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First port of call: a horizon scanning workshop for sustainable Arctic marine infrastructure

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ABSTRACT

To support the predicted growth of shipping activities in the Arctic region in coming decades, port developments and associated shipping infrastructure will be required to be developed in both Arctic and sub-Arctic areas. Such large-scale development in unique and potentially vulnerable areas are likely to have wide-ranging effects and associated impacts. We therefore consider the future challenges, opportunities and knowledge gaps associated with the environmental impacts of developing Arctic and sub-Arctic port infrastructure. Here we present the outputs of an international, virtual workshop held in January 2022 exploring this theme. The workshop brought together Arctic, marine and port researchers, practitioners, non-governmental organisations, and local communities representing a range of geographies and disciplines. Based on pre-workshop consultation, five topics were considered: marine mammals and noise; discharges and pollution; ecosystem impacts and effects; environmental management and assessment; and infrastructure and geography. Dissemination of the workshop found five overriding themes that were common across each topic discussion: i) utilising best practice and governance; ii) community and Indigenous Peoples engagement and participation; iii) common vs. Arctic-specific challenges; iv) impact assessment including consideration of cumulative impacts and effects; and v) climate change. The workshop highlighted the requirement to continue to build and broaden discussion, for further collaborative work and research streams to be developed, to ensure any future Arctic and sub-Arctic port infrastructure, in support of Arctic shipping, is developed sustainably.

KEYWORDS

Climate change; Arctic; best practice; shipping; port infrastructure; community engagement

Introduction

Shipping in the Arctic is increasing, with further increases projected in the coming decades.[1] This is driven by multiple factors including, the ongoing development of natural

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[1]Victor M. Eguíluz et al., 'A Quantitative Assessment of Arctic Shipping in 2010–2014', *Scientific Reports* 6, no. 1 (2016).

resource extraction industries, climate change (leading to reductions in sea ice extent and duration, which duly has increased Arctic accessibility to shipping activity), regulatory changes, improving technology and operations enabling access, national and international policy, infrastructure investment and developments, fuel prices and demand for goods (i.e. the global economy).[2] However, the associated port infrastructure, communication and navigation networks, and search and rescue facilities required to support further increases in shipping are still largely lacking for large portions of the Arctic and sub-Arctic region. Therefore, significant investment and sustainable development is still required before the Arctic's Sea routes are considered truly viable for continuous and large-scale shipping.[3]

The potential development of Arctic and sub-Arctic port infrastructure is anticipated to foster economic opportunity, for example, by providing services for extractive industries and for tourism.[4] However, it remains unclear as to the associated wide-ranging potential impacts ports may have on the marine environment, the desire and enthusiasm of local and Indigenous communities for these developments to be pursued, and how such developments may be managed. Indeed, Panahi et al.[5] noted the scarcity of research associated with Arctic port developments, compared with research on Arctic shipping.

Ports are highly complex environments; encompassing a wide variety of activities throughout their lifetime that are linked to actions such as cargo and passenger transport, merchandise handling (to and from ports), large ships manoeuvring/under power, sludge and sewage removal, dredging and goods handling, ship maintenance (including crew changeover) and refuelling.[6,7] Ports may also be associated indirectly with other anthropogenic activities, such as heavy and light vehicles, rail transportation, waste production and power generation.[8] All activities are associated with different and multiple effects; and as such have the potential to result in negative local or broader environmental and social impacts if not carefully assessed, mitigated, and managed.

In this paper, we present observations from a workshop on the future challenges, opportunities and knowledge gaps associated with the environmental impacts of Arctic and sub-Arctic port infrastructure. The workshop brought together Arctic, marine and port researchers, practitioners, NGOs and local communities representing a range of geographies and disciplines. We provide concluding outcomes and future recommendations disseminated from the workshop discussion, with the aim to guide, support and inform future associated work and discussion on this topic.

[2]Björn Gunnarsson, 'Recent Ship Traffic and Developing Shipping Trends on the Northern Sea Route – Policy Implications for Future Arctic Shipping', *Marine Policy* 124 (2021).
[3]Julia Pahl and Brooks A. Kaiser, 'Arctic Port Development', in *Arctic Marine Resource Governance and Development*, ed. Niels Vestergaard, et al. (Cham: Springer International Publishing, 2018).
[4]Brooks A. Kaiser, Julia Pahl, and Chris Horbel, 'Arctic Ports: Local Community Development Issues', ibid.
[5]Roozbeh Panahi et al., 'Reflecting on Forty Years Contextual Evolution of Arctic Port Research: The Past and Now', *Transportation Research Part A: Policy and Practice* 144 (2021).
[6]Jasmine Siu Lee Lam and Theo Notteboom, 'The Greening of Ports: A Comparison of Port Management Tools Used by Leading Ports in Asia and Europe', 34, no. 2 (2014).
[7]Daniel Seong-Hyeok Moon and Jong Kyun Woo, 'The Impact of Port Operations on Efficient Ship Operation from Both Economic and Environmental Perspectives', *Marit.Policy Manage.* 41, no. 5 (2014).
[8]H. A. van Klink, 'The Port Network as a New Stage in Port Development: The Case of Rotterdam', *Environ Plan A* 30, no. 1 (1998).

Methods

Horizon scanning is an effective tool for bringing experts in different subject areas together to discuss a common issue. Whilst there is no standard horizon-scanning process, a common approach is to use expert workshops. To bring together, share and then collate the views of key stakeholders on the future development of port infrastructure associated with the growth in Arctic shipping, a 2.5-hour virtual workshop 'Scanning the Horizon: Identifying challenges, knowledge gaps and opportunities for sustainable development of port infrastructure for the Arctic's Shipping Routes' was held on 27 January 2022.

Prior to the workshop, a questionnaire was shared with potential workshop participants (approximately 70 people), with a 46% response rate. Based broadly on the workshop facilitators' expertise and the key drivers for future Arctic shipping, as identified in the academic literature, six predefined workshop discussion topics were identified (Figure 1). Survey respondents were asked to comment on i) whether they thought the identified topics were relevant, and whether any topics were not captured, ii) to identify any global examples of port infrastructure development 'best practice'; and iii) to identify any 'lessons learned' from previous global examples of port infrastructure development. A summary of the survey results is provided in the workshop report (https://bit.ly/ArcticPortDevelopment).

Following input from the survey respondents, one of the predefined topics, 'Policy and Governance', was identified as a cross-cutting discussion topic, and is therefore discussed within all other workshop topic sessions, rather than as a stand-alone topic.

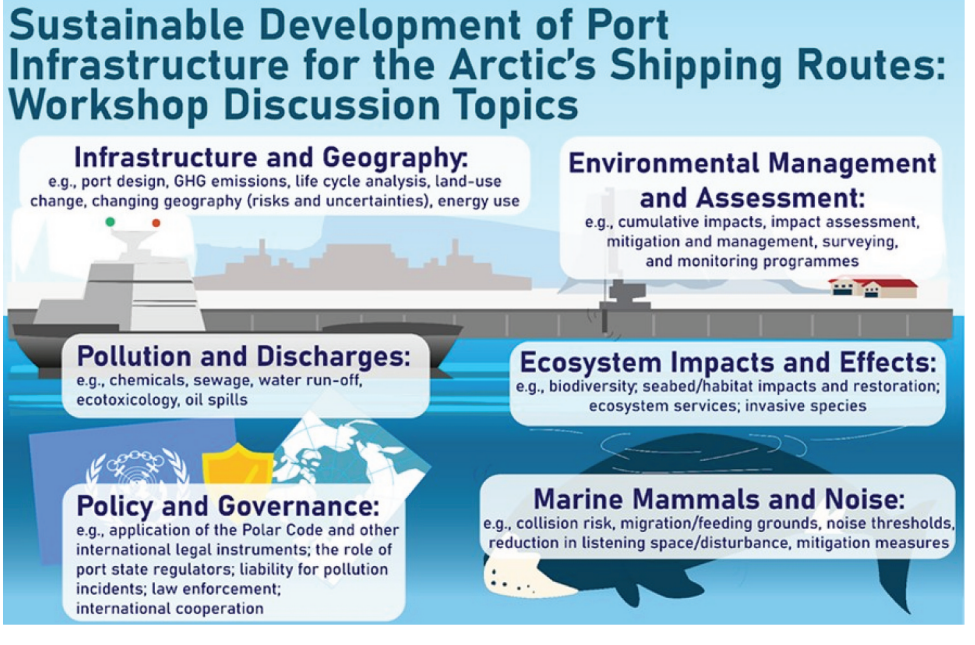


Figure 1. Predefined workshop discussion topics for a workshop focusing on the sustainable development of Arctic port infrastructure. Breadth of discussion included: planning and scoping, construction and development, operation, cumulative impacts, expansion and decommissioning and salvage.

The objectives of the stakeholder workshop were: (1) to identify and explore future challenges for developing sustainable ports infrastructure to support Arctic shipping; (2) to discuss the potential opportunities and issues that could result from the development of additional port facilities in sub-Arctic countries; and (3) to identify examples of best practice and technologies that should be considered or act as knowledge providers when developing sustainable, low impact, Arctic ports in the future.

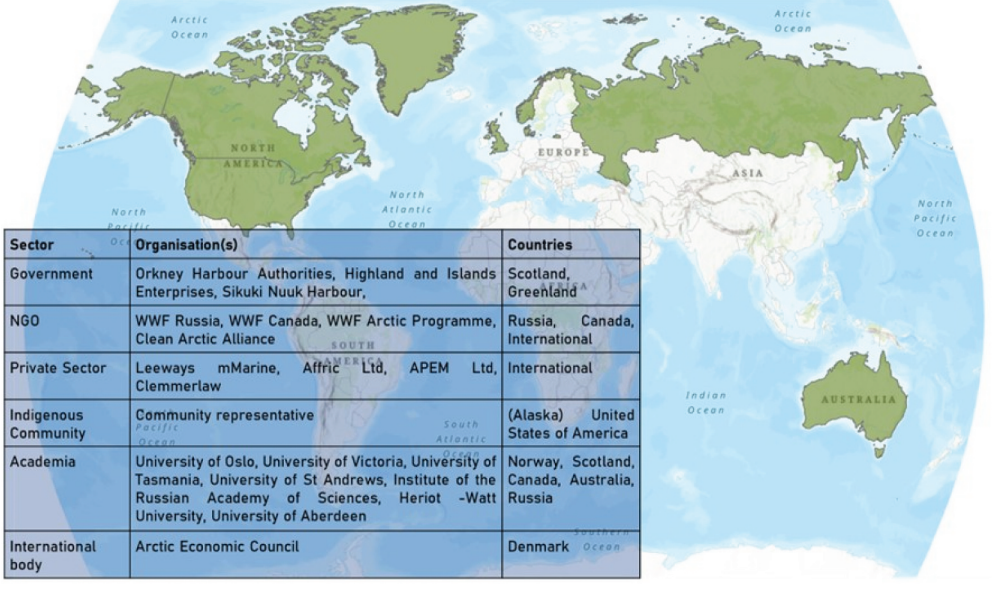
Participants at the workshop consisted of a broad and balanced representation from different stakeholder groups. In total, 26 people, representing different organisations and geographical areas attended the workshop (Figure 2).

Although the primary focus of the workshop was to consider the environmental implications and management of developing sub-Arctic and Arctic port facilities, participants were also encouraged to consider the cultural significance of sub-Arctic and Arctic regions and the importance of these lands, seas and their associated resources to many Indigenous communities and cultures within the workshop discussions.

Through facilitated discussions, covering a wide breadth of activities relevant to port infrastructure, participants were asked to consider a variety of topics (Figure 1) and relevant questions (see workshop report https://bit.ly/ArcticPortDevelopment for full list of questions). Results from these discussions were self-recorded by the participants on a Jamboard (https://jamboard.google.com/) and note-taking was undertaken by the facilitators. The workshop was purposefully not video- or audio-recorded, to encourage open discussion.

Workshop results and discussion

Following the workshop, a project report was compiled by the workshop facilitators, and shared with workshop participants for comments and feedback. The final report summarises the workshop discussion points, and groups together similar topics to identify



Sector	Organisation(s)	Countries
Government	Orkney Harbour Authorities, Highland and Islands Enterprises, Sikuki Nuuk Harbour,	Scotland, Greenland
NGO	WWF Russia, WWF Canada, WWF Arctic Programme, Clean Arctic Alliance	Russia, Canada, International
Private Sector	Leeways mMarine, Affric Ltd, APEM Ltd, Clemmerlaw	International
Indigenous Community	Community representative	(Alaska) United States of America
Academia	University of Oslo, University of Victoria, University of Tasmania, University of St Andrews, Institute of the Russian Academy of Sciences, Heriot -Watt University, University of Aberdeen	Norway, Scotland, Canada, Australia, Russia
International body	Arctic Economic Council	Denmark

Figure 2. Stakeholder representation; green highlighted countries indicate countries represented.

overarching themes (https://bit.ly/ArcticPortDevelopment). Analysis of the workshop discussions highlighted that there are a wide range of challenges and opportunities associated with future and present Arctic and sub-Arctic port development. The full list of potential challenges raised, along with key example case studies, are outlined in the full workshop report, which summarises the issues and key findings into five broad themes, these are discussed in further detail below (Figure 3).

Discussions (within all workshop topics) also centred around the need to establish best practice on environmental data collection and monitoring. Challenges and opportunities that were noted include i) the benefit in establishing pan-Arctic guidelines for monitoring and collecting environmental data (i.e. to ensure comparability and help broker collaboration), ii) establishing a true environmental baseline, iii) development and use of innovative technologies to monitor and collect data in remote regions (e.g. autonomous vehicles and subsea observatories), iv) the importance of collecting other data too, such as social data, v) learning from other industries, making environmental/social data collection and ongoing monitoring a core part of the planning, assessment, and engagement processes.

The final key themes (Figure 3) illustrate the interconnectivity of the challenges and potential recommendations for sustainable port development in the sub-Arctic and Arctic; and highlight the need for cooperation, inclusion and investment in research.

Key theme: best practice and Governance

Governance of the Arctic's shipping industry was discussed within the frameworks of the International Maritime Organisation's (IMO) Polar Code for ships operating in polar waters (the Polar Code) and the Arctic Council. The Arctic Council established the Arctic Shipping Best Practice Information Forum, supporting awareness on best practices for the shipping sector and promoting the effective implementation of the Polar Code. However, the Polar

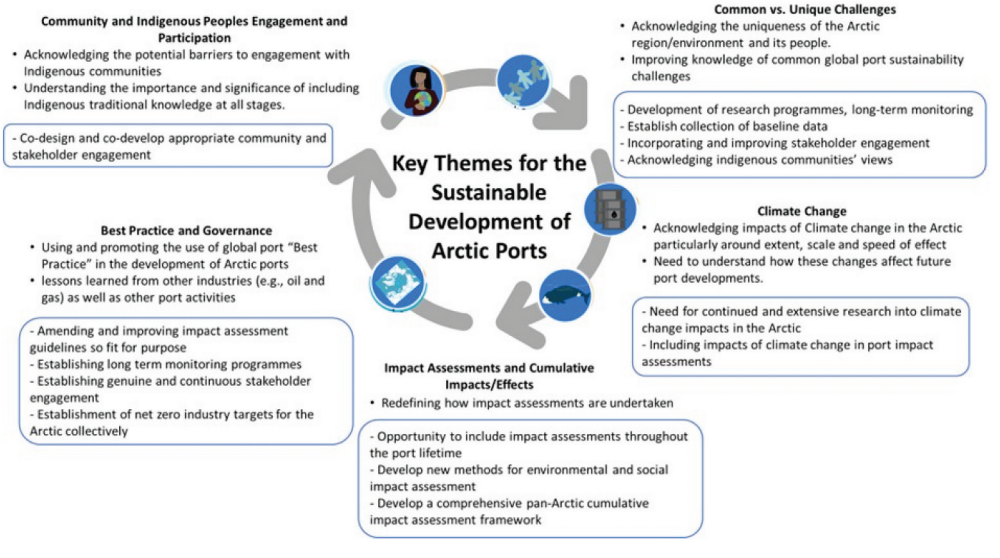


Figure 3. Concluding themes identified by the workshop exploring the sustainable development of Arctic port infrastructure.

Code does not cover Arctic port infrastructure development. There is no formal code applicable to Arctic or sub-Arctic port developments at present (individual nations have their own environmental and industry-related regulations, e.g. EU EIA Directive).

With the development of Arctic and sub-Arctic port infrastructure and the associated construction industry continuing to evolve and grow, Arctic planning and infrastructure investment is urgently required,[9] but only in a way that minimises risks to the environment and communities.

Workshop discussions centred on i) utilising knowledge from 'best practice' to prevent issues arising (or to resolve issues), ii) learning from issues that have arisen elsewhere, iii) learning from experiences in similar harsh environments (for example, extreme cold or stormy locations) and iv) learning from and improving upon similar community/stakeholder engagement encounters. Workshop delegates discussed the importance and value of building upon 'best practices and lessons learned' with regards to port developments elsewhere and considered other sectors to have the potential to act as knowledge providers, to help inform sustainable Arctic developments.

It was highlighted at the workshop that gaining perspectives and knowledge from different disciplines and within/across sectors (e.g. sharing information across different Port Authorities; or different industries) would also be highly beneficial. Related to shared perspectives, it was also considered important to consider the alternative scenarios for future port developments, e.g. size, location or even the decision to not develop a port at all, even if this means having to expand existing infrastructure elsewhere.

To highlight the need for using lessons learned (learning from mistakes) and the need to establish best practice, the port development at Nome, Alaska was introduced by the Nome community representative. Although an ongoing development at the time of the workshop (initial investigative work started in approx. 2010), the lessons learned centred on a mismatch of community and Indigenous community views, with the views of the city, state and federal United States governments, primarily due to a lack of constructive community engagement and their role in the decision-making process. The community representative outlined their views, stating that the policies related to the port expansion were destroying Alaska Native people's way of life and their history in the community. Some ten years later and following additional government funding for the expansion in 2020, the community still feel that issues are unresolved, including: i) inadequate public consultation period; ii) inadequate environmental impact statement (including air quality impacts); iii) a need to include subsistence uses into design of port; iv) inadequate spill prevention and response; v) a need to support access to natural resources for subsistence harvest; v) ensure port does not increase cost of living to local community; vi) a need to ensure the port does not create additional challenges for local community; and vii) a need to protect cultural and archaeological resources.[10]

Finally, discussions were had on the plans for the decarbonisation of the shipping industry and potential for net zero industry targets (a highlight for the industry at COP 26 November 2021), with the discussions focussing on 'green shipping corridors' and

[9]Panahi et al., 'Reflecting on Forty Years Contextual Evolution of Arctic Port Research: The Past and Now'.
[10]Kawerak Inc, 'Kawerak Comments on Unresolved Issues Re: Port of Nome Feasibility Report' https://kawerak.org/kawerak-comments-on-unresolved-issues-re-port-of-nome-feasibility-report/.

'zero-emission shipping'. The 'Clydebank Declaration for green shipping corridors'[11] was introduced. The signatories of the Declaration, among other statements –

> Emphasise the importance of pursuing efforts to limit the increase in the global average temperature to 1.5°C above pre-industrial levels... Recognise the benefits of pursuing synergies between decarbonisation and clean air policies in shipping, and building on existing measures related to the reduction of pollution from ships... recognise that a rapid transition in the coming decade to clean maritime fuels, zero-emission vessels, alternative propulsion systems, and the global availability of landside infrastructure to support these, is imperative for the transition to clean shipping.

It is the intention that these first 'green corridors' will be used to test and prove the 'zero-emissions' technology across the whole value chain (including ports, energy providers, ship owners, customers, investors, etc.). The goal is for ships capable of running on zero-emissions fuels to make up at least 5% of the global fleet by 2030.[12]

Workshop participants noted that it was unclear whether the 'green shipping corridors' and 'green ports' would only be focussing on greenhouse gas (GHG) emissions, or whether other environmental impact mitigation measures (such as protected/sensitive areas, associated shipping management tools, port infrastructure development/construction and community engagement) would also be implemented within these corridors to maximise overall environment and community protection; and how these 'corridors' would work in a multi-administrative environment such as the Arctic.

Key theme: community and Indigenous peoples engagement and participation

Arctic Indigenous communities have strong connections to the natural environment,[13] with fishing and subsistence harvesting providing vital food and other services. A study on low impact shipping corridors in Arctic Canada[14] emphasises the vital need for the meaningful inclusion of Indigenous community voices in the development of Arctic shipping policy and governance, and this sentiment should of course extend to the development of Arctic/sub-Arctic ports. The impact of increased shipping, the expansion of Arctic/sub-Arctic port towns and the development of new ports will be felt most acutely by the local coastal communities (e.g. increased industrial activity, increasing visitor numbers). However, knowledge about these local and regional implications, and response to the growth in Arctic shipping and associated infrastructure is scarce.[15]

[11] UK Government, 'Cop 26: Clydebank Declaration for Green Shipping Corridors', https://www.gov.uk/government/publications/cop-26-clydebank-declaration-for-green-shipping-corridors/cop-26-clydebank-declaration-for-green-shipping-corridors.

[12] Mission Innovation, 'Zero-Emission Shipping – Mission Innovation', mission-innovation.net.

[13] Jason Prno, Matthew Pickard, and John Kaiyogana, 'Effective Community Engagement During the Environmental Assessment of a Mining Project in the Canadian Arctic', *Environmental management* 67, no. 5 (2021).

[14] Jackie Dawson et al., 'Infusing Inuit and Local Knowledge into the Low Impact Shipping Corridors: An Adaptation to Increased Shipping Activity and Climate Change in Arctic Canada', *Environmental Science & Policy* 105 (2020).

[15] Julia Olsen, Grete K. Hovelsrud, and Bjørn P. Kaltenborn, "Increasing Shipping in the Arctic and Local Communities' Engagement: A Case from Longyearbyen on Svalbard", in *Arctic Marine Sustainability: Arctic Maritime Businesses and the Resilience of the Marine Environment*, ed. Eva Pongrácz, Victor Pavlov, and Niko Hänninen (Cham: Springer International Publishing, 2020).

It is widely acknowledged that planning and management of places and/or resources is most effective when done in cooperation with those who experience the associated problems and opportunities[16,17,18] Similarly, the tools and techniques used to support planning should also involve the facilitation of knowledge, needs and values of stakeholders and governing parties, rather than being solely developed and operated by researchers or in fact industry and government (economic drivers). States have acquired international binding obligations for the engagement of local and Indigenous communities in development projects under various conventions including: i) Article 8(j) of the Convention on Biological Diversity (CBD); ii) Decision VIII/28, the Conference of the Parties to the CBD; and iii) The International Labour Organisation Convention No. 169 on Indigenous and Tribal Peoples (ILO Convention 169).

During the workshop session focused on this topic, discussions repeatedly stressed the importance of maintaining communication, dialogue, and engagement with Indigenous and local communities. Additionally, the session 'Environmental Management and Assessment' session highlighted the international policy commitments on Indigenous and local communities' participation and allowed a discussion on the significance of integrating traditional knowledge, values, and sustainable practices within environmental impact assessment processes.

The points raised surrounding this topic emphasise the importance of engaging all stakeholders from the outset before further development or plans are pursued, and that a one-size-fits-all method to engaging stakeholders is not appropriate and should be designed and tailored on a case-by-case basis. However, best practices developed elsewhere when engaging Indigenous or local communities may be useful to inform the process. The Arctic Council's sustainable development working group has published a 'good practice for environmental impact assessment and engagement',[19] which includes a number of meaningful models for the engagement of Indigenous peoples and good practice recommendations, which outlines the need to: i) seek true dialogue for meaningful engagement; ii) utilise Indigenous knowledge and local knowledge to complement scientific knowledge; iii) build internal capacity to work in the Arctic context and provide resources to communities to meaningfully engage in EIA; iv) allow EIA to influence project design and decision-making process; and v) strengthen Circumpolar cooperation on transboundary impact assessment. In terms of an example demonstrating lessons learned with regards community engagement, an Arctic mine development revealed the importance of engaging early and often, using a context-specific approach; comprehensive record-keeping and reporting; meaningful incorporation of local knowledge and perspectives; and focussing on long-term relationships, partnerships and local benefits, led to successful project advancement.[20]

[16]Christopher Ling, Kevin Hanna, and Ann Dale, 'A Template for Integrated Community Sustainability Planning', *Environmental management* 44, no. 2 (2009).
[17]Svein Jentoft and Ratana Chuenpagdee, 'Fisheries and Coastal Governance as a Wicked Problem', *Marine Policy* 33, no. 4 (2009).
[18]Chelsey A. Crandall et al., 'Meaningful Action Gives Satisfaction: Stakeholder Perspectives on Participation in the Management of Marine Recreational Fisheries', *Ocean & Coastal Management* 179 (2019).
[19]Arctic Council, 'Good Practices for Environmental Impact Assessment and Meaningful Engagement in the Arctic' (2019).
[20]Prno, Pickard, and Kaiyogana, 'Effective Community Engagement During the Environmental Assessment of a Mining Project in the Canadian Arctic'.

This workshop session identified that for thorough and fair engagement, the goal should be to maintain ongoing dialogue and consultation with and between Indigenous and local communities, and it was remarked that stakeholder engagement should not be seen as a formal checkbox exercise for key project milestones, but instead as a way to ensure true integration of Indigenous knowledge and concerns, reflecting drivers of change (e.g. increase in shipping traffic, change to resource management).

It should be acknowledged that Indigenous community representation (a marine advocate for a consortium of Indigenous tribes in the Bering Strait region) at the workshop highlighted their views suggesting an overall lack of community support regarding large port development and increased shipping in the Arctic. Also referenced was the lack of community engagement, the lack of community involvement in decision-making and overarching perceived economic benefits by a government. However, other community members may have differing opinions depending on the scale and purpose of a development, the perceived community inclusion within associated planning, the stakeholder engagement/involvement and the overall decision-making.

Key theme: common vs. unique challenges

The Arctic environment is unique, with many ecosystems (e.g. ice flora and fauna, cold water coral reefs) and wildlife (e.g. seven endemic marine mammals) found nowhere else on earth, coupled with the Arctic's remoteness and Indigenous communities, presents a plethora of challenges and opportunities for sustainable developments. In addition, as environmental conditions change and human activity continue to increase in the Arctic marine environment, it becomes more important than ever to have a clear understanding of the abundance and distribution of the many and varied wildlife that are present (permanently or temporarily). This will ensure that the impacts of human activities can be minimised; conservation measures can be deployed and managed to protect the most vulnerable species and habitats; human activities and industrial/economic development occur sustainably; and that Indigenous communities and the way of life are preserved, consulted, and supported now and in the future.

The workshop delegates discussed how this uniqueness increases the vulnerability of the Arctic environment and its communities to the likes of climate change and the potential exploitation of resources associated with the expansion of human activities. These vulnerabilities of Arctic communities, traditional practices and knowledge, the importance and immediacy of such threats; may require increased emphasis when considering more standard approaches to environmental assessment for example.

Key theme: impact assessments and cumulative impacts/effects

Anthropogenic threats and impacts to the Arctic marine environment[21] are increasing in frequency and severity. Environmental impacts of a project or activity can be grouped into three broad categories: i) direct impacts – impacts that are a direct result of a project activity or decision. These are usually predictable based on planned activities/routes and

[21]Randall R. Reeves et al., 'Distribution of Endemic Cetaceans in Relation to Hydrocarbon Development and Commercial Shipping in a Warming Arctic', *Marine Policy* 44 (2014).

knowledge of the marine ecosystem and can to some extent be managed or mitigated for; ii) indirect impacts – impacts that are less predictable as they derive from interactions with multiple factors and stakeholders; and could be described as a 'by-product' of an activity and these tend to have a much larger spatial footprint[22]; and iii) cumulative impacts – impacts that are 'the incremental impact of an action when added to another past, present and reasonably foreseeable action'.[23] Cumulative impacts also include impacts from concurring multiple activities. Some impacts can be considered both direct and indirect, depending on the environmental receptor and stressor, and their temporal and spatial extent.

Environmental Assessment (EA) is a widely used tool in the Arctic to ensure that environmental considerations are included in decision-making when new plans or projects are implemented.[24] The International Association for Impact Assessment's (IAIA) definition of Impact Assessment (IA) is –

> the process of identifying the potential consequences of a current or proposed action, both positive and negative, supporting the design and implementation of plans, programs and projects by informing decision-making processes.[25]

Despite states enjoying sovereign rights to exploit their natural resources according to their national policies, this power is limited by a duty of protection and preservation of the marine environment and other EIA obligations imposed under international law which are relevant for EIAs in the Arctic's marine environment, these include:

- The United Nations Convention on the Law of the Sea (UNCLOS) is the general framework for marine environmental protection and is binding for seven out of eight Arctic Nations (Canada, Greenland, Iceland, Norway, Sweden, Finland and the Russian Federation) and complemented by several other international treaties and soft law instruments.
- The CBD provides that contracting parties have EIAs procedures for proposed projects likely to have adverse effects on biodiversity and to ensure environmental consequences of programmes and policies are also considered[26] under what constitutes an obligation for Strategic Environmental Assessments (SEA).
- The Convention on Migratory Species of Wild Animals (CMS) have a general obligation for the conservation of migratory species and the sustainable use and maintenance of their favourable conservation status.[27] Parties must 'endeavour' to undertake actions for the conservation of migratory species regarded as endangered including the prevention, removal, compensation for, or minimisation of the adverse effects of activities or obstacles impeding migration of species.[28]

[22]Biodiversity Consultancy, 'Indirect Impacts on Biodiversity from Industry, July 2013, the Biodiversity Consultancy Ltd Briefing Note' (2013).
[23]Gerjan J. Piet et al., 'Ecological Risk Assessments to Guide Decision-Making: Methodology Matters', *Environmental Science & Policy* 68 (2017).
[24]Trine Skovgaard Kirkfeldt et al., 'Why Cumulative Impacts Assessments of Hydrocarbon Activities in the Arctic Fail to Meet Their Purpose', *Regional Environmental Change* 17, no. 3 (2017).
[25]IAIA, 'Impact Assessment', https://www.iaia.org/wiki-details.php?ID=4.
[26]CBD Arts 14 (1)(a) and Art 14(1)(b).
[27]Art. I (c)(1) and Art I(1)(f) CMS.
[28]Art III (4) CMS.

The application of these international instruments by states is not free of challenges. None of the frameworks that provide for EIA obligations detail the minimum content of the procedure, which is left for the discretion of each state to perform under its own policies, which is confirmed by the language implemented in the obligations to perform EIAs 'as far as possible' and 'as appropriate'[29]

Furthermore, these international treaties can only provide guidance and standards for Parties to reflect in their national legislation as appropriate. While the CBD decisions are adopted in an inclusive manner, with the meaningful input from a diverse range of stakeholders, the meetings of the Conference of the Parties are not a decision-making fora for licencing of activities such as port development.

The workshop delegates highlighted that impact assessments for Arctic/sub-Arctic ports should go beyond the planning stages. That is, traditional EIAs are usually only conducted before a planned project or activity (such as port construction or expansion) and do little to encompass day-to-day operations (e.g. traffic volumes and waste, etc.) within their immediate vicinity, and should where possible consider all stages of the port's life cycle, including anticipated change (such as the projected increase/decrease in traffic volume and types of vessels). Impact assessments should also be considered within a framework of integrated planning, i.e. land to seascape; should include a more robust framework for social impact assessment and community engagement/inclusion; and a well-defined cumulative impacts/effects assessment.

There are significant challenges with the assessment of cumulative effects and impacts of projects and developments in the Arctic/sub-Arctic, with many assessments being considered inconsistent and ambiguous.[30] Other significant challenges may include: i) the land/sea interface, and how to assess cumulative effects across it; ii) past attempts to make changes to working guidance has likely been too ambitious to be implemented successfully; iii) little consideration of future plans and developments; iv) difficulty in understanding and defining the spatial and temporal envelope of the assessments; v) multiple levels of assessment from strategic (Strategic Environmental Assessment, SEA) to project/development specific (e.g. EIA and Cumulative Impacts Assessments, CIA); vi) Cumulative Effects Assessments (CEA) often only including environmental aspects, and the inclusion of socio-economic effects is frequently lacking or considered separately; vii) the tools to undertake these assessments, and to engage stakeholders in the assessment process are frequently lacking[31] and references therein; viii) when undertaken as part of a statutory process, often focuses either on one pressure type or on one receptor; ix) transboundary cumulative and other impacts/effects in the Arctic is more pronounced due the number of Arctic nations; and x) how to ensure consistency and compatibility across these nations.

There are some key features that should be included in any CEA, such as: i) adopting an ecosystem approach; ii) applying a risk assessment framework; iii) obtaining reference conditions; iv) incorporating environmental, social and economic parameters; v) consider effectiveness of existing management; vii) include best available scientific and engineering evidence and viii) implement a flexible and repeatable framework; ix)

[29]See Article 14(a) CBD.
[30]Kirkfeldt et al., 'Why Cumulative Impacts Assessments of Hydrocarbon Activities in the Arctic Fail to Meet Their Purpose'.
[31]Bridget Durning and Martin Broderick, 'Development of Cumulative Impact Assessment Guidelines for Offshore Wind Farms and Evaluation of Use in Project Making', 37, no. 2 (2019).

using a step-wise approach to conduct a fully quantitative CEA based on the selection and subsequent application of the best information available (see[32]). However, at present, there are limited examples of applying a standard CEA framework on multiple projects and multiple receptors (see[33]).

Cumulative effects/impact assessments for ports would also need to consider the impact and linkage to shipping operations (shipping (travelling from a to b) do not currently require an environmental impact assessment globally, however, some aspects of their on board activities or discharges to air and sea, etc., are regulated[34]); giving rise to challenges about where certain responsibilities may lie (i.e. not only focusing on ports but also the associated shipping activity increase). Improvement and growth of port infrastructure may lead to increased goods/services/accessibility and therefore, potentially facilitating more industrial growth and related threats through associated activities such as mining/fishing/cruise ship docking/overland transportation to/from ports.

The workshop discussions surrounding this topic outlined the need for cumulative effects/impacts of port developments to be considered for both terrestrial and marine threats and therefore highlighted the need for the area of effect to be clearly defined. The Arctic currently lacks a common framework and mandate for considering cumulative impacts (some exist for individual countries/territories, e.g. Canada, US, EU – however, studies suggest that methods vary and cumulative effects are not fully addressed[35]; but none to the authors' knowledge are pan-Arctic).

The Arctic Council's best practice guidelines 2019[36] states 'In general, there is a need for a better assessment of cumulative impacts in EIAs'; acknowledging the need for an overall improvement or proper establishment of an impact assessment framework across the Arctic.

The workshop delegates agreed that there is a recognised need for enhanced cooperation and a coherent, integrated regulatory framework that would allow for the assessment of environmental impacts and cumulative effects across the Arctic/sub-Arctic, regardless of the industry or development type. This would require coordinated efforts by Arctic nations and increased regional cooperation to ideally result in a broader pan-Arctic framework. Perhaps therefore, the Arctic Council could play a stronger role, in both implementation of EIA and CEA guidance, however, a proper mandate would need to be agreed through the negotiations of appropriate international legally binding instruments.

Key theme: climate change

Arctic amplification is a phenomenon where the rate of climate warming is more rapid compared with the average rate of global climate warming. Over the last 30 years, the Arctic has warmed at a rate roughly twice that of other regions.[37] In the marine

[32]Gerjan J. Piet et al., 'A Roadmap Towards Quantitative Cumulative Impact Assessments: Every Step of the Way', *Science of The Total Environment* 784 (2021).
[33]Jemma-Anne Lonsdale et al., 'A Novel Approach for Cumulative Impacts Assessment for Marine Spatial Planning', *Environmental Science & Policy* 106 (2020).
[34]Jana Moldanová et al., 'Framework for the Environmental Impact Assessment of Operational Shipping', *Ambio* 51, no. 3 (2022).
[35]Antoienette Wärnbäck and Tuija Hilding-Rydevik, 'Cumulative Effects in Swedish Eia Practice – Difficulties and Obstacles', *Environmental Impact Assessment Review* 29, no. 2 (2009).
[36]Arctic Council, 'Good Practices for Environmental Impact Assessment and Meaningful Engagement in the Arctic'.
[37]NSIDC, 'Persistently Peculiar, December 2020', http://nsidc.org/arcticseaicenews/.

environment in the Arctic, the concerns include the melting sea ice, warming waters and ocean acidification.

The extent of sea ice in the Arctic has been recorded by the National Snow and Ice Data Center (NSIDC) since 1979, with the lowest extent of winter sea ice being recorded in 2017. The 2020 sea ice extent represented the 11th lowest recorded extent (since 1979) and reached its maximum on 5 March 2020. Entering the northern hemisphere winter in December 2020, sea ice extent remains far below average, dominated by the lack of ice on both the Pacific and Atlantic sides of the Arctic Ocean; the average October 2020 Sea ice extent was the lowest on record and the average November 2020 extent was the second lowest[48]. It is predicted that the Arctic Sea could lose its sea ice cover entirely by 2035.[38]

Given the rate of warming and loss of sea ice in the Arctic, the implications on the marine environment are many. There is evidence of northward expansion of some boreal marine invertebrate species.[39] Fish are also likely to move northward (some species are particularly sensitive to changes in temperature); for example, some fish stocks in the Barents Sea are moving north at up to 160 kilometres per decade due to climate change.[40] Loss of ice habitat for ice dependent (sympagic) flora and fauna (many of which are unique to the Arctic and important food web species). Coastal erosion is also another concern of the changing climate, a particular threat to Arctic Indigenous communities and wildlife that live on the coasts. This erosion is accelerated due to the retreat and loss of land-fast ice; this is of course of particular concern when considering the expansion of coastal developments and infrastructure.

The opening of the Arctic through the loss of sea ice also sees the likely increase in invasive, non-native and opportunistic species (despite IMO ballast Water Management Convention (BWM) that entered into force in September 2017 due to exemptions, challenges and cost of equipment upgrading and hull fouling) – which often out-compete their true Arctic counterparts, change predation rates (as seen by increased presence, both in geographic range and time spent in Arctic waters by killer whales for example) and altering the Arctic ecosystem and biodiversity.

Finally, as highlighted extensively throughout this workshop overview, retreating sea ice brings with it the opportunity for people to expand and diversify their activities and exploitation of the Arctic's marine environment, particularly shipping, extractive industries (oil and gas, aggregate, mining, etc.) and tourism (cruise ships, etc.) and of course the need for associated infrastructure.

The broad challenges of climate change in the Arctic were extensively discussed within the workshop topics, with concerns raised over the known and unknown impacts of climate change on the Arctic and any future port developments. The need for continuing research and for climate-related contingency planning at all stages of a development were also highlighted. Essentially, present day data, forecast modelling and simulations may allow for certain assumptions to be made regarding engineering and environmental decisions, however, the climate may not behave as anticipated therefore new challenges may need to be addressed or reassessed throughout the lifespan of a port development.

[38]Maria-Vittoria Guarino et al., 'Sea-Ice-Free Arctic During the Last Interglacial Supports Fast Future Loss', *Nature Climate Change* 10, no. 10 (2020).
[39]CAFF, 'Arctic Biodiversity Assessment 2013' (2013).
[40]WWF, 'Barent Sea', arcticwwf.org/places/barents/.

Table 1. Further discussion topics raised post workshop.

Topic	Potential Issues for Further Discussion
Marine Spatial Planning (MSP)	Challenges of how MSP is undertaken over multiple regions with different priorities (e.g. economic vs. environmental) and regulations. Regional seascape planning/MSP - with full community/stakeholder engagement (led by communities would be recommended).
Marine Protected Areas (MPAs)	A need to thoroughly understand the impacts of Arctic and sub-Arctic port developments on MPAs, including the spatial extent of the impacts; also the associated impacts of increased vessel traffic; potential impacts to connectivity of MPA networks etc. Protected/conservation areas to be implemented with full consultation with stakeholders and decisions based on a conservation/community need, not in response to or benefit of developments.
Ecosystem services and natural capital	There is relatively poor understanding about ecosystem services, natural capital and value to communities - there is a need to establish better research with communities and stakeholders (also improve methods for incorporating western science methods with traditional knowledge). There is a need to establish the true value of the ecosystem services of marine, coastal and terrestrial areas in areas of potential development to ensure the needs and well-being of local communities are protected. In addition, accounting of biodiversity economics is also required to, for example, weigh up biodiversity value vs. economic value, etc.
Balancing local economy with the global economy	Development of port infrastructure involves major financial investment and risk, and it is likely that funding will come from governments rather than private firms - that said there is a need to evolve how decision making is done to ensure an economic and environmental balance is achieved.
Melting permafrost	There are many risks (e.g. landslides) and uncertainties associated with the melting permafrost on infrastructure stability, especially given the fast-moving pace of climate change in the Arctic and the lifespan of the port infrastructure.
Salvage and wreck removal	Like oil spill response, wreck salvage and removal is costly and difficult, and with the challenging environmental conditions in the Arctic, therefore further consideration needs to be given to how this would be taken into account in the Arctic (both in ports and along shipping routes).

Additional topics identified

The workshop process highlighted several key challenges and the need for further research associated with Arctic and sub-Arctic port development. The need to establish 'best practice' frameworks for the assessment of environmental impacts and stakeholder/community engagement were particularly prominent in discussion.

There are also several topics relevant to the sustainable development of port infrastructure that have been identified through continued discussions with colleagues and experts' post-workshop that were not discussed due to time limitations (or were not identified until workshop output analysis was carried out), these have been compiled in Table 1. It should be noted that this list is not exhaustive and instead reflects the expertise of those consulted in this exercise, therefore highlighting the importance and need for continued discussion with a broader range of stakeholders, to allow these topics (and others) to be incorporated into sustainable port developments.

Concluding remarks

This exercise has highlighted a clear need to proactively consider the potential challenges that will arise from developing port infrastructure, to support Arctic shipping growth (from an environmental impact and community engagement perspective). Participation in workshop activities also made it clear that this is considered a broadly important and emerging

issue, and therefore there is a need to continue discussion, broaden the scope, support collaborative networking, and encourage future work around this topic. One such way to achieve this may be through identifying mechanisms for the co-creation of projects with Arctic Indigenous communities, such as opportunities via the Snowchange Cooperative (http://www.snowchange.org/); the Canada Inuit Nunangat UK Arctic research programme[41]; the University of the Arctic (UArctic) (a cooperative network of universities, colleges, research institutes and other organisations concerned with education and research in and about the North; https://members.uarctic.org/); and IARPC (Interagency Arctic Research Policy Committee) Collaborations (bringing together various Arctic stakeholders to share work and collaborate; https://www.iarpccollaborations.org/index.html). Emphasising the need for such projects to enact real world change, fulfil community needs and actively address emerging issues related to climate change and exploitation of Arctic resources. Ensuring that best practices are established for research programmes, community engagement, Indigenous led studies, data collection and monitoring, prior to the further development of port infrastructure, will help to ensure the industry can evolve sustainably; and encourage collaborative planning and knowledge exchange between governments, researchers, NGOs, industry and importantly local Arctic communities.

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No potential conflict of interest was reported by the authors.

Declaration statement

The authors report there are no competing interests to declare

[41]UKRI, 'Canada Inuit Nunangat Uk Arctic Research Programme', https://www.ukri.org/what-we-offer/browse-our-areas-of-investment-and-support/canada-inuit-nunangat-uk-arctic-research-programme/.

Bibliography

Arctic Council, Good Practices for Environmental Impact Assessment and Meaningful Engagement in the Arctic. *Sustainable Development Working Group (SDWG), Arctic Environmental Impact Assessment (EIA) project*, edited by P.A. Karvinen, and S. Rantakallio. Ministry of the Environment of Finland assisted by the Arctic Centre, University of Lapland, 2019. http://hdl.handle.net/11374/2377 .

Biodiversity Consultancy. "Indirect Impacts on Biodiversity from Industry." *The Biodiversity Consultancy Ltd Briefing Note* (2013). July, 2013. https://www.thebiodiversityconsultancy.com/knowledge-and-resources/indirect-impacts-on-biodiversity-from-industry-68/.

CAFF. "Arctic Biodiversity Assessment. Status and trends in Arctic biodiversity" 2013. Conservation of Arctic Flora and Fauna, Akureyri. https://www.caff.is/assessment-series/233-arctic-biodiversity-assessment-2013.

Crandall, C.A., M. Monroe, J. Dutka-Gianelli, and K. Lorenzen. "Meaningful Action Gives Satisfaction: Stakeholder Perspectives on Participation in the Management of Marine Recreational Fisheries." *Ocean & Coastal Management* 179 (2019): 104872. doi:10.1016/j.ocecoaman.2019.104872.

Dawson, J., N. Carter, N. van Luijk, C. Parker, M. Weber, A. Cook, K. Grey, and J. Provencher. "Infusing Inuit and Local Knowledge into the Low Impact Shipping Corridors: An Adaptation to Increased Shipping Activity and Climate Change in Arctic Canada." *Environmental Science & Policy* 105 (2020): 19–36. doi:10.1016/j.envsci.2019.11.013.

Durning, B., and M. Broderick. "Development of Cumulative Impact Assessment Guidelines for Offshore Wind Farms and Evaluation of Use in Project Making." *Impact Assessment and Project Appraisal* 37, no. 2 (2019): 124–38. doi:10.1080/14615517.2018.1498186.

Eguíluz, V.M., J. Fernández-Gracia, X. Irigoien, and C.M. Duarte. "A Quantitative Assessment of Arctic Shipping in 2010–2014." *Scientific Reports* 6, no. 1(2016), 30682. 2016/08/01, doi:10.1038/srep30682.

Government, UK. "Cop 26: Clydebank Declaration for Green Shipping Corridors." https://www.gov.uk/government/publications/cop-26-clydebank-declaration-for-green-shipping-corridors/cop-26-clydebank-declaration-for-green-shipping-corridors

Guarino, M.V., L.C. Sime, D. Schröeder, I. Malmierca-Vallet, E. Rosenblum, M. Ringer, J. Ridley, et al. "Sea-Ice-Free Arctic During the Last Interglacial Supports Fast Future Loss." *Nature Climate Change* 10, no. 10 (2020): 928–32. doi:10.1038/s41558-020-0865-2.

Gunnarsson, B. "Recent Ship Traffic and Developing Shipping Trends on the Northern Sea Route —Policy Implications for Future Arctic Shipping." *Marine Policy* 124 (2021): 104369. doi:10.1016/j.marpol.2020.104369.

IAIA. "Impact Assessment." https://www.iaia.org/wiki-details.php?ID=4.

Innovation, Mission. "Zero-Emission Shipping – Mission Innovation." mission-innovation.net

Jentoft, S., and R. Chuenpagdee. "Fisheries and Coastal Governance as a Wicked Problem." *Marine Policy* 33, no. 4 (2009): 553–60. doi:10.1016/j.marpol.2008.12.002.

Kaiser, B.A., J. Pahl, and C. Horbel. "Arctic Ports: Local Community Development Issues." In *Arctic Marine Resource Governance and Development*, ed. N. Vestergaard, B.A. Kaiser, L. Fernandez, and J.N. Larsen, 185–217. Cham: Springer International Publishing, 2018.

Kawerak Inc. "Kawerak Comments on Unresolved Issues Re: Port of Nome Feasibility Report" https://kawerak.org/kawerak-comments-on-unresolved-issues-re-port-of-nome-feasibility-report/.

Kirkfeldt, T.S., A. Merrild Hansen, P. Olesen, L. Mortensen, K. Hristova, and A. Welsch. "Why Cumulative Impacts Assessments of Hydrocarbon Activities in the Arctic Fail to Meet Their Purpose." *Regional Environmental Change* 17, no. 3 (2017): 725–37. doi:10.1007/s10113-016-1059-3.

Lam, J.S.L., and T. Notteboom. "The Greening of Ports: A Comparison of Port Management Tools Used by Leading Ports in Asia and Europe." *Transport Reviews* 34, no. 2 (2014): 169–89. doi:10.1080/01441647.2014.891162.

Ling, C., K. Hanna, and A. Dale. "A Template for Integrated Community Sustainability Planning." *Environmental Management* 44, no. 2 (2009): 228–42. doi:10.1007/s00267-009-9315-7.

Lonsdale, J.A., R. Nicholson, A. Judd, M. Elliott, and C. Clarke. "A Novel Approach for Cumulative Impacts Assessment for Marine Spatial Planning." *Environmental Science & Policy* 106 (2020): 125–35. doi:10.1016/j.envsci.2020.01.011.

Moldanová, J., I.M. Hassellöv, V. Matthias, E. Fridell, J.P. Jalkanen, E. Ytreberg, M. Quante, et al. "Framework for the Environmental Impact Assessment of Operational Shipping." *Ambio* 51, no. 3 (2022): 754–69. doi:10.1007/s13280-021-01597-9.

Moon, D.S.H., and J. Kyun Woo. "The Impact of Port Operations on Efficient Ship Operation from Both Economic and Environmental Perspectives." *Maritime Policy & Management* 41, no. 5 (2014): 444–61. doi:10.1080/03088839.2014.931607.

NSIDC. "Persistently Peculiar, December 2020." http://nsidc.org/arcticseaicenews/ .

Olsen, J., K.H. Grete, and B.P. Kaltenborn. "Increasing Shipping in the Arctic and Local Communities' Engagement: A Case from Longyearbyen on Svalbard." In *Arctic Marine Sustainability: Arctic Maritime Businesses and the Resilience of the Marine Environment*, ed. E. Pongrácz, V. Pavlov, and N. Hänninen, 305–31. Cham: Springer International Publishing, 2020.

Pahl, J., and A.K. Brooks. "Arctic Port Development." In *Arctic Marine Resource Governance and Development*, ed. N. Vestergaard, B.A. Kaiser, L. Fernandez, and J.N. Larsen, 139–84. Cham: Springer International Publishing, 2018.

Piet, G.J., A.M. Knights, R.H. Jongbloed, J.E. Tamis, P. de Vries, and L.A. Robinson. "Ecological Risk Assessments to Guide Decision-Making: Methodology Matters." *Environmental Science & Policy* 68 (2017): 1–9. doi:10.1016/j.envsci.2016.11.009.

Piet, G.J., J.E. Tamis, J. Volwater, P. de Vries, J.T. van der Wal, and R.H. Jongbloed. "A Roadmap Towards Quantitative Cumulative Impact Assessments: Every Step of the Way." *Science of the Total Environment* 784 (2021): 146847. doi:10.1016/j.scitotenv.2021.146847.

Prno, J., M. Pickard, and J. Kaiyogana. "Effective Community Engagement During the Environmental Assessment of a Mining Project in the Canadian Arctic." *Environmental Management* 67, no. 5 (2021): 1000–15. doi:10.1007/s00267-021-01426-5.

Reeves, R.R., P.J. Ewins, S. Agbayani, M. Peter Heide-Jørgensen, K.M. Kovacs, C. Lydersen, R. Suydam, et al. "Distribution of Endemic Cetaceans in Relation to Hydrocarbon Development and Commercial Shipping in a Warming Arctic." *Marine Policy* 44 (2014): 375–89. doi:10.1016/j.marpol.2013.10.005.

Roozbeh, P., K.Y. Adolf, N.M. Afenyo, and Y.Y. Lau. "Reflecting on Forty Years Contextual Evolution of Arctic Port Research: The Past and Now." *Transportation Research Part A: Policy and Practice* 144 (2021): 189–203. doi:10.1016/j.tra.2020.12.001.

UKRI. "Canada Inuit Nunangat Uk Arctic Research Programme." https://www.ukri.org/what-we-offer/browse-our-areas-of-investment-and-support/canada-inuit-nunangat-uk-arctic-research-programme/.

van Klink, H.A. "The Port Network as a New Stage in Port Development: The Case of Rotterdam." *Environment and Planning A: Economy and Space* 30, no. 1 (1998): 143–60. doi:10.1068/a300143.

Wärnbäck, A., and T. Hilding-Rydevik. "Cumulative Effects in Swedish Eia Practice — Difficulties and Obstacles." *Environmental Impact Assessment Review* 29, no. 2(2009), 107–15. 02/01/2009, doi:10.1016/j.eiar.2008.05.001.

WWF. "Barent Sea." arcticwwf.org/places/barents/