edward Elgar Publishing Limited

Jasanoff, S., ed. (2004[1]): Ordering Knowledge, Ordering Society. In: *States of Knowledge: The Co-production of Science and Social Order.* London: Routledge

Jasanoff, S. (2004[2]): Science and citizenship: a new synergy. *Science and Public Policy* [e-journal]. Vol. 31, No. 2, pp. 90-94. Available at: http://spp.oxfordjournals.org/content/31/2/90.abstract

Jasanoff, S. (1998): The political science of risk perception. *Reliability Engineering & Systems Safety* [e-journal]. Vol. 59, No. 1, pp. 91-99. Available at: http://www.sciencedirect.com/science/article/pii/S0951832097001294

Jasanoff, S. (1997): NGOs and the Environment: From Knowledge to Action. *Third World Quarterly* [e-journal]. Vol. 18, No. 3, pp. 579-594. Available at: http://people.reed.edu/~ahm/Courses/Reed-POL-372-2011-S3_IEP/Syllabus/EReadings/03.2/03.2.Jasanoff1997NGOs.pdf

Jasanoff, S. & Martello, M. L., eds. (2004): Globalization and Environmental Governance. In: *Earthly Politics. Local and Global in Environmental Governance.* Cambridge: The MIT Press

Josefsen, L. (2014): NGOere: Sådan bør borgerinddragelsen forbedres. *Sermitsiaq*, 26th of March. Available at: http://sermitsiaq.ag/ngoere-boer-borgerinddragelsen-forbedres. Accessed 12th of May, 2014.

Josefsen, L. (2013[1]): Ny koalition kræver bedre borgerinddragelse. *Sermitsiaq*, 9th of October. Available at: http://sermitsiaq.ag/ny-koalition-kraever-bedre-borgerinddragelse. Accessed 12th of May, 2014.

Josefsen, L. (2013[2]): Naalakkersuisut: Vi lægger stor vægt på åbenhed. *Sermitsiaq*, 29th of May. Available at: http://sermitsiaq.ag/naalakkersuisut-laegger-stor-vaegt-aabenhed. Accessed 12th of May, 2014.

Kirsch, S. (2009): Sustainable Mining. *Dialectical Anthropology* [e-journal]. Vol. 34, No.1, pp. 87-93. Available at: http://link.springer.com/journal/10624/34/1/page/1

Kuletz, V. (1998): *The Tainted Desert. Environmental and Social Ruin in the American West.* New York: Routledge

Langhoff, R. (2013): *Med folkets mandat? Høringsprocesser og borgerinddragelse på råstofområdet.* Nuuk: Inuit Circumpolar Council and World Wide Fund for Nature. Available at: http://awsassets.wwfdk.panda.org/downloads/med_folkets_mandat___dansk.pdf

Løvschall-Wedel, J. (2013): Miljøstyrelsen er et hold kæft-bolsche. Kallalit Nunaata Radioa, 20th of June 2013 [online]. Available at: http://www.knr.gl/da/nyheder/milj%C3%B8styrelsen-er-et-hold-k%C3%A6ft-bolsche. Accessed 10th of May, 2014.

May, T. (2001): *Social Research. Issues, methods and process*. Third Edition. Buckingham: Open University Press

Merrild Hansen, A. (2013): *Community Impacts: Public Participation, Culture and Democracy.* Background paper prepared for the Committee for Greenlandic Mineral Resources to the Benefit of Society. Available at: http://nyheder.ku.dk/groenlands-naturressourcer/rapportogbaggrundspapir/Community_Impacts.pdf. Accessed 9th of April, 2014.

MEA (2005): *Millennium Ecosystem Assessment. Ecosystems and Human Well-being: A Framework for Assessment*, pp. 49-70. Available at: http://www.maweb.org/documents/document.300.aspx.pdf. Accessed 12th of March, 2014.

Mines Online (2014): Mineral Exploration in Greenland [online]. Available at: https://www.minesonline.com/government-project-opportunities/greenland-opportunities/mineral-exploration-in-greenland.aspx. Accessed 1st of March, 2014.

Mining.com (2012): Greenland – The next mining destination [online]. 19th of September. Available at: http://www.mining.com/web/greenland-the-next-mining-destination/. Accessed 1st of March, 2014.

Minex (2013): Change in Mineral Resource Organisation within the Greenland Government Administration. Issue 44, October 2013. Available from: http://www.geus.dk/minex/minex44.pdf. Accessed 9th of April, 2014.

Mosbech, A. (2013): *Miljøeffekter af råstofaktiviteter i Grønland – Hvad er de mulige effecter på natur og miljø, og hvordan kan påvirkningen bedst reguleres?* Background paper prepared for the Committee for Greenlandic Mineral Resources to the Benefit of Society. Available at: http://nyheder.ku.dk/groenlands-naturressourcer/rapportogbaggrundspapir/Milj_effekter_af_r_stofaktiviteter_i_Gr_nland.pdf. Accessed 15th of March, 2014.

Mythen, G. (2004): *Ulrich Beck. A Critical Introduction to the Risk Society*. London: Pluto Press

Nuttall, M. (2013): Zero-tolerance, uranium and Greenland's mining future. *The Polar Journal* [e-journal]. Vol. 3, No. 2, pp. 368-383. Available at: http://dx.doi.org/10.1080/2154896X.2013.868089

Ostrom, E. (1990): *Governing the Commons. The Evolution of Institutions for Collective Action*. Cambridge: Cambridge University Press

Pregernig, M. & Böcher, M. (2012): Normative and analytical perspectives on the role of science and expertise in environmental governance. In: Hogl, K., Kvarda, E., Nordbeck, R. & Pregernig, M., eds. *Environmental Governance*. Cheltenham: Edward Elgar Publishing Limited

Proactive Investors Australia (2014): Greenland Minerals and Energy signs landmark agreement with China's NFC. *Proactive Investors Australia*, 24th of March. Available at:

http://www.proactiveinvestors.com.au/companies/news/53849/greenland-minerals-and-energy-signs-landmark-agreement-with-chinas-nfc-53849.html. Accessed 6th of May, 2014.

Rosing, M. (2014): Grønlands vej fra drøm til virkelighed. *Politiken Debat* [online]. 24th of January. Available at: http://politiken.dk/debat/kroniken/ECE2190304/groenlands-vej-fra-droem-til-virkelighed/. Accessed 2nd of March, 2014.

Reuters (2013): Update 1 – Greenland votes to allow uranium, rare earths mining. *Reuters* [online]. 24th of October. Available at: http://www.reuters.com/article/2013/10/24/greenland-uranium-idUSL5N0IE4MJ20131024. Accessed 2nd of May, 2014.

Scoones, I., Leach, M., Smith, A., Stagl, S., Stirling, A. and Thompson, J. (2007): *Dynamic Systems and the Challenge of Sustainability*, STEPS Working Paper 1, Brighton: STEPS Centre

Scrutten, A. (2013): Mining, China central issues in Greenland election. *Reuters* [online]. 11th of March. Available at: http://www.reuters.com/article/2013/03/11/us-greenland-election-idUSBRE92907F20130311. Accessed 23rd of March, 2014.

Secher, K. (2008): Grønlands råstofindustri i det 20. århundrede. *Tidsskriftet Grønland*. Vol. 56, Issue 2-3, pp. 46-66

Sejersen, F. (2014): *Efterforskning og udnyttelse av råstoffer i Grønland i historisk perspektiv.* Background paper prepared for the Committee for Greenlandic Mineral Resources to the Benefit of Society. Available at: http://nyheder.ku.dk/groenlands-naturressourcer/rapportogbaggrundspapir/Efterforskning_og_udnyttelse_af_r_stoffer_i_Gr_nland_i_historisk_perspektiv.pdf

Sinding, K. (1999): At the Crossroads: Mining Policy in Greenland. *Arctic.* Vol. 45, No. 3, pp. 226-232

Sørensen, A. K. (2007): Denmark-Greenland in the twentieth century. *Meddelelser om Grønland*. Vol. 34. Copenhagen: Museum Tusculanum Press. Available at: http://www.press.uchicago.edu/ucp/books/book/distributed/D/bo14317389.html

Thagaard, T. (2009): *Systematikk og innlevelse. En innføring i kvalitativ metode*. Third Edition. Oslo: Fagbokforlaget

The Committee for Greenlandic Mineral Resources to the Benefit of Society (2014): *To the benefit of Greenland.* Copenhagen: University of Copenhagen and Nuussuaq: Ilisimatusarfik, University of Greenland. Available at: http://nyheder.ku.dk/groenlands-naturressourcer/rapportogbaggrundspapir/To_the_benefit_of_Greenland.pdf. Accessed 15th of March, 2014.

Vatn, A. (2000): The Environment as a Commodity. *Environmental Values* [e-journal]. Vol. 9, No. 4, pp. 493-509. Available at: http://www.ingentaconnect.com/content/whp/ev/2000/00000009/00000004/art00006

Velling, P. (2013): Overblik: Forstå konflikten om Storskalaloven i Grønland. *DR.dk* [online]. 6th of February. Available at: http://www.dr.dk/Nyheder/Politik/2013/02/06/154830.htm. Accessed 2nd of May, 2014.

Policy documents and consultations

Avataq (2013): Statement to the Mineral Licence and Safety Authorities. *Forslag til: Inatsisartutlov om ændring af inatsisartutlov nr. 7 af 7. december 2009 om mineralske råstoffer og aktiviteter af betydninger herfor (råstofloven).* Consultation feedback, 3rd of Setpember [online]. Available at: http://naalakkersuisut.gl/~/media/Nanoq/Files/Hearings/2012/Inatsisartutlov%202012/Answers/Horingssvarer/Avataq.pdf. Accessed 5ht of May, 2014.

Bureau of Minerals and Petroleum (2013[1]): The Bureau of Minerals and Petroleum (BMP) becomes the Mineral Licence and Safety Authority (MLSA) [online]. Available at: http://www.govmin.gl/index.php/component/acymailing/archive/view/listid-1-mailinglist/mailid-70-the-bureau-of-minerals-and-petroleum-bmp-becomes-the-mineral-licence-and-safety-authority-mlsa?Itemid=100060. Accessed 24th of April, 2014.

Bureau of Minerals and Petroleum (2013[2]): *Application procedures and standard terms for mineral exploration and prospecting licenses in Greenland* [online]. 25th of June. Available

at: http://www.govmin.gl/images/stories/faelles/App_standard_pros_eng_25_jun_2013_web.pdf . Accessed 7th of March, 2014.

Bureau of Minerals and Petroleum (2013[3]): *Høring om forslag til ændring af inatsisartutlov nr. 7 af 7. december 2009 om mineralske råstoffer og aktiviteter af betydning herfor. Råstofloven Bemærkninger* [online]. 9th of December. Available at: http://naalakkersuisut.gl/~/media/Nanoq/Files/Hearings/2013/Raastofloven_aendring/Documents/R%C3%A5stofloven%20Bem%C3%A6rkninger.pdf. Accessed 5th of May, 2014.

Bureau of Minerals and Petroleum (2012[1]): *Redegørelse til Inatsisartut vedrørende råstofaktiviteter i Grønland* [online]. Available at: http://naalakkersuisut.gl/~/media/Nanoq/Files/Publications/Raastof/DK/Redeg%C3%B8relse%20til%20Inatsisartut%20vedr%C3%B8rende%20r%C3%A5stofaftiviteter%20i%20Gr%C3%B8nland%202012.pdf. Accessed 5th of May, 2014.

Bureau of Minerals and Petroleum (2012[2]): *Forslag til: Inatsisartutlov om ændring af inatsisartutlov nr. 7 af 7. december 2009 om mineralske råstoffer og aktiviteter af betydninger herfor (råstofloven). Bemærkninger til forslaget* [online]. Available at: http://naalakkersuisut.gl/~/media/Nanoq/Files/Hearings/2012/Inatsisartutlov%202012/Bem%C3%A6rkninger%20til%20lov%20om%20%C3%A6ndring%20af%20r%C3%A5stofloven%20dansk.pdf. Accessed 6th of May, 2014.

Bureau of Minerals and Petroleum (2012[3]): *Offentlig høring om rapporterne Vurdering af Virkninger på Miljøet og Vurdering af Samfundsmæssig Bæredygtighed, som er udarbejdet i forbindelse med London Mining Greenland A/S' ansøgning om udnyttelsestilladelse til et jernmineprojekt ved Nuuk* [online]. Available at: http://naalakkersuisut.gl/da/H%C3%B8ringer/Arkiv-over-h%C3%B8ringer/2012/London-Mining-ISUA. Accessed 6th of May, 2014.

Bureau of Minerals and Petroleum (2012[4]): Statement at the *Offentlig høring om rapporterne Vurdering af Virkninger på Miljøet og Vurdering af Samfundsmæssig Bæredygtighed, som er udarbejdet i forbindelse med London Mining Greenland A/S' ansøgning om udnyttelsestilladelse til et jernmineprojekt ved Nuuk.* Consultation meeting at the University of Nuuk, 24th of September [online]. Available at:

http://naalakkersuisut.gl/~/media/Nanoq/Files/Hearings/2012/London%20Mining%20ISUA/Referat%203%20dansk.pdf. Accessed 5th of May, 2014.

Bureau of Minerals and Petroleum (2012[5]): Statement at the *Offentlig høring om rapporterne Vurdering af Virkninger på Miljøet og Vurdering af Samfundsmæssig Bæredygtighed, som er udarbejdet i forbindelse med London Mining Greenland A/S' ansøgning om udnyttelsestilladelse til et jernmineprojekt ved Nuuk.* Consultation meeting at the University of Nuuk, 8th of October [online]. Available at: http://naalakkersuisut.gl/~/media/Nanoq/Files/Hearings/2012/London%20Mining%20ISUA/Referat%204%20dansk.pdf. Accessed 7th of May, 2014.

Bureau of Minerals and Petroleum (2011[1]): *BMP guidelines for preparing an Environmental Impact Assessment (EIA) Report for Mineral Exploitation in Greenland* [online]. Available at: http://www.govmin.gl/images/stories/minerals/EIA_guidelines_mining.pdf. Accessed 27th of April, 2014.

Bureau of Minerals and Petroleum (2011[2]): *Redegørelse til Inatsisartut vedrørende råstofaktiviteter i Grønland* [online]. Available at: *http://naalakkersuisut.gl/~/media/Nanoq/Files/Publications/Raastof/DK/Redeg%C3%B8relse%20til%20Inatsisartut%20vedr%C3%B8rende%20r%C3%A5stofaftiviteter%20i%20Gr%C3%B8nland%202011.pdf*. Accessed 6th of May, 2014.

Bureau of Minerals and Petroleum (2010): *Grønlands uran mission til Canada 6. til 12. september 2010* [online]. Available at: http://naalakkersuisut.gl/~/media/Nanoq/Files/Publications/Raastof/DK/Gr%C3%B8nlands%20uran%20mission%20til%20Canada.pdf. Accessed 8th of May, 2014.

Bureau of Minerals and Petroleum (2009[1]): *Mineral Strategy 2009. Update of objectives and plans for mineral exploration activities in Greenland* [online]. Available at: http://www.govmin.gl/images/stories/about_bmp/publications/mineral_strategy_2009.pdf. Accessed 23rd of April, 2014.

Bureau of Minerals and Petroleum (2009[2]): *Råstofdirektoratets Årsberetning 2009* [online]. Available at:

http://naalakkersuisut.gl/~/media/Nanoq/Files/Publications/Raastof/DK/R%C3%A5stofdirektoratets%20%C3%85rsberetning%202009.pdf. Accessed 23rd of April, 2014.

Danish Centre for Environment and Energy (2012): *Jameson Land. A strategic environmental impact assessment of hydrocarbon and mining activities.* Aarhus University. Available at: http://www2.dmu.dk/Pub/SR41.pdf. Accessed 10th of May, 2014.

Departementet for Erhverv og Arbejdsmarked (2011): Status for bosteder i Grønlands kommuner med særlig fokus på bygderne. Sammenfatning. Nuuk 2011. Accessed 3rd of February, 2014.

Departementet for Erhverv, Råstoffer og Arbejdsmarked Grønland (2014): *Vurdering av Samfundsmæssig Bæredygtighed (VSB). Vejledning vedrørende mineralprojekter om processen og udarbejdelse af VSB rapporten.* April 2014, Nuuk. Available at: http://naalakkersuisut.gl/~/media/Nanoq/Files/Hearings/2014/VSBvejledning/Documents/VSB%20vejledning%202014_DK.pdf. Accessed 3rd of May, 2013.

Fencker, B. (2012): Statement to the Mineral License and Safety Authority. *Offentlig høring om rapporterne Vurdering af Virkninger på Miljøet og Vurdering af Samfundsmæssig Bæredygtighed, som er udarbejdet i forbindelse med London Mining Greenland A/S' ansøgning om udnyttelsestilladelse til et jernmineprojekt ved Nuuk*. Consultation feedback, 8th of September [online]. Available at: http://naalakkersuisut.gl/~/media/Nanoq/Files/Hearings/2012/London%20Mining%20ISUA/Referat%204%20dansk.pdf. Accessed 7th of May, 2014.

Foreningen 16. August (2013): Statement to the Mineral icense and Safety Authorities. *Offentlig høring om rapporterne Vurdering af Virkninger på Miljøet og Vurdering af Samfundsmæssig Bæredygtighed, som er udarbejdet i forbindelse med True North Gems' ansøgning om udnyttelsestilladelse for rubin og safir forekomsten Aappaluttoq ved Qeqertarsuatsiaat/Fiskenæsset.* Consultation feedback, 12th of September [online]. Available at: http://naalakkersuisut.gl/~/media/Nanoq/Files/Hearings/2013/TNG%20QEQ/Hrings%20svar/120913%20Foreningen%2016%20%20august%20svar%20-%20dansk.pdf. Accessed 6th of May, 2014.

Greenpeace (2013[1]): Statement to the Mineral Licence and Safety Authorities. *Forslag til: Inatsisartutlov om ændring af inatsisartutlov nr. 7 af 7. december 2009 om mineralske råstoffer og aktiviteter af betydninger herfor (råstofloven).* Consultation feedback [online]. Available at: http://naalakkersuisut.gl/~/media/Nanoq/Files/Hearings/2012/Inatsisartutlov%202012/Answers/Horingssvarer/Greenpeace.pdf. Accessed 7th of May, 2014.

Greenpeace (2013[2]): Statement to the Bureau of Minerals and Petroleum. *Offentlig høring om rapporterne Vurdering af den samfundsmæssige Bæredygtighed (VSB) og Vurdering og Virkninger på Miljøet (VVM), som er udarbejdet i forbindelse med Tanbreez Mining Greenland A/S ansøgning om udnyttelsestilladelse for den sjældne jordart eudialyt samt mineralet feldspat ved Killavaat Alannguat (Kringlerne)*. Consultation feedback, January 2014 [online]. Available at: http://naalakkersuisut.gl/~/media/Nanoq/Files/Hearings/2013/Tanbreez/Answers/Horingssvar/060114%20Greenpeace%20svar%20-%20dan.pdf. Accessed 8th of May, 2014.

Grønlands Arbejdsgiverforening (2014): Statement to the Mineral License and Safety Authority. *Forslag til Grønlands olie- og Mineralstrategi for 2014-2018.* Consultation feedback, 7th of February [online]. Available at: http://naalakkersuisut.gl/~/media/Nanoq/Files/Hearings/2014/Olie%20og%20mineralstrategien%202014%202018/Answers/14%20GA%20%20Hringssvar%20vedr%20Forslag%20til%20Grnlands%20olie%20og%20mineral%20strategi%20DOK1482936.PDF. Accessed 6th of May, 2014.

Inatsisartut (2009): *Greenland Parliament Act of 7. December 2009 on mineral resource activities (the Mineral Resources Act).* Nuuk. Accessed 21st of April, 2014.

Jeremiassen, V. (2012): Statement to the Mineral License and Safety Authority. *Offentlig høring om rapporterne Vurdering af Virkninger på Miljøet og Vurdering af Samfundsmæssig Bæredygtighed, som er udarbejdet i forbindelse med London Mining Greenland A/S' ansøgning om udnyttelsestilladelse til et jernmineprojekt ved Nuuk*. Consultation feedback, 8th of September [online]. Available at: http://naalakkersuisut.gl/~/media/Nanoq/Files/Hearings/2012/London%20Mining%20ISUA/Referat%204%20dansk.pdf. Accessed 8th of May, 2014.

Kommuneqarfik Sermersooq (2014): Statement to the Mineral License and Safety Authority. *Offentlig høring om rapporterne Vurdering af den samfundsmæssige Bæredygtighed (VSB) og Vurdering og Virkninger på Miljøet (VVM), som er udarbejdet i forbindelse med Tanbreez Mining Greenland A/S ansøgning om udnyttelsestilladelse for den sjældne jordart eudialyt samt mineralet feldspat ved Killavaat Alannguat (Kringlerne)*. Consultation feedback, 9th of January [online]. Available at: http://naalakkersuisut.gl/~/media/Nanoq/Files/Hearings/2013/Tanbreez/Answers/Horingssvar/130114%20Sermersooq%20svar%20-%20dan.pdf. Accessed 6th of May, 2014.

Kommuneqarfik Sermersooq (2013): Statement to the Mineral License and Safety Authorities. *Høring om forslag til ændring af inatsisartutlov nr. 7 af 7. december 2009 om mineralske råstoffer og aktiviteter af betydning herfor*. Consultation feedback, 20th of January [online]. Available at: http://naalakkersuisut.gl/~/media/Nanoq/Files/Hearings/2013/Raastofloven_aendring/Answers/samlet%20h%C3%B8ringssvar%20danske%20290114%20aendring%20raastofloven.pdf. Accessed 6th of May, 2014.

London Mining (2013): Whitebook. Consultation feedback from the Hearing Portal for London Mining´s ISUA project. 13th of March [online]. Available at: http://naalakkersuisut.gl/~/media/Nanoq/Files/Attached%20Files/Raastof/Hoeringer/ISUA%202012/Whitebook%20London%20Mining.pdf. Accessed 11th of May, 2014.

Ministry of Fisheries, Hunting and Agriculture (2014): Statement to the Mineral Licence and Safety Authority. *Forslag til Grønlands olie- og Mineralstrategi for 2014-2018.* Consultation feedback, 6th of February [online]. Available at: http://naalakkersuisut.gl/~/media/Nanoq/Files/Hearings/2014/Olie%20og%20mineralstrategien%202014%202018/Answers/18%20Departemen%20for%20Fiskeri%20Fangst%20og%20landbrug.PDF. Accessed 6th of May, 2014.

Orbicon (2013): Tanbreez Project Environmental Impact Assessment. Non-Technical Resume and Conclusion. 6th of August 2013 [online]. Available at: http://naalakkersuisut.gl/~/media/Nanoq/Files/Hearings/2013/Tanbreez/Documents/4a%20-%20EIA_EN_Non-Technical%20Resume_August%202013.pdf. Accessed 3rd of May, 2014.

Råstofstyrelsen (2014): *Grønlands olie- og mineralstrategi 2014-2018* [online]. Available at: http://naalakkersuisut.gl/~/media/Nanoq/Files/Publications/Raastof/DK/Gr%C3%B8nlands%20olie%20og%20mineralstrategi%202014%202018.pdf. Accessed 23rd of April, 2014.

Råstofstyrelsen (2013): *Råstofredegørelsen 2013* [online]. Available at: http://naalakkersuisut.gl/~/media/Nanoq/Files/Publications/Raastof/DK/Raastofredegoerelsen_2013_DA.pdf. Accessed 23rd of April, 2014.

Sulinermik Inuussutissarsiuteqartut Kattuffiat (2014): Statement to the Mineral License and Safety Authorities. *Forslag til Grønlands olie- og Mineralstrategi 2014-2018.* Consultation feedback, 7th of February [online]. Available at: http://naalakkersuisut.gl/~/media/Nanoq/Files/Hearings/2014/Olie%20og%20mineralstrategien%202014%202018/Answers/19%20Kommuneqarfik%20Sermersooqs%20h%C3%B8ringssvar%20DA.PDF. Accessed 6th of May, 2014.

World Wide Fund for Nature (2014): Statement to the Mineral License and Safety Authorities. *Forslag til Grønlands olie- og Mineralstrategi 2014-2018.* Consultation feedback, 6th of February [online]. Available at: http://naalakkersuisut.gl/~/media/Nanoq/Files/Hearings/2014/Olie%20og%20mineralstrategien%202014%202018/Answers/7%20WWF.PDF. Accessed 8th of May, 2014.

World Wide Fund for Nature (2013): Statement to the Mineral License and Safety Authorities. *Høring om forslag til ændring af inatsisartutlov nr. 7 af 7. december 2009 om mineralske råstoffer og aktiviteter af betydning herfor.* Consultation feedback, 9th of January [online]. Available at: http://naalakkersuisut.gl/~/media/Nanoq/Files/Hearings/2013/Raastofloven_aendring/Answers/samlet%20h%C3%B8ringssvar%20danske%20290114%20aendring%20raastofloven.pdf. Accessed 8th of May, 2014.

8.0. Appendices

8.1. Appendix 1

Connelly's sustainability triangle

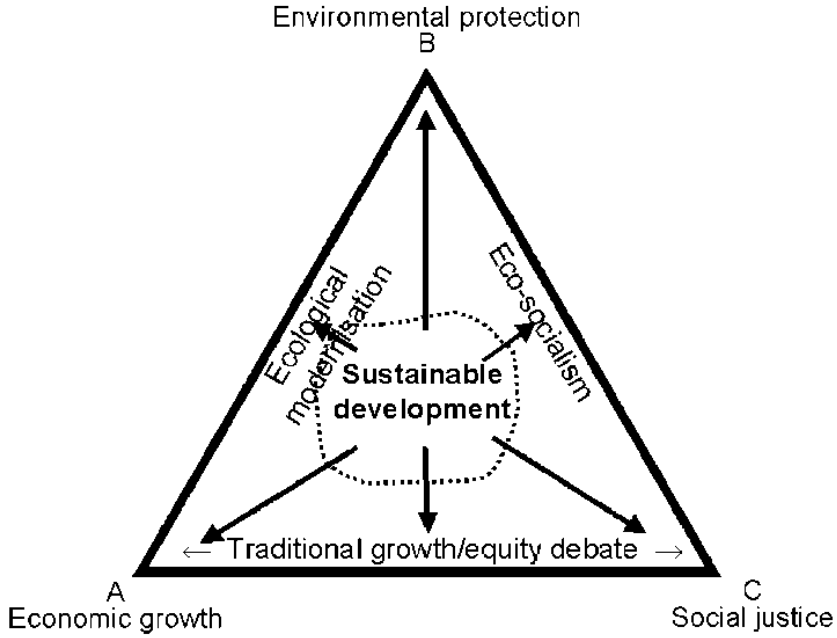


Figure 5. Sustainable development mapped in the field

Source: Connelly, S. (2007): Mapping Sustainable Development as a Contested Concept. *Local Environment* [e-journal]. Vol. 12, No. 3, pp. 259-278.

The corners of the triangle represent extreme positions, e.g. corner A signifies that the concern for economic growth surpasses both the concern for social justice and environmental protection. The lines between the corners represent positions that take into account two of the concerns, e.g. line A-B signifies that the concern for economic growth is coupled with the concern for environmental protection, resulting in what Connelly has termed "ecological modernisation." The closer one is to corner A, the stronger is the concern for economic growth on behalf of environmental protection. The middle of the triangle represents sustainable development, achieved through balancing the three concerns.

8.2. Appendix 2

Current exploitation licenses for minerals in Greenland (except radioactive elements):

Licence: No. 2003/05 at Napasorsuaq in South West Greenland Licensee: Angel Mining (Gold) A/S. Licence area: An area covering 22 km.. Licence period: 2003 - 2033. Expires 24 April 2033.

Licence: No. 2005/26 at Seqinnersuusaq in West Greenland Licensee: Minelco A/S. Licence area: An area covering 9 km.. Licence period: 2005 - 2035. Expires 29 July 2035.

Licence: No. 2008/29 at Maarmorilik in West Greenland Licensee: Black Angel Mining A/S. Licence area: An area covering 52 km2 Licence period: 2008 - 2037. Expires 21 May 2037

Licence: No. 2008/40 at Malmbjerget in East Greenland Licensee: Malmbjerget Molybdenum A/S. Licence area: An area covering 362 km2 Licence period: 2009 - 2038. Expires 24 May 2038

Licence: No. 2013/31 at Isukasia in West Greenland Licensee: London Mining Greenland A/S Licence area: An area covering 290 km2 Licence period: 2013 - 2042. Expires 24 October 2042

Licence: No. 2014/21 at Aappaluttoq in West Greenland Licensee: True North Gems Greenland A/S Licence area: An area covering 17 km2 Licence period: 2014 - 2044. Expires 7 March 2044

8.3. Appendix 3

Current exploration licenses for minerals in Greenland (except radioactive elements):

Licence: No. 2002/06 at Naajat in West Greenland Licensee: Hudson Resources Inc. Licence area: An area covering a total of 96 km2. Licence period: 2014.

Licence: No. 2006/04 at Narsaq Kangerluarsuk in West Greenland Licensee: Tanbreez Mining Greenland A/S Licence area: An area covering 18 km². Licence period: 2014 - 2016.

Licence: No. 2006/10 at Vagar in West Greenland Licensee: NunaMinerals A/S, Greenland. Licence area: An area covering a total of 435 km². Licence period: 2011 - 2015.

Licence: No. 2007/01 at Skærgården in East Greenland Licensee: Platina Resources Ltd. Licence area: An area covering a total of 141 km2. Licence period: 2012 – 2016

Licence: No. 2007/02 at Tarsarneq in North Greenland Licensee: Bedford (No. 3) Limited Licence area: An area covering 120 km2. Licence period: 2012 – 2016

Licence: No. 2007/03 at Carlsberg Fjord in East Greenland Licensee: China-Nordic Mining Company Ltd. Licence area: 4 sub areas covering a total of 445 km². Licence period: 2012 – 2016

Licence: No. 2007/31 at Seernat in Northeast Greenland Licensee: Ironbark Zinc Limited Licence area: An area covering a total of 130 km2. Licence period: 2012 – 2016

Licence: No. 2007/32 at Mestersvig in East Greenland Licensee: Ironbark Zinc Limited Licence area: An area covering a total of 122 km2. Licence period: 2012 – 2016

Licence: No. 2007/33 at Daugaard Jensen in Northwest Greenland Licensee: Ironbark Zinc Limited Licence area: An area covering a total of 154 km2. Licence period: 2012 – 2016

Licence: No. 2007/45 at Ivigtut in West Greenland Application: Pending Renewal
Licensee: Rimbal Pty. Ltd. Licence area: An area covering a total of 57 km2. Licence period:

2012 - 2016

Licence: No. 2007/51 at Majoqqaq in West Greenland Licensee: NunaMinerals A/S Licence area: An area covering a total of 64 km2. Licence period: 2012 - 2016.

Licence: No. 2007/53 at Nunarhuaq in North Greenland Licensee: NunaMinerals A/S Licence area: An area covering a total of 41 km2. Licence period: 2012 – 2016

Licence: No. 2008/01 at Qaqqatsiaq in West Greenland Licensee: True North Gems. Licence area: An area covering a total of 38 km2. Licence period: 2013 - 2017.

Licence: No. 2009/15 at Ivittuut in West Greenland Licensee: Hunter Minerals Pty Ltd. Licence area: An area covering 32 km². Licence period: 2014 - 2016.

Licence: No. 2009/21 at Malmbjerget in East Greenland Licensee: Malmbjerg Molybdenum A/S. Licence area: An area covering 171 km². Licence period: 2014 - 2016.

Licence: No. 2009/38 covering an area in West Greenland Licensee: Hunter Minerals Pty. Ltd. Licence area: An area covering 38 km2. Licence period: 2014 - 2018

Licence: No. 2010/02 covering an area in West Greenland Licensee: Greenland Minerals & Energy A/S (Trading) Licence area: An area covering 80 km2 Licence period: 2010 - 2014

Licence: No. 2010/05 covering an area in West Greenland Licensee: Avannaa Exploration Ltd. Licence area: An area covering 12 km2 Licence period: 2010 - 2014

Licence: No. 2010/17 covering an area in West Greenland Licensee: Greenland Gold Resources Ltd. Licence area: An area covering 151 km2 Licence period: 2010 - 2014

Licence: No. 2010/24 covering an area in West Greenland Licensee: Rimbal Pty Ltd. Licence area: An area covering 44 km2 Licence period: 2010 - 2014

Licence: No. 2010/26 covering an area in West Greenland Licensee: NunaMinerals A/S Licence area: An area covering 173 km2 Licence period: 2010 - 2014

Licence: No. 2010/27 covering an area in West Greenland Licensee: NunaMinerals A/S Licence area: An area covering 288 km2 Licence period: 2010 - 2014

Licence: No. 2010/39 at Taateraat in East Greenland Licensee: NunaMinerals A/S Licence area: An area covering a total of 370 km2. Licence period: 2010 – 2014

Licence: No. 2010/40 at Sarfartoq in West Greenland Licensee: Hudson Resources Inc. Licence area: An area covering 92 km². Licence period: 2014

Licence: No. 2010/41 at Andree in Northeast Greenland Licensee: NunaMinerals A/S Licence area: An area covering 441 km2. Licence period: 2010 - 2014

Licence: No. 2010/45 at Qaumarujuup Eqqaa in North West Greenland Licensee: Angel Mining PLC. Licence area: 3 sub areas covering a total of 134 km². Licence period: 2010 - 2014.

Licence: No. 2010/47 covering an area in North Greenland Licensee: Ironbark Zinc Ltd. Licence area: An area covering 170 km2 Licence period: 2010 - 2014

Licence: No. 2010/49 covering an area in West Greenland Licensee: Greenland Gold Resources Ltd. Licence area: An area covering 173 km2 Licence period: 2010 – 2014

Licence: No. 2011/25 covering an area in North Greenland Licensee: NAMA Greenland Ltd. Licence area: An area covering 1570 km2 Licence period: 2011 – 2015

Licence: No. 2011/26 covering an area in West Greenland Licensee: Greenland Minerals and Energy Ltd. Licence area: An area covering 68 km2 Licence period: 2011 – 2015

Licence: No. 2011/27 covering an area in West Greenland Licensee: Greenland Minerals and Energy Ltd. Licence area: An area covering 67 km2 Licence period: 2011 – 2015

Licence: No. 2011/28 covering an area in East Greenland Licensee: Ironbark Zinc Ltd. Licence area: An area covering 29 km2 Licence period: 2011 – 2015

Licence: No. 2011/31 covering an area in West Greenland Licensee: Avannaa Exploration Ltd. Licence area: An area covering 126 km2 Licence period: 2011 – 2015

Licence: No. 2011/32 covering an area in North Greenland Licensee: Ironbark Zinc Ltd. Licence area: An area covering 57 km2 Licence period: 2011 – 2015

Licence: No. 2011/33 covering an area in North Greenland Licensee: Ironbark Zinc Ltd. Licence area: An area covering 155 km2 Licence period: 2011 – 2015

Licence: No. 2011/39 covering an area in North Greenland Licensee: Avannaa Exploration Ltd. Licence area: An area covering 6159 km2 Licence period: 2011 – 2013

Licence: No. 2011/51 covering an area in East Greenland Licensee: CGRG Ltd. Licence area: An area covering 1025 km2 Licence period: 2011 – 2013

Licence: No. 2011/53 covering an area in West Greenland Licensee: CGRG Ltd. Licence area: An area covering 370 km2 Licence period: 2011 – 2015

Licence: No. 2011/54 covering an area in West Greenland Licensee: North American Nickel Inc. Licence area: An area covering 3336 km2 Licence period: 2011 – 2015

Licence: No. 2011/58 covering an area in West Greenland Licensee: Pinnacle Nominees Pty. Ltd. Licence area: An area covering 179 km2 Licence period: 2011 – 2015

Licence: No. 2012/01 covering an area in East Greenland Licensee: Jameson Land Resources A/S. Licence area: An area covering 1931 km2 Licence period: 2012 – 2016

Licence: No. 2012/02 covering an area in East Greenland Licensee: Avannaa Exploration Ltd. Licence area: An area covering 353 km2 Licence period: 2012 – 2016

Licence: No. 2012/04 covering an area in East Greenland Licensee: NAMA Coal Ltd. Licence area: An area covering 622 km2 Licence period: 2012 – 2016

Licence: No. 2012/13 covering an area in West Greenland Licensee: Rare Earths Minerals No. 2 ApS. Licence area: An area covering 310 km2 Licence period: 2012 - 2016
Licence: No. 2012/14 covering an area in West Greenland Licensee: Rare Earths Minerals No. 2 ApS Licence area: An area covering 188 km2 Licence period: 2012 - 2016

Licence: No. 2012/15 covering an area in West Greenland Licensee: Rare Earths Minerals No. 2 ApS Licence area: An area covering 334 km2 Licence period: 2012 – 2016

Licence: No. 2012/16 covering an area in East Greenland Licensee: Malmbjerget Molybdenum A/S Licence area: An area covering 479 km2 Licence period: 2012 – 2016

Licence: No. 2012/25 covering an area in East Greenland Licensee: Platina Resources Limited. Licence area: An area covering 1255 km2 Licence period: 2012 – 2016

Licence: No. 2012/26 covering an area in East Greenland Licensee: 21st NORTH ApS Licence area: An area covering 84 km2 Licence period: 2012 – 2016

Licence: No. 2012/28 covering an area in West Greenland Licensee: North American Nickel Inc. Licence area: An area covering 265 km2 Licence period: 2012 – 2016

Licence: No. 2012/29 covering an area in West Greenland Licensee: Avannaa Exploration Ltd. Licence area: An area covering 1080 km2 Licence period: 2012 – 2016

Licence: No. 2013/01 covering an area in West Greenland Licensee: Hudson Resources Inc**.** Licence area: An area covering 146 km2**.** Licence period: 2013 – 2018

Licence: No. 2013/04 covering an area in West Greenland Licensee: Kavanaru Oil Exploration Corp. Licence area: An area covering 171 km2 Licence period: 2013 – 2017

Licence: No. 2013/05 covering an area in West Greenland Licensee: Greenland Minerals and Energy Ltd. Licence area: An area covering 65 km2 Licence period: 2013 – 2017

Licence: No. 2013/06 covering an area in West Greenland Licensee: Obsidian Mining Ltd. Licence area: An area covering 146 km2 Licence period: 2013 – 2017

Licence: No. 2013/09 covering an area in West Greenland Licensee: Coastal Ventures A/S Licence area: An area covering 5,486 km2 Licence period: 2013 – 2017

Licence: No. 2013/12 covering an area in East Greenland Licensee: CGRG Ltd Licence area: An area covering 101 km2. Licence period: 2013 – 2018

Licence: No. 2013/15 covering an area in West Greenland Licensee: CGRG Ltd Licence area: An area covering 432 km2. Licence period: 2013 – 2018

Licence: No. 2013/16 covering an area in West Greenland Licensee: CGRG Ltd Licence area: An area covering 728 km2. Licence period: 2013 – 2018

Licence: No. 2013/17 covering an area in North Greenland Licensee: Nuna Minerals A/S Licence area: An area covering 5096 km2. Licence period: 2013 – 2018

Licence: No. 2013/20 covering an area in West Greenland Licensee: Rare Earth Minerals Plc**.** Licence area: An area covering 21 km2**.** Licence period: 2013 – 2018

Licence: No. 2013/21 covering an area in East Greenland Licensee: 21st North ApS Licence area: An area covering 14 km2. Licence period: 2013 – 2018

Licence: No. 2013/25 covering an area in West Greenland Licensee: Moxie Pictures Inc Licence area: An area covering 32 km2. Licence period: 2013 – 2018

Licence: No. 2013/27 covering an area in West Greenland Licensee: Northern Shield Resources Inc. Licence area: An area covering 1810 km2**.** Licence period: 2013 – 2018

Licence: No. 2013/28 covering an area in West Greenland Licensee: Greenland Gold Resources Ltd. Licence area: An area covering 242 km2**.** Licence period: 2013 – 2018

Licence: No. 2013/38 covering an area in North Greenland Licensee: Avannaa Exploration Ltd**.** Licence area: An area covering 68 km2**.** Licence period: 2013 – 2018

Licence: No. 2014/01 covering an area in West Greenland Licensee: Regency Mines Plc. Licence area: An area covering 17 km2. Licence period: 2014 – 2018

Licence: No. 2014/07 covering an area in East Greenland Licensee: ARC Mining Licence area: An area covering 986 km2. Licence period: 2014 – 2018

Licence: No. 2014/09 covering an area in East Greenland Licensee: ARC Mining Licence area: An area covering 346 km2. Licence period: 2014 – 2018

Licence: No. 2014/11 covering an area in West Greenland Licensee: Copenhagen Minerals Inc. Licence area: An area covering 49 km2**.** Licence period: 2014 – 2018

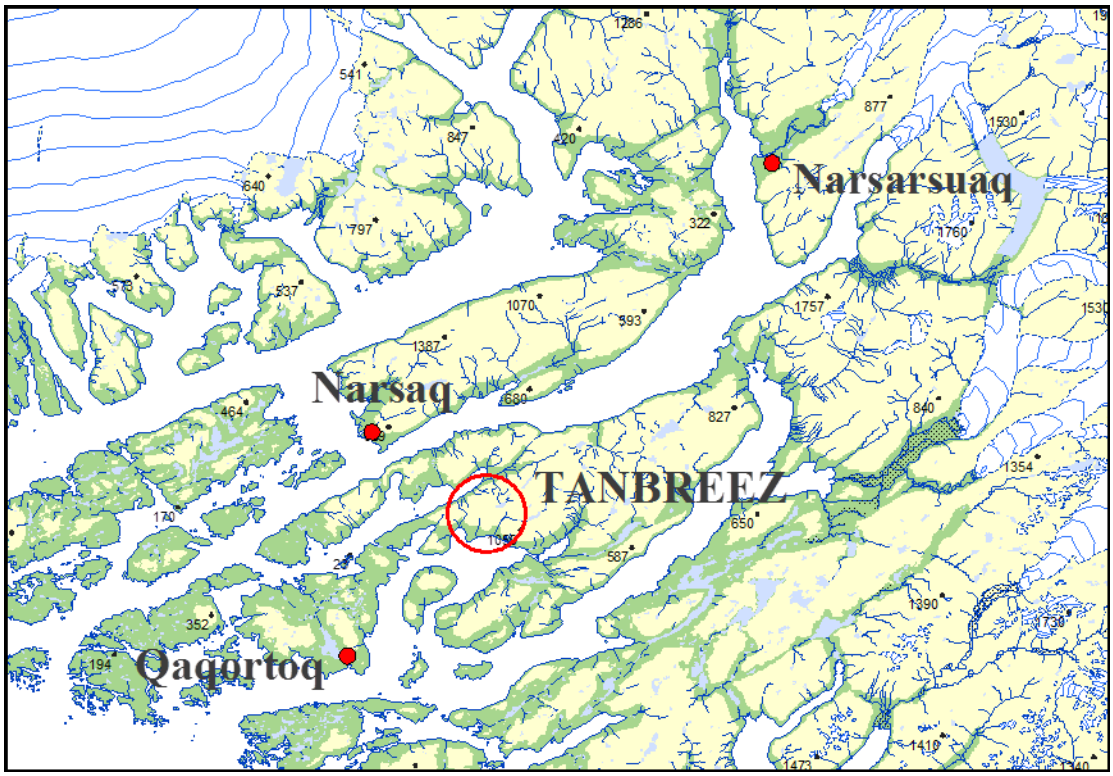
Licence: No. 2014/15 covering an area in North Greenland Licensee: Avannaa Exploration Ltd. Licence area: An area covering 6153 km2**.** Licence period: 2014 – 2018

Source: The government of Greenland, updated 1st of July 2014.

8.4. Appendix 4

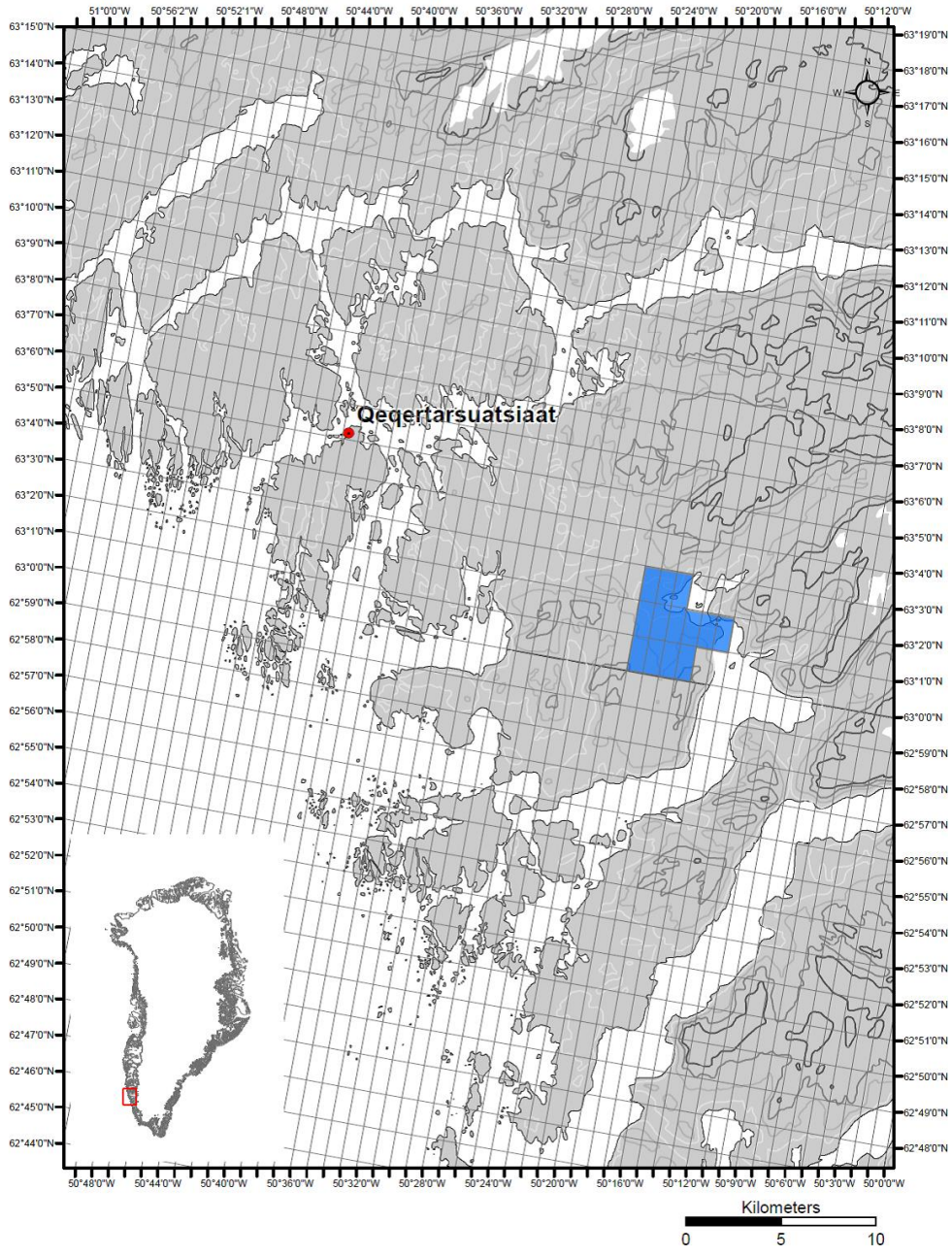
Maps of mining projects discussed in the thesis:

Tanbreez Mining Greenland A/S, rare earth minerals at Kringlerne



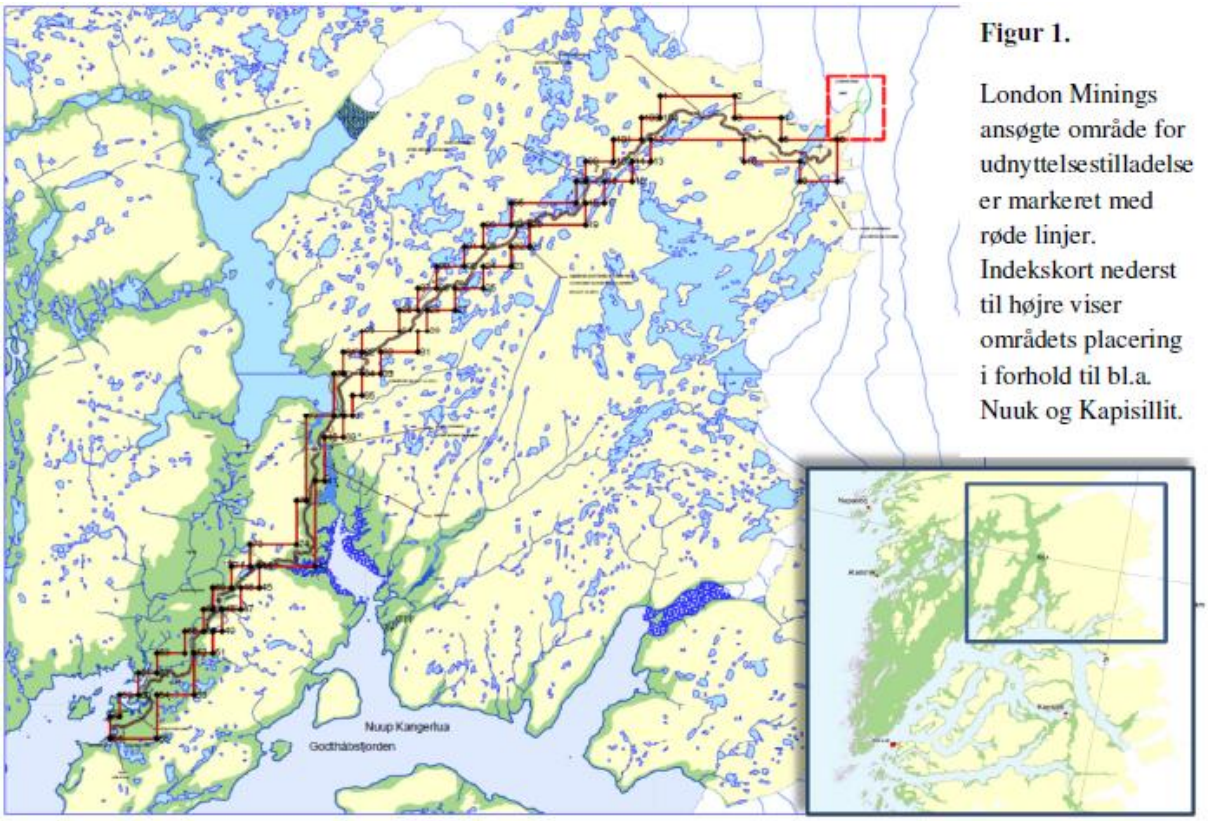
Source: The government of Greenland

True North Gems A/S, rubies and sapphire at Aappaluttoq Fiskenæsset



Source: The government of Greenland

London Mining Greenland A/S, iron ore at Nuuk



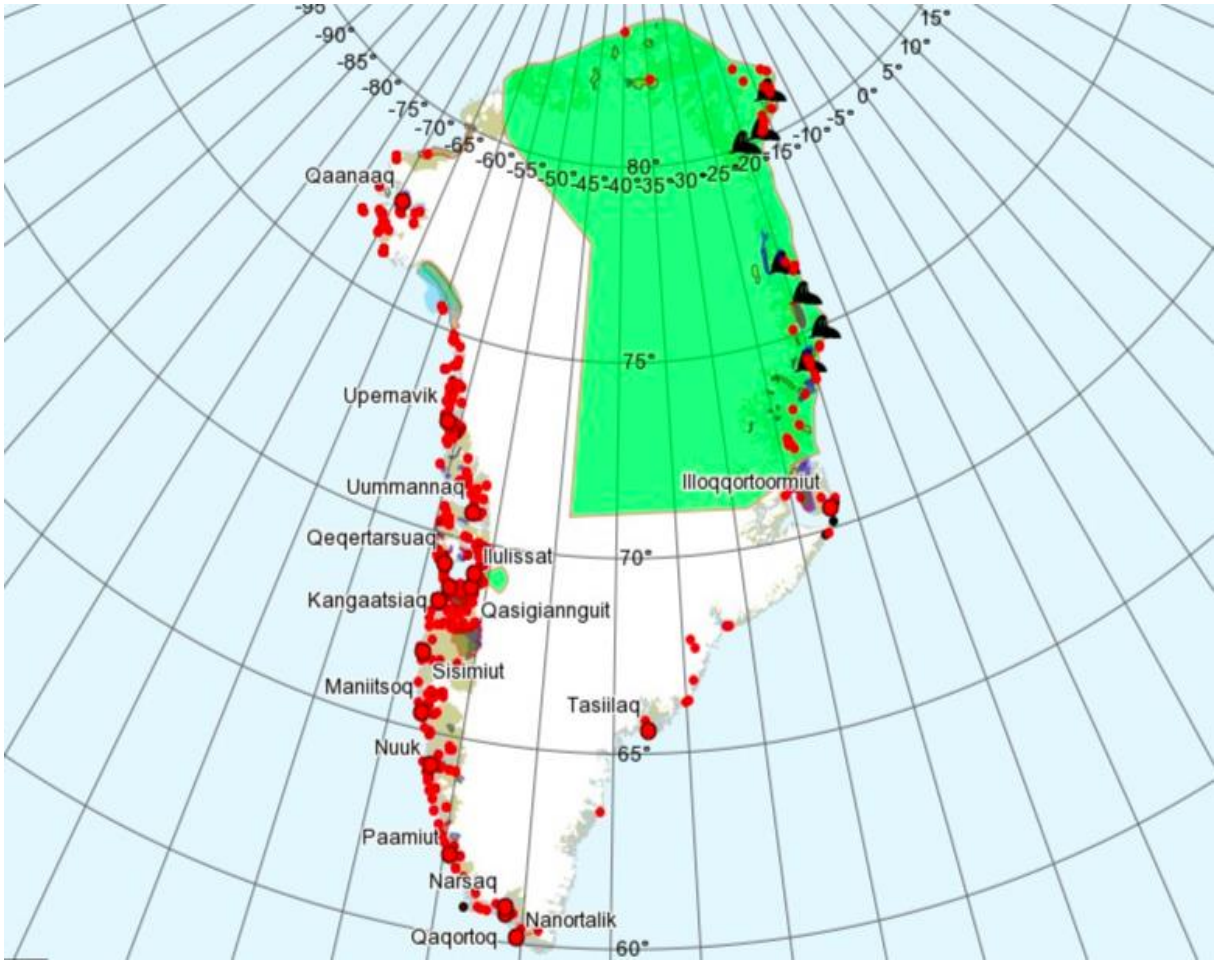
Figur 1.

London Minings ansøgte område for udnyttelsestilladelse er markeret med røde linjer. Indekskort nederst til højre viser områdets placering i forhold til bl.a. Nuuk og Kapisillit.

Source: The government of Greenland

8.5. Appendix 5

Map of sensitive areas in Greenland



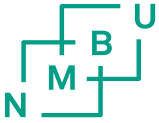
Source: The government of Greenland

Red dots: towns

Green: preserved areas

Dark brown: Ramsar areas

Red and black: sensitive areas



Norwegian University
of Life Sciences

Postboks 5003
NO-1432 Ås, Norway
+47 67 23 00 00
www.nmbu.no