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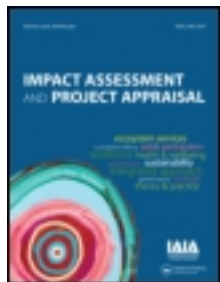
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A value-rational view of impact assessment of mega industry in a Greenland planning and policy context

Anne Merrild Hansen and Lone Kørnøv

The article reflects on the challenges to Greenland's impact assessment (IA) system in a planning and policy context, and discusses if and how IA at a strategic decision level could contribute to securing good environmental management and support sustainable development. This is done by focusing on two value-rational questions: (1) Where are we going with industrial development, IA regulation and IA practice in Greenland? and (2) What should be done? The two questions are answered through a gap analysis of legislation and IA practice and through the values for a future IA system in Greenland expressed by key actors. The research points to a need for strategic considerations in relation to planning new industries, which could be met by upstreamed IAs. A broad concept of environment in IAs, increased participation in the process and accessibility to the IA statement for all stakeholders are needed.

Keywords: Greenland, SEA, EIA, mega industry, value-rationality

WORLDWIDE, IMPACT ASSESSMENT (IA) is implemented into national environmental protection strategies on the policy, plan, programme and project levels. The use of IA is still at its early stages in Greenland, as Greenland is only now developing IA legislation at the project level. For various reasons the policy, plan and programme levels are so far excluded from mandatory impact assessment. IA is primarily carried out in relation to mining and petroleum exploration and exploitation, and with very limited public participation in the process and limited public accessibility to the environmental statement. The context in Greenland is currently changing; among other countries Greenland is undergoing organizational reforms, implementing new 'mega industries' and facing climate change challenges.

The aim of this article is to go beyond views upon general best practice for IA and grasp the context-specific challenges for IA implementation at the strategic level of decision-making in Greenland. The research takes a point of departure in two value-rational questions:

- Where are we going with industrial development, IA regulation and IA practice in Greenland?
- What should be done?

The article is based upon context analysis, and analysis of IA practice and existing values. It is meant as a contribution to the understanding of existing IA work in Greenland and the ongoing discussion of IA's future role in Greenland's environmental protection strategy.

Background to Greenland

Greenland is a self-governing territory of Denmark. It is the world's largest island, has an Arctic climate,

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and is occupied by a population of 56,000. Most of the island is covered by ice. The island's main economic activities are fishing and hunting, and in many ways Greenland can be defined as a developing country. The society has recently undergone significant changes and is still adjusting. Within the last century a traditional Inuit nomad hunter culture dependent on the hazards and resources of nature has (not seamlessly) been replaced by a modern western lifestyle (Rasmussen, 2005a,b).

Greenland has not yet experienced general industrialization; even though parts of the fishing fleet and production have been modernized, it was mostly unprocessed products that were exported in 2009. Therefore, to uphold the new way of living, Greenland is today dependent on subsidies from Denmark. However, factors such as the accelerating industrialization of countries in Asia are likely to compound the increasing demand for raw materials to fuel the global economy, and as Greenland contains a wealth of natural resources (minerals, oil and hydropower sources) it is positioning itself as a likely supplier of industrial demands. In Greenland, activities to attract new industries are being pursued in order to gain economic sustainability and thereby make it possible to uphold the modern lifestyle independently of Danish subsidies. Among other industries, mining and aluminium production are currently being planned.

On 25 November 2008 there was a referendum on a second step towards independence from Denmark, and on 21 June 2009 the Home Rule government was replaced by an extended Home Rule government (referred to as the Self Rule government). Under the new Self Rule all activities in connection with oil and mineral activities may be governed by Greenland if the Self Rule government decides so (Dusik, 2009; Winther, 2007; Greenland Statistics, 2009).

These new tendencies are likely to have impacts on Greenland's environment, economy and society. In relation to new industries in Greenland, IAs have been carried out in an attempt to balance the need for environmental considerations and protection, and the wish for economic growth. Today there is a legal demand for environmental approval of different types of industry, including tanneries and the on-shore fishing industry. Currently, Greenland's agency for Environment and Nature is preparing a regulation of environmental impact assessments (EIAs) for the island. Institutional changes may provide an opportunity for a harmonized EIA legal framework.

There is, however, no legal framework for conducting strategic environmental assessment (SEA) of proposed policies, plans and programmes (PPPs) in Greenland. But some more strategic assessments have been made. These resemble large-scale, detailed EIAs and include assessment of cumulative impacts of proposed developments in the respective study areas. There is a perceived need for establishing a legal framework for SEA regulations that would

There is, however, no legal framework for conducting strategic environmental assessment of proposed policies, plans and programmes in Greenland

apply for PPPs in Greenland. The potential for initiating the preparation of SEA regulations has also recently been discussed in the Ministry of Infrastructure and Environment. Greenland is involved in an Overseas Countries and Territories Association (OCTA) project regarding formulation of best practice for IA in OCTA countries and identification of the weaknesses and needs in relation to the local IA legislation systems. It has also been discussed in the Self Rule government whether or not SEA should be included in a future environmental protection strategy for Greenland (Dusik, 2009).

Methodological approach

To study Greenland and the challenges to IA implementation we take a point of departure in phronetic planning research and use two out of four value-rational questions put forward by Bent Flyvbjerg: (1) Where are we going? and (2) What should be done? (Flyvbjerg, 2004). Thus, the focus is on values and evaluative judgements. An important argument for choosing this approach is the emphasis on the particular situation and context in Greenland — recognizing that there are no final, objective answers to the questions. By raising the value-rational questions we are looking for input to the ongoing dialogue about Greenland's development and how IA may be developed and practised. We do not consider the questions of desirability of the development of Greenland or the power questions related to who gains and who loses in this respect. In this way the study provides a partial understanding of the values and complexity surrounding industrial development in Greenland and the needs for a future IA system. The analysis presented is structured according to the two value-rational questions, and the methodological choices are presented in the following sections.

Answers to the question of 'Where are we going?'

The question 'Where are we going with industrial development, IA regulation and IA practice in Greenland' is answered through a context analysis and an analysis of IA practice.

The context analysis focuses on (a) the policy for gaining independence and industrial development, (b) the challenge of global warming and planning

in a vulnerable Arctic environment and (c) the existing planning and environmental legislation in Greenland.

Key documents describing the rationale for Greenland's policies are reviewed. The focus is on the laws in relation to the implementation of the Self Rule, together with existing literature on the historical social development in relation to Greenland's policy-making.

The context analysis also builds upon new research, pointing at tendencies and impacts of climate change, and a documentary study of the existing legislation requiring IA — specifically the Mineral Act and guidelines concerning mineral activities, and legislation in relation to protection of nature and environment in general.

In the **analysis of IA practice** the strategic level of IAs in Greenland is the focus, and the analysis forms part of the basis for discussing Greenland's capacity to proactively address the necessary questions in relation to future mega industry and thus secure a long-term and sustainable development for society and nature. Despite experience that securing the correct level of assessment and tiering is not a single top-down process, due to, for example, time lags between different tiers (Fischer, 2007; Arts *et al*, 2005), it is necessary to ensure that sufficient information exists at all levels to provide the basis for robust and sustainable decisions.

The analysis of the levels of assessments undertaken in Greenland is based on a review of selected environmental reports, documenting the environmental impacts of mega projects in Greenland. The documentary review is based on an analysis of the following topics and questions:

- The role of IAs: Which objectives are raised in the environmental statements as the primary reasons for undertaking the IA?
- Alternative assessment: Which alternatives are included in the IA?

The first two questions relate to the strategic level of the IA. The objectives and thereby the main questions raised in the IA are strongly linked to whether the IA is at the policy, plan, programme or project level. This in turn raises the necessary strategic question of 'why action', 'what actions' and 'where actions' and not only the question of 'how actions' at the project level.

- Concept of environment: Which environmental parameters are included in the IA?

The analysis looks into the concepts of environment included in the statements, and can conclude whether there is a narrow or a more broad inclusion of environmental parameters involved in the IA practice. On the basis of this analysis it can be discussed whether the current IA practice is capable of revealing and avoiding trade-offs.

The cases, selected from nine IAs of industrial development projects in Greenland, are:

- Aluminium production, Alcoa, SEA (Greenland Home Rule, 2008).
- Minerals and petroleum exploration, a preliminary strategic environmental impact assessment of minerals and hydrocarbon activities on the Nuussuaq Peninsula, West Greenland (NERI, 2008).
- Qorlortorsuaq hydroelectric plant, Environmental report (NIRAS, 2001).
- Gold Mine, Nalunaq Gold Project, Environmental Impact Assessment, 2002, prepared for Nalunaq I/S (SRK Consulting, 2002).

The four selected environmental statements document the environmental impacts of mega projects in Greenland. 'Mega projects' are defined as the most expensive projects in terms of infrastructure and investments in the world today, with typical cost from one hundred million to billions of dollars (Flyvbjerg, 2007). These mega projects represent a significant possible economic development in Greenland and at the same time a significant potential threat to environmental protection, human health etc. In addition, they are, because of the large investment, long-term binding projects for Greenland's society.

The four cases were selected according to the principles that the IA is: (a) of mega projects and (b) officially described as and/or named as an EIA or SEA.

Answers to 'What should be done?'

The question of what should be done is answered through an **identification of values and interest** focusing on key persons' perceptions and expectations of a future IA system. The aim is to find out how environmental assessment can contribute to society's capacity for value-rational action. What environmental values in Greenland are to be protected — from a Greenland perspective, and what role could IA play in this regard?

To elucidate the values in relation to IA, key people were selected as respondents for a questionnaire. The questionnaire was designed to answer the following value-rational questions:

- In which values should performance of IA be anchored?
- At which strategic tier should IA be carried out?
- Who should be responsible for IA?
- Who should be involved in IA and have access to results?
- Which environmental parameters have to be included in IA when planning new industries?

The selected persons are identified as people who:

- Understand the concept of IA — expressed in their job position and/or their involvement in the public debate on environmental assessment;

- Are politicians, government officials of the Self Rule; or
- Have shown concerns about and interest in environmental assessment in Greenland.

The 16 respondents included eight government officials, the Minister for Finance and the Minister for Infrastructure, Traffic and Environment, five persons from non-governmental organizations, and one private individual. In addition to the questionnaire, follow-up telephone interviews with all respondents have been undertaken.

Finally, the **comparative analysis** identifies the needs that are not fulfilled, and the possible strengths and weaknesses of the existing system. The comparative analysis builds upon the context analysis, the analysis of IA practice and the identification of values, and compares the wishes and needs with the IA practice and legislative context.

Where are we going?

In summary, the context analysis shows that climate change with higher temperatures increases the accessibility to natural resources due to ice freeing. At the same time Greenland seeks economic and political independence from Denmark and is planning to attract new mega industries in order to fulfil this aim. The warming climate and new industries will affect the environment on a yet unknown scale. Furthermore, the legislative status shows that IAs of PPPs are not demanded in Greenland, and that IA as a whole is still at its early stages. The analysis of IA practice shows that practice at a strategic level is further developed than legislatively required.

Policies for independence and industrial development

The Greenland Self Rule government is working dedicatedly towards gaining more independence and becoming an individual state. To gain independence, development and economic growth are required, and Greenland is determined to reach this aim. At the same time, there is a consciousness of the complexity related to industrial development, including the needs for climate change mitigation. The Greenland Minister of Health and Environment explained this double-sided challenge that Greenland is facing when he participated in an EU climate conference in Lisbon in 2007: 'Greenland wants to be environmentally conscious and contribute to the reduction of CO₂ emissions at the global level, but at the same time wants to be a country in industrial progress, being able to attract foreign investors to the area of minerals and petrol exploitation' (Abelsen, 2007). Thus, Greenland has a dual strategy which both exploits and protects the environment.

To establish economic sustainability a progressive policy, aiming at attracting mega industries, is now

being carried out, and Greenland has the potential for significant economic development (Greenland Home Rule, 2007). Existing accessible mineral deposits are localized and a range of new projects, such as mining, aluminium production and petroleum exploration, are likely to be implemented within the next few years. Today there are three active mines in Greenland: Minelco A/S (olivine), Nalunaq Gold Mine A/S (gold) and Black Angel Mining A/S (lead and zinc) (Bureau of Minerals and Petroleum, 2009). In addition to mineral activities Alcoa and the Greenland government are also contemplating the construction of an aluminium smelter, which would begin operating around 2015 (Greenland Development, 2009). Greenland does not produce any of the ingredients of aluminium, but its abundant hydropower can cheaply power smelters. Aluminium production is a very energy-demanding activity, which is both costly and in a global context requires a low-CO₂-emitting energy supply. The potential aluminium project in Greenland includes, besides the smelter itself, construction of hydropower dams, roads, a harbour, dwellings and service facilities for workers during construction and later operation.

Global warming and vulnerable Arctic environment

Global warming with higher temperatures causes reduction of the ice cap (Kerr, 2007). The mass loss of ice is happening at a faster rate than predicted by previous models (Aoalgeirsdóttir, 2008), and the increase in mass loss of ice means that yet unidentified mineral and petrol deposits are expected to be accessed and further exploited in the future. On the Black Angel Mining A/S website homepage it is explained that: 'The most spectacular discovery on the ground in 2005 was finding an outcrop of massive sulphide uncovered by a retreating glacier. The existence of mineralization at this location was known, but previously it was covered by 60 m of ice' (Angus & Ross, 2008).

Indigenous peoples who live in areas with fragile ecosystems are particularly vulnerable when it comes to climate change, and the *Report of the Office of the United Nations High Commissioner for Human Rights on the Relationship Between Climate Change and Human Rights* emphasizes that climate change has already affected people in the Arctic (OHCHR, 2009).

Planning and environmental protection law in Greenland

Greenland's environmental protection system does not include strategic initiatives. The present national environmental protection law, Landsting Act No. 29 of 18 December 2003 on the Protection of Nature, requires that enterprises causing significant pollution, with emissions to earth, water or air, should seek environmental approval from the environmental

authority (The Home Rule) (Landsting, 2003). The enterprises concerned are listed in annex 1 to the law, and include animal husbandry, storage, disposal or treatment of waste, processing of animal raw materials and chemical manufacturing. There are no general limits for emission values, but limits can be set by the Home Rule for the individual company. To gain environmental approval the respective companies should document that they follow the laws' restrictions, and initiatives to minimize pollution should be taken before the project is implemented (Greenland Home Rule, 2004). When the project is implemented, monitoring to check that legal requirements are upheld takes place. Regarding public involvement, the Landsting Act on the Protection of Nature does not include requirements for public participation during the assessment of an application for environmental approval.

The use of impact assessments, which could be a tool for incorporating environmental protection into the planning of mega industry, is only at its early stages in Greenland. Greenland has endorsed the Espoo Convention, and a formal system for EIA is due to be implemented in Greenland, but as Greenland has not consented to the Strategic Environmental Assessment (SEA) Protocol, there are no formal demands to conduct SEAs (Hansen, 2008). SEA is an attempt at foreseeing the impacts of a decision and providing information to decision-makers, so that they can make an informed decision with minimized negative impacts at an early stage in the planning process (European Commission, 2001). The activities in relation to aluminium production etc. will require planning at a higher level than EIA only, and therefore it has been decided to conduct a SEA for the aluminium project.

Environmental protection in relation to mining and petroleum exploration is yet another story, as it is carried out pursuant to the Mineral Resources Act, which is a part of the Greenland Home Rule System and establishes the framework for joint administration by Greenland and Denmark of mineral resources in Greenland. The Joint Committee on Mineral Resources in Greenland was set up in July 1979, and has since been the central political forum for the Greenland–Danish co-operation on minerals and petroleum in Greenland (Danish Energy Agency, 1999). The respective laws in relation to environmental and nature protection do not include

specific activities for mineral resources and exploitation. This exception carries, among others, the opportunity to implement mineral activities in preserved areas in Greenland. In some cases the Mineral Resources Act is more restrictive than the other environmental legislation; for example, EIAs based on two to three years' baseline studies are required to gain a licence for mineral investigations and/or exploitation in Greenland, while there is no legal requirement to perform EIAs for other mega industry projects as described above. The present Mineral Resource Act has no requirements for public involvement or public access to information besides a decisional declaration. However, the bill for a new act includes public hearing if a project will have an impact on nature and climate. In addition, the bill suggests a new requirement of public access to some environmental information, though not the entire environmental statement.

Greenland is taking home the full authorization for mineral and petrol activities in Greenland from the Danish State, including the granting and the administration of EIAs and baseline studies.

IA practice

Despite the fact that limited legislation is in place and a limited number of IAs have been undertaken, some practice exists and can be analysed. The overall results from the documentary analysis of the four selected environmental statements are presented in Table 1. The analysis of practice shows that none of the assessments takes place at the policy level of decision-making. Cases 1 and 2 are, however, both above the project level EIA.

Case 1 is labelled a strategic environmental assessment and includes six alternative locations of aluminium production and the associated constructions, such as hydropower dams, transmission lines, roads, buildings and ports. The assessment is made by the Greenland Home Rule. The assessment is primarily based on existing knowledge and points out the data yet to be collected to provide a complete overview of the area. The SEA focuses upon the impacts of alternative locations for an aluminium smelter and hydropower dams in Greenland. It also considers the zero-alternative, aluminium production in China, which is considered to be the country in which marginal aluminium production will take place if Greenland is not chosen. This alternative was assessed in a separate Life Cycle Assessment focusing on the global warming potential (GWP) emissions related to aluminium production.

Case 2 is the first strategic environmental assessment in Greenland to investigate a larger area with a view to identifying the area's sustainable capacity in relation to industry projects. The assessment was made by the Danish National Environmental Research Institute (NERI) on behalf of the Bureau of Minerals and Petroleum, Greenland Home Rule. The assessment focuses on activities such as mineral and

The use of impact assessments, which could be a tool for incorporating environmental protection into the planning of mega industry, is only at its early stages in Greenland

Table 1. Case study of four IA statements in Greenland

Strategic level IA	Case 1	Case 2	Case 3	Case 4
	Plan/programme SEA	Programme IA	Project EIA	Project EIA
Focus of assessment	Aluminium production including hydropower, roads, harbour etc	Mineral and hydrocarbon activities on the Nuussuaq Peninsula	Hydropower at the Qorlortorsuaq lake	Nalunaq gold mine
IA's role	<p>'The overall aim of undertaking an SEA is to collect knowledge and points of view' (Greenland Home Rule, 2007)</p> <p>'... part of the total preparations for the decision regarding the location of an aluminium smelter by either Nuuk, Maniitsoq or Sisimiut' (Greenland Home Rule, 2008)</p> <p>The SEA should '...identify the themes and problems related to development of heavy energy-demanding industry in Greenland' (Greenland Home Rule, 2008)</p>	<p>'The assessment is preliminary, because it is based solely on existing information. One of the main objectives has been to identify important data gaps which should be filled in order to prepare a more elaborate strategic impact assessment or future environmental impact assessments of specific activities.'</p> <p>'A SEA is included in the background for the decisions made by the relevant authorities, and may identify general regulatory or mitigative measures and monitoring requirements that must be dealt with by the companies applying for concessions' (EIAs) (NERI, 2008: 14)</p>	<p>'In connection with the establishment of Qorlortorsuaq hydropower plant it has been decided to prepare an environmental statement, which accounts for the environmental impacts from the hydropower plant in the construction and operational phase.'</p> <p>(SRK Consulting, 2002)</p>	<p>The IA is undertaken as an Ecological Risk Assessment (ERA) and is part of a feasibility study.</p> <p>'The specific objective of the ERA is to determine the environmental impacts likely to be associated with the discharge of a detoxified tailing slurry (after substantial pre-discharge dilution with seawater) from a submerged pipeline some 130 m deep within Saqqaa Fjord in South Greenland...'. (SRK Consulting, 2002)</p>
Alternatives assessed	<p>Aluminium smelter located at Nuuk</p> <p>Aluminium smelter located at Maniitsoq</p> <p>Aluminium smelter located at Sisimiut</p> <p>Aluminium production in the marginal production country — China</p>	None	<p>For part of the transmission line:</p> <p>Cable laying</p> <p>New trace</p>	None
Concept of environment	Nature, environment (aquatic environment, water resources, waste, waste water, air emissions, noise, dust), health, culture, regional development and migration	'The impact assessment encompasses only biological resources, chemical background measurements and local use of the area. Socioeconomics, archaeology and cultural history are not included' (NERI, 2008: 14)	Flora, fauna, freshwater and drinking water, landscape, animal life, cultural heritage, waste water, waste, air pollution, tourism and fishing	Marine biota, demersal organisms, epibenthic organisms, human health, existing and future fisheries

hydrocarbon exploration on the Nuussuaq Peninsula. The assessment is based upon existing knowledge and points out the data yet to be collected to provide a complete overview of the area. A point of criticism against the SEA is that no alternatives are described, and it does not relate to other plans, but only presents a description of the area and identifies potential impacts in relation to petrol and mineral activities, and explains what future EIAs for specific projects in the area should include. Thus the assessment is only dealing with 'how actions' and does not include strategic concerns of sustainable capacity.

Case 3 is one of two environmental impact assessments that have been carried out in relation to hydropower dams in Greenland. The dam in this project is supplying the two largest cities in South Greenland with power. The environmental assessment includes dam construction, hydropower plant, transmission lines and transformer stations. The assessment is based upon existing materials and common knowledge. Case 3 includes two alternatives for part of the transmission line, and the assessment describes which alternative will have less impact on the environment.

Case 4 is an assessment of a specific mining project in Greenland: Nalunaq Gold Mine. Four EIAs have been undertaken regarding mining projects. The EIA of Nalunaq Goldmine in Southwest Greenland is chosen as an example of this type of assessment. The EIA has been carried out by consultants on behalf of the mining company. The EIA of the mineral activities comprise a set of legally required parameters clarified through three years' of baseline studies on the location. The assessment itself is undertaken as an ecological risk assessment. The EIA has focus on reducing the potential impacts from the mining project, and this way it answers the project-specific question of 'how actions', as it is meant to.

In summary, IA practice shows cases at both the project level and at a higher strategic level of decision-making. The statements involve assessments according to a rather broad concept of environment. The concepts, however, vary significantly between the cases, and it is observed that explanation of the specific scoping is missing. The *ad hoc* SEA of aluminium production can be highlighted as the most comprehensive case of the four analysed. Besides working with a broad concept of environment, this case includes different location alternatives in both Greenland and in marginal production countries and these are assessed equally.

What should be done?

The overall perspective on nature and environment presented in the analysis is that humans are part of nature, influencing it, and being influenced by it, and also being dependent on natural resources to live. Therefore they should be aware of and take responsibility for the human-caused impacts on the

environment. This establishes a basis for how respondents answer the value-rational question of 'what should be done'.

Stakeholders' value-rational views upon IA

The respondents' views upon wants and needs in relation to a future development of Greenland's IA system are presented below.

Values in which performance of IA should be anchored There was general agreement among the respondents that the path to future welfare of Greenland depends upon industrial development while at the same time securing environmental protection. Autonomy is not seen as important in this respect. As illustrated in Figure 1, there are various estimates of which businesses are going to carry this development, but generally the respondents point to mineral, oil and aluminium production as the main occupations in Greenland's future economy.

One respondent expressed the challenge in Greenland as to 'maintain a good standard of living without compromising on the protection of environment and nature, and at the same time preserve the cultural uniqueness. How it is achieved is, however, more complicated, but one of the prerequisites is implementing IA in relation to e.g. large plants'. According to the respondents there are several reasons why it is in Greenland's interest to protect the environment.

First, Greenland is in the process of implementing new intensive industries and should attend to local environmental interests. The international signal value of being environmentally conscious provides motivation for taking environmental interests into consideration. There is a clear indication that the respondents find that IA should be implemented in

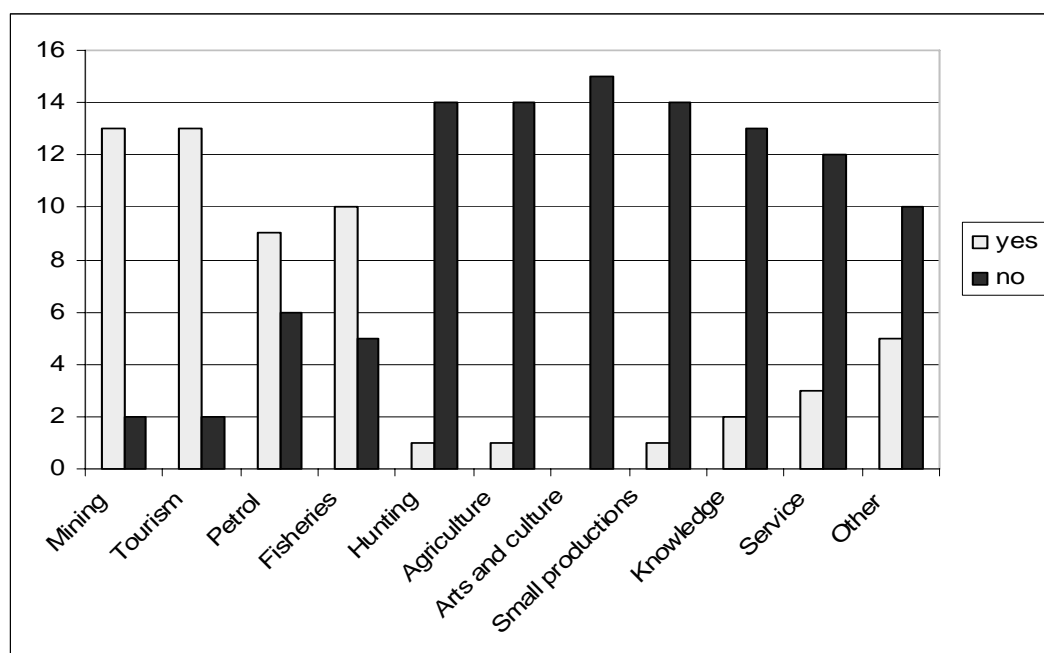


Figure 1. Businesses expected to carry Greenland's industrial development (N = 15)

response to Greenland's needs and not to promote Greenland or to protect the interests of the outside world.

Second, it was also stated that environmental assessment can help to balance industrial development and environmental protection. A respondent noted: 'It is important to preserve the environment and the Greenlandic traditions while still having an industrial development and being able to create an international community. The big challenge as I see it is to get the process towards achievement of these goals to go hand in hand.' The overall picture of Greenland's relationship to nature and environment expressed by the respondents is interpreted as follows: Man must be seen as part of and dependent on nature, and therefore he must take care of it and ensure that people do not unreasonably affect the environment.

Strategic level of IA According to the respondents, the reason why IA is relevant and needs to be integrated into the legislative system is that IA can help to ensure incorporation of environmental considerations in planning and implementation of new industries. A respondent put it this way: 'I would point to a more sustainable economic development as an essential goal for Greenland. This is probably achieved primarily through the development of large industries, e.g. in the sector of minerals and petrol. Personally and professionally I think it is important to take care of the fragile and often unspoilt nature that Greenland has — while also paying regard to the necessary economic development.' Surprisingly only half, or 8 out of 15, of the respondents believe that IAs should be made with a view to achieving sustainable development in Greenland.

It appears clearly from the questionnaires that the respondents find it relevant and necessary to implement IA at both the strategic level and the project level. The respondents all agree that a good IA should be able to cover all levels of IA (project, programme, plan and policy), but with less emphasis on the policy, for example in relation to questions of whether or not a particular industry should be promoted. A total of 12 out of 14 respondents expressed specifically that IAs should be carried out when deciding on the issue of land allocation, or licensing of new industries, and in relation to spatial planning at the programme and plan level.

It appears clearly from the questionnaires that the respondents find it relevant and necessary to implement IA at both the strategic level and the project level

One respondent added a comment about IA at the project level: 'It is important that IA is part of the basis for decision-making, and therefore they [IA] should be made before the decision is taken. It is therefore important that IAs are included as part of the decision-making and not when the project is already booted'. Another respondent wrote regarding the strategic level: 'I believe that good environmental assessment should identify, predict and communicate any potential environmental impacts over a longer cycle. In addition, it should suggest alternative proposals and a conclusion, from a scientific viewpoint.'

IA responsible The investigation gives a clear picture of who should be responsible for protecting the environment: it is mainly the public authorities and the companies. The public authorities should be responsible for 'securing that the environmental assessment fulfils legislation', and the companies should be 'responsible for doing the environmental assessment'. Regarding the politicians the respondents raise the view that they should have the overall responsibility for defining IA requirements and securing legislation. Some of the respondents point to the importance of including independent organizations in the IA works. A respondent wrote: 'To inform the public, independent agencies without public or industrial affiliation should be part of IA processes'.

Involvement in IA and access to results The respondents agree upon a broad inclusion of actors in the IA preparation (see Figure 2). Regarding IA preparation the answers are less unequivocal. The emphasis is on the companies as those who work out the IA and write the statement.

Researchers/experts and public authorities are also highlighted as key actors in IA preparation, and the need for researchers and experts to be involved in implementing IAs is primarily emphasized by the administrators themselves. Several respondents from the administration suggest that politicians be involved later in the IA process, when the final approval has been given. Differentiation between SEA and EIA is also suggested, so that EIA responsibility could be delegated to administrators. Concerning access to the results, including the IA statement, the respondents in general find that access should be secured for all stakeholders involved, and also the public.

Concept of environment in IA As all 16 respondents in the investigation found all the possible environmental parameters relevant, the analysis shows a strong interest for IA to include considerations on a broad concept of environment when new industries are planned, including local economy, national economy, culture, climate, soil, air, water, health, flora, fauna, landscapes, social welfare and settlement patterns. A respondent explained that he

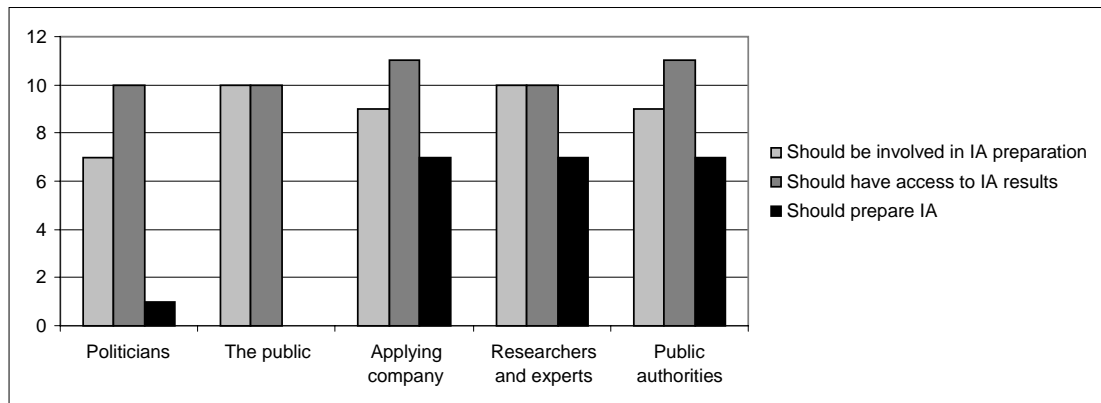


Figure 2. Involvement in the IA preparation and access to the IA results (N = 11)

believes the competence and information needed in relation to IA when planning new industries are already available: 'I believe that many of the above points are included in the application material that a company comes up with, and the central administration together with international institutions relate to these issues ... I really see all the parameters as important in the planning of major new businesses in Greenland.' This indicates that the information needed for SEA is already available in some form and maybe just needs to be structured and considered from an environmental perspective.

Comparative analysis: gaps found

Comparing the results from the two value-rational analyses including the analysis of context, practice and needs/wants, three main gaps are identified. The gaps are illustrated in Table 2. Remarkably, the gaps are mainly between the legislative framework and the needs/wants, while the practice and the needs/wants are closer to agreement. The exception is involvement in the process and access to the IA results. Here the gap is related to both legislation and practice.

First, comparing the results from the three parts of the investigations it is shown that the needs/wants are actually a combination of the two others. The legislative system is focused on securing the environment through IA, the companies conduct the IAs, and consequently the companies focus on conducting a good IA to be able to gain permission to act. And the respondents find that the role of IA is to balance the need for industrial development with the need for environmental protection.

A gap is found in relation to the strategic level of the IAs. The environmental laws, even those which are still not implemented, only require IAs at the project level. However, both IA practice and the expressed needs/wants show that there is an interest and willingness to take the IAs to the strategic level including both the programme and plan level of IA. The policy level is not yet included in practice, nor is it formulated as a clear wish from the respondents.

Regarding responsibility, the analysis shows overall coherence between needs/wants, legislation and practice.

The second main gap is found in relation to needs/wants regarding involvement in the IA process and access to the IA results. As presented, the respondents agree upon the need for a broad inclusion of

Table 2. Gaps found between needs/wants, IA legislation and IA practice in Greenland

	IA legislation		Needs and wants		IA practice
Values for IA performance	Protecting the environment		Balancing development and environmental protection		Mitigation and securing industrial permission
Strategic level	Project tier	GAP	Project, plan and programme tiers		Project, plan and programme tiers
Responsibility	Public authorities, the politicians and companies		Public authorities, the politicians and companies		Companies, public authorities and politicians
IA involvement and access	Companies and authorities. Limited public access	GAP	Public authorities, companies, the public, researchers/experts and politicians	GAP	Authorities and companies. Limited access for the public
Concept of environment	Different concepts. Primarily narrow	GAP	Broad concept of environment		Variations but in general broader than the law prescribes

stakeholders in the process and that stakeholders in general must have access to the results. Legislation, however, lacks clear statutory guidelines securing involvement and access to information. The limited access to environmental information has also been experienced in practice, when the authors were trying to obtain environmental statements in Greenland.

Finally, it is shown how the legislative system in Greenland does not yet include the broad concept of environment, known from the EU directive and other developed countries. But looking into practice in relation to the four IA cases reviewed it seems that more parameters than prescribed in the law are taken into consideration. The variation in the parameters included can be explained as a consequence of the different and inconsistent laws in relation to minerals on the one side and industries on the other, as the different legislations require inclusion of different parameters. Still, the cases go beyond the legal demand in their descriptions, which could indicate the need for a broader concept of environment to be able to give the full picture of the impacts of a certain project. The results from the questionnaire analysis of values and interests draw the same picture, as they show that all respondents find all the mentioned parameters relevant.

Conclusion and discussion

The development of an IA system for Greenland is complex. The system cannot be prescribed, but needs to be developed through value-rationality and a dialogue between different actors. The authors' intention has not been to suggest specific priorities for a future IA system in Greenland. Rather the article is meant to inspire reflection and discussion to achieve further insight into wishes and needs that can guide the IA system. The emphasis on value-rationality raises the questions of 'where development in Greenland is going?' and 'what should be done?'. The answers to these questions form the basis of a comparative analysis between IA legislation/practice and needs/wants, which reveals the following main gaps:

- **IA in Greenland today should be upstreamed to the strategic level of decision-making and include SEA.** The respondents are unanimous about the need for IA at the plan and programme levels. Strategic environmental assessments are

not yet conducted at the policy level in Greenland. One single assessment has been carried out at the plan level, two at the programme level, and six at the project level. The situation in Greenland today, characterized by a progressive policy with regard to attracting mega industries, and combined with the vulnerable Arctic climate and global warming causing ice-cap reductions, makes it highly relevant to discuss whether IA legislation should be taken to a higher level.

- **IA should be more inclusive towards stakeholders and increase access to IA results and statements.** With respect to the assessment process and participation, both practice and legislation are inconsistent with the expressed needs and wants. The legislation does not automatically secure access to the IA statements, and due to confidentiality some statements are not accessible to the public. The newest case studied, the SEA of aluminium production points, however, to a development of practice bending towards the expressed wants. In this case openness in the process and access to the statements are secured.
- **IA should in general be based upon a broad concept of the environment.** The analysis shows a desire for IA to include a broad range of parameters, covering more than the physical environment. However, the IA practice shows great variation in the width of parameters included and the depth to which they are assessed in the reports. It is concluded that there is a lack of common legal requirements for environmental assessments carried out in Greenland, as there is no shared concept in the legal acts and guidelines used.

The key stakeholders' views point to a need for IA legislation and practice based upon a broader concept of the environment, a safeguarding of more public participation and access to the environmental statements. Furthermore, the current industrial development in Greenland, along with climate change, points to the need for a strategic IA covering the plan and programme level of decision-making to reduce the gap between wants/needs and the reality. This includes assessing alternatives and their impacts against the needs and societal capacities, which leads to questions including how intensive an industrial development should be allowed, which industries can settle without significantly negative and irreversible consequences for the Greenlandic environment, and how will this affect the environment and society cumulatively. This discussion has just started and no decisions have been taken in this respect.

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But looking into practice in relation to the four IA cases reviewed it seems that more parameters than prescribed in the law are taken into consideration

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