



HAL
open science

Producing futures for the Arctic: what agency for Indigenous communities in foresight arenas?

Simon Maraud, Samuel Roturier

► To cite this version:

Simon Maraud, Samuel Roturier. Producing futures for the Arctic: what agency for Indigenous communities in foresight arenas?. *Futures*, 2023, 153, pp.103240. 10.1016/j.futures.2023.103240 . hal-04447922

HAL Id: hal-04447922

<https://hal.science/hal-04447922>

Submitted on 8 Feb 2024

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Producing futures for the Arctic: what agency for Indigenous communities in foresight arenas?

Simon Maraud, Samuel Roturier

Université Paris-Saclay, CNRS, AgroParisTech, Ecologie Systématique Evolution, F-91405, Orsay, France

ARTICLE INFO

Keywords:

Foresight
Indigenous
Arctic
Participation
Integration
Indigenous and local knowledge

ABSTRACT

The integration of Indigenous and Local Knowledge (ILK) and the involvement of Indigenous peoples and Local communities (IPLCs) in the making of the futures are strongly encouraged by the implementation of processes such as participatory scenarios. This article critically examines efforts within this area in Arctic regions by analysing how ILK integration occurs and what agency IPLCs have in this process. We identify three different foresight arenas where futures are manufactured, namely: the global reviewing, foresight forums, and local participatory foresight arenas. IPLCs have been integrated; however their agency remains limited. Instead of allowing IPLCs to offer innovative foresight methods, define foresight files specific to Indigenous priorities and concerns, and develop alternative futures, this integration in fact constrains ILK by enforcing a Western paradigm. We also identify two distinct strategies for Indigenous people to promote their own futures and strengthen their influence over the process of making decisions about the Arctic. The first is a battle of the futures where IPLCs compete with other stakeholders within the arenas' existing frameworks to ensure that their interests are adequately addressed. The second involves decolonizing futures by emancipating their production from the frameworks of the arenas and creating new space for ILK paradigms.

1. Introduction

In 2020 the global report on Biodiversity and Ecosystem services published by the International Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) recognized that the visions, perspectives, rights, and knowledge of Indigenous Peoples and Local Communities (IPLCs) were not being adequately considered when developing future scenarios. IPBES has been encouraging foresight researchers examining future trajectories to develop scenarios and models that mobilize and engage Indigenous and local knowledge (ILK) since 2016 (IPBES, 2016). The influence of IPLCs and their knowledge on the governance of their ancestral territories and natural resources has increased since the 1980 s (Johannes, 1989) with the support of the Convention on Biological Diversity and international organizations such as UNESCO and the IUCN, and more recently, the IPCC and IPBES (IPCC, 2020; Lam et al., 2020; McElwee et al., 2020; Nadasdy, 1999). According to the latter, ILK “is formed through IPLCs’ direct dependence on their local ecosystems, and observations and interpretations of change generated and passed down over many generations, and yet adapted and enriched over time” (www.ipbes.net) but also encompasses territorial and resource management systems, social institutions, and beliefs (Berkes, 1999). The value of ILK is also increasingly acknowledged by scientists, enhancing the recognition of ILK holders and their political rights.

The Arctic has gradually become an important area of focus for foresight studies because it faces a number of challenges including global warming, which is likely to affect the Arctic more severely than other regions of the planet (Bintanja, 2018; Spielhagen et al., 2011), leading to significant effects on its ecosystems and populations. The field of foresight studies encompasses a diverse set of methods and goals; it does not strive

* Corresponding author.

E-mail address: simon.maraud@universite-paris-saclay.fr (S. Maraud)

to “[predict] the future but to open a discussion on the diversity of possible futures” (Lumbroso, 2019, p.15). For Flynn et al., (2017, p.50), foresight is a “contextual snapshot” that reveals the makers’ priorities and concerns. It is also a governance tool in which certain views and representations of the world are imposed to facilitate thinking about issues and solutions (Chateauraynaud & Debaz, 2017b). For scientists, foresight has become a major tool for examining the futures of ecological systems in relation to global change and conservation or ecological management measures (Coreau et al., 2009; Oteros-Rozas et al., 2015). The making of futures thus depends on knowledge as well as political visions, worldviews and epistemologies. Accordingly, Lumbroso (2019, p.95–96) defines the manufacture of futures as: “the set of practices that produce promises about the future and the material forms in which these promises are embodied; the networks associated with these practices and with the circulation of the promises, and the power relationships between them; and the dynamics of competition between rival promises, which lead to the predominance of some promises in shared representations of the future and to the exclusion of alternatives”.

Integrating ILK into the making of futures via processes such as participatory scenario making could improve the quality of future scenarios by incorporating knowledge of the environment accumulated over centuries while also empowering IPLCs by maximizing the visibility of their interests. However, this irenic vision of integrating ILK with science has been questioned since the 1990 s by multiple authors working in the fields of development (Agrawal, 1995) and natural resource management (Nadasdy, 1999). We hypothesize that the integration of ILK in foresight research and IPLCs’ engagement in the development of future scenarios are limited by the same factors. Our overall objective is therefore to understand how ILK integration occurs in the manufacture of futures and what agency IPLCs have in this process. More specifically this essay aims to: (i) characterize the place of IPLCs in the arenas where Arctic foresight is debated and crafted; (ii) analyse current perspectives and pathways for including ILK in foresight studies; and (iii) invite stakeholders in futures-making processes to position themselves with respect to the real expectations of integrating ILK and/or IPLCs into the making of one or several Arctic futures.

To this end, we postulate that there are three different foresight arenas in which futures are manufactured; the first part of this essay describes these arenas. We then review the critical literature on the integration of ILK with nature conservation to give the reader an overview of the constraints, limitations, and issues associated with integrating ILK into science and natural resource management. Third, we describe how IPLCs and their representatives are integrated into the manufacture of futures in each foresight arena. Finally, based on our analysis, we identify two distinct strategies by which Indigenous communities could participate in futures-making: the battle of the futures and the decolonization of futures.

2. Three foresight arenas for futures-making in the Arctic

We postulate there are three main arenas in which futures for the Arctic are made: the global reviewing foresight arena, the foresight forums arena, and the local participatory foresight arena (Fig. 1). Each has its own goals and approaches and may not involve the same groups of stakeholders. Multiple strategies could be

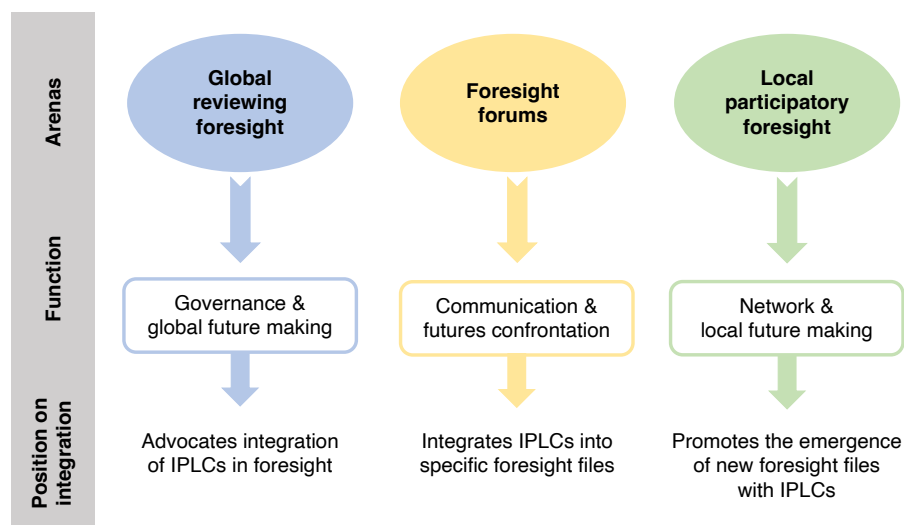


Fig. 1. Three foresight arenas for futures-making and the place of IPLCs.

Table 1

International forums examined to characterize the foresight forums arena. The information on the Arctic frontiers 2020 and EU Industry Week 2021 events was insufficient to estimate the proportion of representatives of Indigenous organizations in the programmes or not available (NA).

N°	Forum	Year	Place	Presentations given by representatives (as a % of the total number)	IPLCs' Duration in days
1	Arctic circle	2015	Reykjavic, Iceland	6	3
2	11 th ministerial meeting of the Arctic Council	2019	Rovaniemi, Finland	42	2
3	Arctic circle	2019	Reykjavik, Iceland	11	4
4	Arctic frontiers	2020	Tromsø, Norway	NA	5
5	Polar Week (Polar institute, Wilson Center)	2020	Virtual (COVID-19)	4	5
6	Science and Geopolitics of Himalaya-Arctic-Antarctic (SaGHAA)	2020	Virtual (COVID-19)	0	2
7	Arctic future symposium	2020	Virtual (COVID-19)	10	3
8	EU Industry week	2021	Virtual (COVID-19)	NA	4
9	Rovaniemi Arctic Spirit	2021	Rovaniemi, Finland	15	3

used to integrate IPLCs and create a dialogue between Western and Indigenous knowledge systems and values, each of which could lead to differing levels of Indigenous participation and empowerment. The global reviewing foresight arena includes national, supranational and international governing bodies that collaborate in the making, reviewing and use of scenarios and models to implement guidelines and policies that are expected to favour the adaption of human societies and their environment to future issues. The foresight forums arena is where scenarios and models are displayed and debated within a group of stakeholders with access to the arena. Finally, the local participatory foresight arena is where scenarios and models are produced in collaboration with diverse local stakeholders, including Indigenous ones, to define issues and anticipate future challenges at the local scale. These arenas are naturally connected with each other and there are opportunities for groups or individuals to circulate between them and for knowledge transfer. Some stakeholders are active in all arenas and some are initially active in only one or two but may gain access to others over time.

To understand and analyse how Arctic futures are produced and discussed with IPLCs in each arena, we examined a wide range of material. We paid particular attention to the definition of the foresight files, i.e. the objects that concentrate the dynamic of the discussions to create the expectations on which the production of futures is based (Lumbroso, 2019; Treyer, 2006). For the global reviewing foresight arena, we chose five reports produced by inter- and supranational bodies that focus on foresight and/or Arctic futures. Two of them concern global environmental issues including biodiversity conservation (IPBES, 2019a, 2016) and climate change (IPCC, 2020), while the other two are strategic plans for the Arctic region produced by the European Union (EU) (European Commission, 2021) and the Arctic Council (Arctic Council, 2021). We analysed the main issues raised in the different assessments and recommendations as well as the place given to IPLCs in each case.

For the foresight forums arena, we selected nine international conferences (Table 1) that took place between October 2015 and November 2021. Most of them focused exclusively on Arctic regions, but two – SaGHAA 2020 and the EU industry week 2021 – had a broader focus, so only specific relevant panels from these conferences were considered. These conferences were chosen because they had an international audience, were conducted in English, and were filmed. This enabled us to perform a systematic analysis of past conferences and those held during the COVID-19 pandemic. As academics, we have considerable experience in this arena and have attended many conferences over the last decade. However, we included only one conference that we attended physically in our selection (Table 1). The numbers of presentations at the conferences varied widely,

from 19 to 889. We analysed their programmes to identify the attending stakeholders and organisations as well as their roles at these meetings to understand who had opportunities to expose visions, strategies, scenarios, or models. The foresight files were identified by analysing the subjects of the thematic sessions and round tables.

Finally, for the local participatory foresight arena, we chose four recently published case studies in which workshops were organized by researchers to (co-)produce scenarios together with Indigenous communities. The four case studies collectively cover the entire circumpolar North: one focuses on northern Sweden (Nilsson et al., 2015), one on the Canadian Arctic (Falardeau, pp. - et al., 2019), and two on the Russian Arctic (Petrov et al., 2021; Stephen et al., 2019). It was important that the methodologies and workshop designs of the case studies were thoroughly described to enable identification of the foresight files (i.e., the main objects discussed during the workshops) and to facilitate detailed analysis of the IPLCs' levels of participation.

3. Integration of ILK and IPLCs in nature conservation: an old debate

The process of integrating ILK and IPLCs in nature conservation has been debated since the 1990 s and has generated an important critical literature. Since the 1980 s, conservation has involved many Indigenous peoples across the North as a way to increase their influence on management and increase the efficiency of nature conservation (Notzke, 1995). This process has been analysed in depth in social sciences to decipher possible biases and power relations, so this review will provide valuable guidance on what is currently known about dynamics that exist today in each foresight arenas.

There has been a genuine international strategic shift in recent decades that has emphasized the recognition and legitimacy of Indigenous and local knowledge, promoting its consideration and the inclusion of new stakeholders in management processes to represent visions other than that of Western sciences (Berkes, 1999; Figgis, 2003). This has raised hopes for the emergence of innovative governance patterns that could be emancipatory for IPLCs, especially at the international scale (Brockington et al., 2008; Figgis, 2003).

Despite a global Indigenous will for democratic decentralization, the integration of IPLCs in nature conservation has historically only seemed possible insofar as it does not challenge the structure of the dominant science-based model (Figgis, 2003). Despite sincere efforts, the integration of Indigenous representatives in the management of natural resources of their land has ultimately led to institutionalization, an exclusion of political and ethical considerations of the integration process, a bureaucratization of indigenous communities, and the extension of state power without creating any viable alternatives (Nadasdy, 2005). Several authors have presented explanations for this trajectory and tried to clarify how new types of knowledge can be integrated into professional scientific management. Although ILK is assumed to be qualitative, experience based, holistic and oral (in contrast to science, which is seen as quantitative, analytical and literate) ILK has often been treated as an additional "set of data" to complement or be fitted into an existing management regime without necessitating any change of paradigm (Agrawal, 1995; Nadasdy, 1999). In addition, the integration of IPLCs has been structured by power hierarchies that favour processes of compromise, negotiation, and compensation in which it is generally incumbent on Indigenous representatives to make themselves understood by managers and state authorities rather than the opposite (Büscher et al., 2012; Brockington et al., 2008; Sandoval, 2000). The integration of IPLCs into Western management models based on specialized bureaucracies has also led to a compartmentalization of knowledge and worldviews, and by extension, governance (Nadasdy, 1999). Moreover, integrating such bureaucracies has commonly been interpreted to mean integrating various specialist offices that each address one particular aspect of the environment rather than understanding the environment as a whole. Finally, participating in nature conservation has entailed joining discussions that are usually organized by scientists and natural resources managers who define the relevant issues and mediate dialogue in offices and conference centres. Consequently, ILK integration has often failed to disrupt colonial patterns and give IPLCs true agency in nature conservation (Büscher et al., 2012; Muller, 2003).

The integration of ILK in nature conservation and its many links with other fields of natural resources management appears to be closely connected to the coloniality of the institutions currently in charge of these issues. By acknowledging and analysing the power relations embedded into integration mechanisms, many authors have found that Indigenous participation has produced few real benefits. Some have even argued that participation is currently not about creating alternatives but legitimizing decisions from the power centre (Nadasdy, 2005). What seems quite clear is that there cannot be one single form of integration that fits all Indigenous and local contexts and stakeholders.

This short review of ILK integration with science in nature conservation and management provides a framework for examining how IPLCs and their representatives are integrated in each foresight arena

4. The integration of ILK in the futures-making

4.1. The global reviewing foresight arena

The global reviewing arena is where foresights made at the global or regional level are assessed and reviewed. It draws on the output of organisations operating at multiple levels (national, supranational, and international) with the objective of influencing, supporting, or implementing new guidelines and policies for the future. The material we studied originates from four organizations that focus closely on the Arctic. The main foresight files discussed in this arena were: sustainable development, geopolitics, natural resource use and business development, climate change mitigation and adaptation, and biodiversity conservation (Arctic Council, 2021; European Commission, 2021; IPCC, 2020; IPBES, 2019b, 2016). Each organisation's reports promoted priority files relevant to its own agenda (e.g. biodiversity conservation for IPBES or geopolitics for EU). However, climate change mitigation and adaptation was identified as a foresight file in all reports.

All four organisations highlight the importance of taking ILK into account and including IPLCs in the production of the Arctic future in all of their foresight files. They mainly refer to using ILK when assessing current changes (climate change, land encroachment, landscape change, technology, etc.) and emphasize a desire for Indigenous stakeholders to participate in and benefit from the implementation of new solutions in areas such as land-use planning, sustainable development, biodiversity conservation, and food security (European Commission, 2021; Hurlbert et al., 2019; IPBES, 2019a). Indigenous representatives are now an integral part of the various bodies that discuss the future of the Arctic in this arena, all of which address Indigenous issues in their policies and guidelines.

IPBES has become a major actor in this arena and a strong advocate for the integration of IPLCs in developing future scenarios. According to IPBES, it is critical that IPLCs collaborate and participate with “other relevant stakeholders, policymakers and scientists to generate novel ways of conceptualizing and achieving transformative change towards sustainability” (IPBES, 2019b, p.44). This collaboration is expected to involve implementing a dialog between different knowledge systems “on topics relevant to IPBES” (IPBES, 2016). IPBES has identified several key knowledge gaps relating to the participation of IPLCs within the arena, in areas including the integration of ILK and participation of IPLCs in environmental governance, the heterogeneity of IPLCs' visions and IPLCs themselves, and methodologies for including ILK in scenarios and models. IPBES also clearly states that work in this arena should be for, by and in collaboration with IPLCs.

The material from the IPCC and the European Commission does not address the development of future scenarios as directly as that from the IPBES. However, it does deal with future issues through climate and landscape change assessments and plans for adaptation, mitigation, and development. Both organisations actively advocate the integration and participation of IPLCs and the mobilization of ILK (IPCC, 2020; Hurlbert et al., 2019). For the IPCC, the involvement of IPLCs as the communities most vulnerable to climate change increases the likelihood of maximising co-benefits in governance (IPCC, 2020). Meanwhile, the European Union's new Arctic policy is presented as being designed to improve the living conditions of Arctic inhabitants by including young people, women, and Indigenous peoples in Arctic decision-making on topics such as innovation and research, job creation, digital skills, and education (European Commission, 2021). The new Integrated European Arctic Policy for the Arctic is structured around three main axes: international cooperation and security, climate change, and sustainable development, all of which are supposed to include Arctic inhabitants (European Commission, College meeting, April 2016).

The Arctic Council is slightly different as it assumes an important place for the Arctic's Indigenous peoples in the different governance bodies. It does not produce scenarios per se but strongly advocates for the participation of IPLCs in various expert groups to address Arctic challenges and future issues. The Arctic Council's Strategic Plan for 2021–2030 includes guidelines for including more Indigenous perspectives on climate change, ecosystems management, the marine environment, and social and economic development and knowledge, including the co-production of knowledge based on different knowledge systems to increase the relevance of decision-making (Arctic Council, 2021).

The studied material indicates that the general idea of integration is being advanced within the global foresight arena but many challenges remain. All four organisations acknowledge the importance of using ILK

to meet the organisations' needs and achieve their goals. For them, ILK and IPLCs' participation offers many advantages when producing promises about the future.

However they are also caught in numerous contradictions. All four organisations address regional or global (e.g. climate change) issues but acknowledge that ILK and IPLCs' participation are diverse and locally relevant. All also highlight ILK and IPLCs' participation in developing global solutions but admit that this participation and the resulting solutions should have local benefits. Finally, even though this arena lacks assessment of the real impacts or transformative consequences of integrating IPLCs, all four organisations promote their approach as being successful and increasing the quality of their decision-making processes.

4.2. The foresight forum arena

The foresight forums arena consists of forums where groups of stakeholders gather, discuss, confront, and debate visions, strategies, scenarios, or models. There are many conferences and symposiums on the Arctic across the northern hemisphere focusing on different fields with national or international audiences. The participants of the nine forums we reviewed and assisted were academics (mostly from European and North American universities), policy makers (mostly at national and supranational levels), private sector actors (linked to development activities), and Indigenous organizations' representatives.

In these forums, the different stakeholders meet to clarify issues and convince other members or reach compromises in order to implement a specific strategy. Inviting Indigenous participants to the conferences helps to diversify the visions and strategies for current and future issues relating to the Arctic. This arena is thus supposed to offer opportunities to listen, and be listened to, in discussions about the stakeholders' visions, concerns, needs and perspectives. This arena also features conversations, debates, and confrontations relating to the differing expertise of academics, policy makers, private stakeholders, and IPLCs as participants seek to combine different types of knowledge and visions on an issue. Each stakeholder also generally believes that the arena should focus on his/her specific vision, strategy, scenario, or model, and tries to convince the other stakeholders of this.

Table 1 shows the effective participation of Indigenous organizations' representatives in this arena based on the proportion of presentations delivered by such representatives at each conference. In general, indigenous representatives deliver fewer presentations than stakeholders from other categories (academics, policy makers, and private sector actors) and their involvement varies widely. The participation of representatives of Indigenous organizations at the 11th ministerial meeting of the Arctic Council was very high (42%), which is quite unusual in this arena but can be understood given the prominent place of IPLCs in the Arctic Council. Conversely one conference had no Indigenous representatives in its programme (SaGHAA, 2020). Representatives of Indigenous organizations did participate in all of the other conferences, in accordance with the integration of IPLCs advocated within the global reviewing foresight arena, albeit in rather low numbers (between 0% and 15%, Table 1). Interestingly, the participation rate of Indigenous representatives increased between the two Arctic Circle conferences (2015 and 2019), reflecting the general trend of inviting more Indigenous peoples to participate in this arena. In addition, while the inclusion of IPLCs in the foresight forum arena is clearly increasing, only a few Indigenous organizations attend regularly, with the most active being the Inuit Circumpolar Council, the International Centre for Reindeer Husbandry, Sami parliaments and the Sami Council. Some even gave multiple talks at the same conference – for instance, the president of the Finish Sami parliament intervened three times during the Rovaniemi Arctic Spirit 2021 conference. This is suggestive of a hierarchy of perceived legitimacy among Indigenous organizations.

The main foresight files that were discussed at the nine conferences were climate change, economic development, social development, geopolitics (security and cooperation), local governance, and Indigenous worlds, each having different apparent degrees of importance. The representation of Indigenous speakers seemed to vary by topic; they were over-represented in sessions dedicated to Indigenous worlds and totally absent in sessions about geopolitics. We also noticed that panels chaired by representatives of Indigenous organizations were extremely rare. This means that there were few sessions with topics that were chosen by Indigenous organizations and where they controlled, organized, and coordinated discussions. As in the global reviewing foresight arena, Indigenous organizations were definitely involved in this arena but largely as guests rather than hosts. Despite being highlighted during the cultural and social events of these forums, they were clearly still marginal stakeholders that were only able to discuss conference topics in foreign languages, in conference rooms within cities, using very precise technicalities and modalities that require specific skills to fit with the arena's operations.

4.3. The local participatory foresight arena

The local participatory foresight arena is the third arena we identified as being important in participatory scenario-making involving IPLCs. Acknowledging the lack of diversity in scenario-construction and the frequent use of top-down approaches, we investigated a variety of views and issues to obtain a comprehensive picture of how people inhabiting Arctic regions are included in the construction of possible futures (Nilsson et al., 2021). This arena is mainly lead by researchers who organize workshops to develop scenarios and co-produce models with diverse stakeholders, including IPLCs. A diversity of views and issues is thus strongly emphasized.

Table 2.
Participation of IPLCs in the workshops chosen as case studies

	Study 1	Study 2	Study 3	Study 4
Title	The Russian Arctic by 2050: Developing Integrated Scenarios (Petrov et al., 2021)	A novel approach for co-producing positive scenarios that explore agency: case study from the Canadian Arctic (Falardeau et al., 2019)	Uncertain futures: The changing Global Context of the European Arctic. Report of a scenario-building workshop in Pajala, Sweden (Nilsson et al., 2015)	Blue Action. Environment scanning workshop and report 2 (Stephen et al., 2019)
Basis for selecting participants	Profession	Profession, possession of ILK	Profession	Profession, scale of actions
Objectives	To identify key driving forces of the future of the Arctic zone up to 2050	a) To develop positive scenarios to determine concrete human agency; b) to co-identify drivers of change	To identify drivers of change	a) To promote cooperation between stakeholders; b) to adapt to impact of climate change and uncertain development; c) to create new economic opportunities
Coproduction of objectives	No	No	Yes	No
Imposed foresight files	Economic development; Arctic shipping; Indigenous people's livelihoods; climate change	No	Climate change; Sustainable development; Security; Arctic cooperation	Climate change; economic development; energy resources; Arctic geopolitics; policies
Co-produced foresight files	NA	Governance; economic development; climate change	No	No
Combination of quantitative and qualitative data	Yes	No	Yes	Yes
Reflexivity on methods	Yes	Yes	Yes	Yes

The authors of the four workshops chosen as case studies focused on local perceptions of what is relevant according to the participants. We examined how the participants and their knowledge were mobilized in the workshops and the possible biases of the process (Table 2). All of the participants of the four workshops were selected based on their professions, except for in study 2, where Inuit elders were included because of their knowledge. The common objective of the workshops was to identify drivers of future change. For Falardeau et al. (2019), this helped to determine the agency of Indigenous stakeholders, while Stephen et al. (2019)

argued that it favoured local adaptation and economic opportunities. With the exception of study 2, all of the workshops imposed foresight files focusing on two issues as dominant concerns for the future (Table 2): development and climate change. For instance, the objective of the workshop conducted by Petrov et al., (2021, p.307) was Russian-Norwegian “bilateral cooperation in developing the Barents Sea petroleum resources”. In this case, the futures had to be considered in terms of the development of a fossil resource industry, which heavily framed the scenario, even with IPLCs. Conversely, Falardeau, pp. -, p.3) et al. (2019) implemented a more open method where the participants had to imagine positive futures to “foster a sense of agency, innovative thinking” to create transformative initiatives. Interestingly, however, this more open method of coproduction produced foresight files very similar to those from the other three cases. It is notable that in all four studies, participants were required to discuss futures based on an academic diagnosis of the context. However, all four teams of authors were very conscious of the limitations and gaps in their methodologies as well as their tendency to reproduce power relations existing outside the arena relating to (among other things) gender and racial issues as well as differences in social, economic, symbolic and cultural capital.

The local participatory foresight arena is the most inclusive arena for IPLCs due to the wide use of participatory scenario-making in research projects. This arena actually creates a space for dialogue between different stakeholders (IPLCs, extractive businesses, policy makers, etc.), hopefully with a long-term perspective. Such opportunities are quite rare for Indigenous peoples, who generally have limited agency in the making of the futures of their own regions (Falardeau et al., 2019; pp. -; Nilsson et al., 2017; Petrov et al., 2021). By combining quantitative and qualitative approaches, participatory scenarios engage IPLCs with the analysis of changes, developments, and visions for the environmental, political, and economic spheres in the Arctic. This process can highlight unexpected concerns that may become key drivers or uncertainties in a model that would not otherwise be recognized (Nilsson et al., 2021, 2017). Participatory scenario development involves including heterogeneous participants and allowing them to develop their own future visions to generate diverse inclusive scenarios (Falardeau et al., 2019; pp. -; Petrov et al., 2021). This arena thus generates comparatively concrete and context-dependent interpretations of Arctic issues and solutions (Nilsson et al., 2017).

However, like the two other arenas, the local participatory foresight arena is structured by several biases and power relations that inevitably influence the production of knowledge and scenarios. All of the participatory scenarios concerning Arctic futures from the workshops were created under a specific vision that defined what issues would be discussed; most of the chosen issues were related to the economy. However, the organizers of the workshops were very aware of the limitations of their methods and receptive to reflexivity (Table 2). This was actually the only arena where such issues were truly integrated into the process in an effort to identify innovative methods for altering or eliminating power relations and developing a more transformative approach to futures-making (Zurba et al., 2021; Chateauraynaud & Debaz, 2017a; Inayatullah, 2013; Nuttall, 2012). Despite this reflexivity, the discussions that happened in the arena were still held within a Western paradigm and infused with political goals that extend beyond the local participants’ realities.

Although the scientists of the third arena made breakthroughs in integrating new systems of knowledge into their projects, there are still structural boundaries that support the colonial backdrop (Zurba et al., 2021). It is thus very difficult to assess to what extent ILK are truly integrated and what kind of alternative futures could emerge as a result (Flynn et al., 2017). Oteros-Rozas et al. (2015) argued that the main limit of participatory scenario planning was the evaluation of its genuine impact. There is thus a need to study the long-term use of such approaches and their impact to clarify the agency and empowerment it gives to IPLCs (Bourgeois et al., 2017; Falardeau et al., 2019; pp. -; Nilsson et al., 2017). In addition, analysis of scenarios is not sufficient by itself because they are subject to interpretation and it is important to consider who will be interpreting them (Nilsson et al., 2017; Raymond et al., 2010). This brings us to the question of who really benefits from participatory scenario-making: the participants or the researchers? The authorship of these studies is usually restricted to researchers and knowledge production is mostly rewarded in the academic world (Nilsson et al., 2017). This probably explains the hegemonic position of Western sciences in the development of the workshop discussions and their influence on the results. Researchers are the most influential stakeholders of the local participatory foresight arena because they control the validity of the (co)produced knowledge and are the ones that benefit most from it.

5. The limited agency of Indigenous communities in the futures-making

5.1. Foresight arenas: a structural frame for the battle of the futures

Our analysis of the different arenas where the manufacture of Arctic futures takes place revealed that IPLCs are now integrated as legitimate stakeholders in all three foresight arenas. However this does not mean that there are Indigenous political agendas. Indeed, the integration of ILK in the foresight arenas is subject to the same pitfalls identified in previous studies on ILK integration in nature conservation, including compartmentalization, institutionalization, bureaucratization and westernization of ILK systems (Nadasdy, 2005).

The manufacture of futures in each arena is based on a dominant Western paradigm that heavily limits the ability of IPLCs and their representatives to transform ways of thinking about futures in terms of priorities, temporal and spatial scales, purposes and associated ideologies or ontologies (Adamson et al., 2018; Elwood et al., 2019). Priorities for the Arctic's future are defined in all arenas by a number of ubiquitous foresight files: international cooperation and geopolitics, economy and development, environment and climate change (European Commission, 2016; European Commission, 2021; Falardeau et al., 2019; pp. -; IPBES, 2019a; Nilsson et al., 2015; Petrov et al., 2021; Sami Council, 2019; Stephen et al., 2019). These foresight files impose a global perspective on the functioning of the Arctic and anticipate a supposed objective and universal future. It is possible that integrating ILK in the three arenas would provide better ways of understanding and addressing these global issues, but this alone is not sufficient to represent the plurality and diversity of Indigenous priorities and concerns because of the inevitable genericization of ILK within the integration framework (Avenier, 2008; Zurba et al., 2021). All three arenas that we studied, including the local participatory foresight arena, were very technocratic and business-centered. Therefore, ILK could only be integrated by forcing it to fit into a pre-existing frame rooted in the development model (Agrawal, 1995). The process also requires IPLCs to adopt foreign languages, means of communication, and rhetoric, which in turn requires them to choose representatives who possess such skills and excludes potentially very knowledgeable individuals whose silent know-how or ways of being never reach the arenas (Nadasdy, 1999). Ultimately, the methods, goals and outputs produced in the foresight arenas were developed to assist policy making and governance issues. Consequently, they impose a frame on the promises about the futures, forcing them to fit existing models of governance and limiting their impact; at most, they can influence policies and their ultimate impacts on decisions and policy making are uncertain (IPBES, 2016; Nilsson et al., 2017).

There are some interesting differences in the way that the environment and climate change foresight file is mobilized in the three arenas and in general when discussing future directions (Falardeau et al., 2019; pp. -; Flynn et al., 2017; Nilsson et al., 2017). In the global reviewing foresight arena and the foresight forums arena, it is the foresight file where the integration of IPLCs and ILK is most heavily emphasized and they are most frequently included in discussions about issues and solutions. Conversely, in the local participatory foresight arena it is the area where Indigenous peoples feel they have the least influence. Climate change was discussed in all four workshops examined within this arena but it was mainly treated as a contextual phenomenon beyond the participants' control (Falardeau et al., 2019; pp. -; Nilsson et al., 2015; Petrov et al., 2021; Stephen et al., 2019). Therefore, one file where the integration of IPLCs and ILK was seen as being crucial in two arenas was actually something over which they felt completely powerless and almost completely lacking in agency. This can be attributed to the fact that climate change is seen as an elusive and global phenomenon that causes Indigenous people to suffer without being able to address the underlying inequality, vulnerability, and power relations (Nuttall, 2012). There is a global tendency to address climate change as an apolitical object (Comby, 2017) even though it has significant global political implications. It has become the one enemy to fight for the Arctic, concealing and naturalizing ongoing violence to ecosystems and people resulting from concrete policies and activities that harm the environment. Climate change is omnipresent in discussions about Arctic futures and influences the way the Arctic is perceived as an area of collapsing territories and passive populations embedded in a fatalistic narrative. As a result, the Arctic story has become one of a region at the edge of the tipping point (Nuttall, 2012) that is symbolic of the World's vulnerability to climate change. It is thus seen as a space where climate change defines the future. The focus on climate change as a global threat leads to neglect of the diversity of Arctic territories that each have their own specificities and dynamics, making their individual futures even more obscure and uncertain. Uncertainty can lead to inaction and paralysis instead of decisiveness and performative actions (Ney & Thompson, 2000; Peterson et al., 2003). By not naming the activities responsible for climate change in the Arctic (and instead referring only to the consequences of these activities as climate change), the debate is made more nebulous, reducing participants' ability to take transformative decisions and thereby reducing Indigenous agency. However, our analysis of the three arenas also showed that climate change is a driver that federates all stakeholders who want to fight this one common

enemy. New partnerships have emerged between states, private companies, NGOs and IPLCs to create new possibilities “to get greener”. However, for Indigenous peoples whose livelihoods depend strongly on their environment, such partnerships also ironically reinforce Indigenous invisibility (Sium et al., 2012).

By describing the integration of IPLCs as legitimate stakeholders in the foresight arenas, our study also highlights their status as a new competitive partner in the manufacture of futures. It is vital for IPLCs to participate in this battle of the futures, which arises because “the questions of the future do not only appear as verbal or adverbial formulas, but also as the expression of visions of the world carried by groups of stakeholders determined to produce, or to counteract, a future turning into a reality” (Chateauraynaud & Debaz, 2017a, p.154). The battle of the futures suggests a need to align alternative representations of the future with the framework of the dominant vision: it is “a matter of producing discourses on the future that anchor [...] widely shared visions of the future” (Lumbroso, 2019, p.110). In the Arctic, this process occurs in the different foresight arenas, is structured by major foresight files, and is driven by organisations with strong power relationships that compel IPLCs seeking to shine a spotlight on their own interests and values to do so within a Western framing of the future. Our study showed that the three arenas only allow the participation of the IPLCs in the battle of the futures. This is presented as the best way of maximizing the visibility of their interests within the arenas to create alternative futures, even if it is done through Western institutions. The battle of the futures encompasses various methods that are specific to the three arenas (ranging from top-down to participatory approaches) and give IPLCs differing degrees of agency. Entering into the battle of the futures may be beneficial for IPLCs if it allows them to make their own choices. It is also the most common way for IPLCs to influence the creation of the Arctic futures because it allows them to be visible and to force organizations to consider their interests in relevant arenas. The Sámi Arctic Strategy published by the Sámi Council (2019), which bore the title Securing enduring influence for the Sámi people in the Arctic through partnerships, education and advocacy, is an obvious example of this strategy. However participation does not automatically mean empowerment and a representation of heterogeneity and could in reality be a continuation of historical and colonial ways of governing (Nadasdy, 2005, 2002, 1999). It is therefore vital to understand that futures are structured by asymmetrical power relationships within the different futures-making arenas (Berkhout, 2006; Lumbroso, 2019). The nature of these patterns is such that although governments, companies and researchers all argue for the integration of ILK and IPLCs in the process of developing solutions, this process always occurs within the framework of existing arenas and their modes of operation. As a result, Indigenous representatives are obliged to adapt their own futures to the structures within which they are integrated, although they sometimes try to fight this. The arenas are gradually adopting a more and more inclusive stance, which represents a promising step forwards, but they have many inherent biases that prevent Indigenous agency from actively creating new paths for the Arctic regions.

5.2. Decolonizing the futures?

In 1993, Sardar (1993) stated that the future had become the new space to colonize. Just as history writes the past in the light of the present, foresight makes promises about and builds futures that are embedded in the present context and thus incorporate existing power relationships between the participating stakeholders.

Our results have shown colonial structures that influence how Arctic futures are thought about and debated. In all three foresight arenas that we identified, IPLCs have only limited agency in the manufacture of futures; they actively participate in the battle of the futures but generally do not spearhead the definition of foresight files or propose specific methodologies. The main foresight files discussed in the three arenas depict the Arctic a space full of geopolitical, environmental and economic challenges but place much less emphasis on its role as a homeland. The dialectic description of the Arctic as being vulnerable to global changes but also full of opportunities for development gives an overly simplistic picture of the realities facing IPLCs and their history of diverse adaptive responses to various transformations (Bates, 2007; Elwood et al., 2019; Hastrup, 2009; Huntington et al., 2019 Tyler et al., 2007). Decolonizing the futures would entail modifying these representations by acknowledging their political impact and also becoming conscious of the influence of colonial patterns on the processes, methods, and results of foresight.

The decolonization of futures should be understood in terms of the creation of new methods that allow the future to be questioned using various approaches that may be ontological, epistemological, political, spiritual, philosophical, economic, or empirical, among other things. Since “methods are not passive strategies” (Fine et al., 2003, p.187), it is important that the chosen methods can open up diverse perspectives on the futures, which is essential for the emergence of new foresight files (Chateauraynaud & Debaz, 2017b) that reflect the

complexity and plurality of heterogeneous Arctic IPLCs (Cunsolo Willox et al., 2012; Vasquez-Fernandez & Ahenakew pii tai poo taa, 2020).

A critical step of the foresight methodology has been identified by Lumbroso (2019) relating to the capability of reconnection to the actual situations after imagining an alternative future. This is needed because projection onto a future necessarily entails disconnecting from the current reality; reconnection is the key idea to validate the process of futures-making because it determines the legitimacy accorded to a future (Chateauraynaud & Debaz, 2017a; Delay, 2020; Lumbroso, 2019). At present, this legitimacy depends largely on the current stakeholder hierarchies and their influence on what is considered applicable. In a colonial context, reconnection is a way of imposing strict boundaries on how the futures should or can be seen. Within such a paradigm, the decolonization of the futures could be regarded as taking a step away from reality. However, we argue that this is exactly the point: to disconnect from colonial realities in order to create new futures. While becoming too disconnected could be seen as a weakness, it might in actuality be a force for positive change because of its potential to expand perspectives and create space for non-colonized futures. As a result, it could promote community empowerment by increasing the agency of IPLCs (Bourgeois et al., 2017).

The decolonization of futures must be understood here as a plural process specific to the various contexts in which it occurs and not as a universal condition: there cannot be one definition of the decolonization of the futures (Battiste & Henderson, 2000; Sium et al., 2012). It is therefore crucial to make explicit and systematic the positionality of a process and to clearly explain where, when, and how certain results were obtained and for whose benefit (Browne et al., 2009). Futures produced using the methodologies and techniques of the three arenas are almost exclusively created and documented in written form. This sidelines oral knowledge, know-how, cultural references, and narratives that are embedded in ILK and thus excludes a large proportion of the Indigenous audience. In the battle of the futures, Indigenous stakeholders are not placed at the origin of the futures-making process or treated solely as its recipients.

Some ideas that have been debated in other fields (Büscher et al., 2012; Colchester, 1994; Coulthard, 2014; Fedreheim & Blanco, 2017; Figgis, 2003; Igoe, 2003; Nadasdy, 2005, 1999; Stein et al., 2020; Tanner, 2001) may be applicable in this context. In particular, it might be desirable to (i) understand the role of colonization as a systemic process both in history and in the current context; (ii) consider the influences of the chosen language and forms on the production of ideas and visions; and (iii) continue transformative processes even if they become difficult, uncomfortable, and vertiginous. Implementing all three ideas could facilitate the emergence of new foresight arenas that de-centre expertise to facilitate the creation of alternative Indigenous futures (Huntington et al., 2019; Sium et al., 2012). The arenas we identified appear to be constrained by power relations and limited by both the forms used in futures production and the audiences that are addressed. Nevertheless, the local participatory foresight arena could be a useful setting for experimenting with the decolonization of the futures because despite their hegemonic position, the researchers involved in all of the case studies showed some reflexivity on their work and addressed the political dimensions of foresight. In addition, work at the local level may provide more opportunities to put local communities' perspectives at the forefront of futures-making and allow Indigenous actors to choose the future and modify possible trajectories.

The central difference between the battle of the futures and the decolonization of futures is that the former focuses on strengthening the role of IPLCs within the existing arenas whereas the latter aims to emancipate the production of futures from the arenas' frameworks to expand the space for ILK paradigms. As such, these two approaches represent different strategies for Indigenous people to promote their own futures and strengthen their role in the upcoming decisions concerning the Arctic. It remains to be seen whether IPLCs will find one strategy more useful and appealing than the other in different communities and contexts, and what real impact these strategies will have on the present and futures of the Arctic.

Declaration of Competing Interest

None.

Acknowledgements

We are grateful to two anonymous reviewers for their constructive comments, to Sarah Lumbroso and Benoît Labbouz for the fruitful discussions about the material, and to Sees-editing Ltd for correcting the written English. This research was funded through the 2017–2018 Belmont Forum and BiodivERsA joint call for

research proposals, under the BiodivScen ERA-Net COFUND programme, and the funding organizations of the FATE program: Agence Nationale de la Recherche (ANR)—ANR-18-EB14-0008), Academy of Finland (decision number 326323), Deutsche Forschungsgemeinschaft (DFG, German Research Foundation)—411410325, Formas (2018- 02439), the National Science Foundation (1850949), the Natural Sciences and Engineering Research Council of Canada (NSERC), and the Research Council of Norway (296987).

References

- Adamson, G. C. D., Hannaford, M. J., & Rohland, E. J. (2018). Re-thinking the present: The role of a historical focus in climate change adaptation research. *Global Environmental Change*, 48, 195–205. <https://doi.org/10.1016/j.gloenvcha.2017.12.003>
- Agrawal, A. (1995). Dismantling the divide between indigenous and scientific knowledge. *Development and Change*, 26(3), 413–439. <https://doi.org/10.1111/j.1467-7660.1995.tb00560.x>
- Arctic Council. (2021). Arctic Council Strategic Plan: 2021-2030. Arctic Council Secretariat.
- Avenier, M.-J. (2008). A methodological framework for constructing generic actionable knowledge. *Cahiers Délelött Recherche*, n°2007(06), 18.
- Bates, P. (2007). Inuit and scientific philosophies about planning, prediction, and uncertainty. *Arctic Anthropology*, 44(2), 87–100.
- Battiste, M., & Henderson, J. Y. (2000). Protecting indigenous knowledge and heritage: A global challenge. Purich Publishing.
- Berkes, F. (1999). *Sacred ecology*. Routledge.
- Berkhout, F. (2006). Normative expectations in systems innovation. *Technology Analysis & Strategic Management*, 18, 299–311. <https://doi.org/10.1080/09537320600777010>
- Bintanja, R. (2018). The impact of Arctic warming on increased rainfall. *Scientific Reports*, 8(1). <https://doi.org/10.1038/s41598-018-34450-3>. Article 1.
- Bourgeois, R., Penunia, E., Bisht, S., & Boruk, D. (2017). Foresight for all: Co-elaborative scenario building and empowerment. *Technological Forecasting and Social Change*, 124, 178–188. <https://doi.org/10.1016/j.techfore.2017.04.018>
- Brockington, D., Duffy, R., & Igoe, J. (2008). *Nature unbound: Conservation, capitalism and the future of protected areas*. Routledge.
- Browne, K., Bakshi, L., & Law, A. (2009). Positionalities: It's not About Them and Us, it's About Us. In S. J. Smith, R. Pain, S. A. Marston, & I. I. I. J. P. Jones (Eds.), *The SAGE handbook of social geography* (pp. 586–604). SAGE Publications Inc.
- Büscher, B., Sullivan, S., Neves, K., Igoe, J., & Brockington, D. (2012). Towards a synthesized critique of neoliberal biodiversity conservation. *Capitalism Nature Socialism*, 23(2), 4–30.
- Chateauraynaud, F., & Debaz, J. (2017a). Aux bords de l'irréversible: Sociologie pragmatique des transformations. Editions Pétra.
- Chateauraynaud, F., & Debaz, J. (2017b). Scénarisation des possibles et constructions des futurs. *Aux bords de l'irréversible: Sociologie pragmatique des transformations* (pp. 137–188). Editions Pétra.
- Colchester, M. (1994). *Salvaging nature: Indigenous peoples, protected areas and biodiversity conservation*. Diane Pub Co.
- Comby, J.-B. (2017). Dépolitisation du problème climatique. *Idées économiques et sociales*, 190, 20–27.
- Coreau, A., Pinay, G., Thompson, J. D., Cheptou, P.-O., & Mermet, L. (2009). The rise of research on futures in ecology: Rebalancing scenarios and predictions. *Ecology Letters*, 12(12), 1277–1286.
- Coulthard, G. S. (2014). *Red skin, white masks*. University of Minnesota Press.
- Cunsolo Willox, A., Harper, S. L., Ford, J. D., Landman, K., Houle, K., & Edge, V. L. (2012). "From this place and of this place:" Climate change, sense of place, and health in Nunatsiavut, Canada. *Social Science & Medicine*, 75(3), 538–547.
- Delay, E. (2020). Prospective et scénarios. *Dictionnaire critique de l'anthropocène* (pp. 682–684). CNRS Editions.
- Elwood, J., Stein, S., & Andreotti, V. de O. (2019). *Towards Braiding Towards Braiding*.
- European Commission (2016) Joint communication to the European parliament and the council—An integrated European union policy for the Arctic, (testimony of European Commission).
- European Commission (2021) Joint communication to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the regions—A stronger EU engagement for a peaceful, sustainable and prosperous Arctic, (testimony of European Commission).
- Falardeau, M., RaudseHearne, C., & Bennett, E. M. (2019). A novel approach for co-producing positive scenarios that explore agency: Case study from the Canadian Arctic. *Sustainability Science*, 14(1), 205–220.
- Fedreheim, G. E., & Blanco, E. (2017). Co-management of protected areas to alleviate conservation conflicts: Experiences in Norway. *International Journal of the Commons*, 11(2).
- Figgis, P. (2003). The changing face of nature conservation: Reflections on the Australian experience. *Decolonizing Nature: Strategies for Conservation in a Post-colonial Era* (1re ed (pp. 197–219). Routledge.
- Fine, M., Weis, L., Weseen, S., & Wong, L. (2003). For whom? Qualitative research, representations, and social responsibilities. *The landscape of qualitative research* (Second ed., pp. 167–207). Sage.
- Flynn, M., Ford, J. D., Pearce, T., & Harper, S. L. (2017). Participatory scenario planning and climate change impacts, adaptation and vulnerability research in the Arctic. *Environmental Science & Policy*, 79, 45–53.
- Hastrup, K. (2009). The nomadic landscape: People in a changing Arctic environment. *Geografisk Tidsskrift-Danish Journal of Geography*, 109(2), 181–189.
- Huntington, H. P., Carey, M., Apok, C., Forbes, B. C., Fox, S., Holm, L. K., Ivanova, A., Jaypoody, J., Noongwook, G., & Stammler, F. (2019). Climate change in context: Putting people first in the Arctic. *Regional Environmental Change*, 19(4), 1217–1223.
- Hurlbert, M., Krishnaswamy, J., Davin, E., Johnson, F. X., Mena, C. F., Morton, J., Myeong, S., Viner, D., Warner, K., Wreford, A., Zakieldeen, S., & Zommers, Z. (2019). Risk Management and Decision making in Relation to Sustainable Development. In P. R. Shukla, J. Skea, E. Calvo Buendia, V. Masson-Delmotte, H.- O. Pörtner, D. C. Roberts, P. Zhai, R. Slade, S. Connors, R. van Diemen, M. Ferrat, E. Haughey, S. Luz, S. Neogi, M. Pathak, J. Petzold, J. Portugal Pereira, P. Vyas, E. Huntley, K. Kissick, M. Belkacemi, & J. Malley (Eds.), *Climate Change and Land: An IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems*. IPCC.

- Igoe, J. (2003). *Conservation and Globalization: A Study of National Parks and Indigenous Communities from East Africa to South Dakota* (First ed.). Cengage Learning.
- Inayatullah, S. (2013). *Futures studies: Theories and methods*. OpenMind.
- IPBES. (2016). In S. Ferrier, K. N. Ninan, P. Leadley, R. Alkemade, L. A. Acosta, H. R. Akçakaya, L. Brotons, W. Cheung, V. Christensen, K. A. Harhash, J. Kabubo-Mariara, C. Lundquist, M. Obersteiner, H. Pereira, G. Peterson, R. Pichs-Madruga, N. H. Ravindranath, C. Rondinini, & B. Wintle (Eds.), *Summary for policymakers of the methodological assessment of scenarios and models of biodiversity and ecosystem services of the intergovernmental Science-policy Platform on Biodiversity and Ecosystem Services* (p. 32). Secretariat of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.
- IPBES. (2019a). *Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*. Zenodo.
- IPBES. (2019b). In S. Díaz, J. Settele, E. S. Brondizio E.S., H. T. Ngo, M. Gueze, J. Agard, A. Arneth, P. Balvanera, K. A. Brauman, S. H. M. Butchart, K. M. A. Chan, L. A. Garibaldi, K. Ichii, J. Liu, S. M. Subramanian, G. F. Midgley, P. Miloslavich, Z. Molnar, D. Obura, A. Pfaff, S. Polasky, A. Purvis, J. Razzaque, B. Reyers, R. Roy Chowdhury, Y. J. Shin, I. J. Visseren-Hamakers, K. J. Willis, & C. N. Zayas (Eds.), *Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services* (p. 56). IPBES secretariat.
- IPCC (2020) *Summary for policymakers—Climate Change and Land: An IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems* [P.R. Shukla, J. Skea, E. Calvo Buendia, V. Masson-Delmotte, H.- O. Pörtner, D. C. Roberts, P. Zhai, R. Slade, S. Connors, R. van Diemen, M. Ferrat, E. Haughey, S. Luz, S. Neogi, M. Pathak, J. Petzold, J. Portugal Pereira, P. Vyas, E. Huntley, K. Kissick, M. Belkacemi, J. Malley, (eds.)].
- Johannes, R.E. (1989) *Traditional Ecological Knowledge: A Collection of Essays*. IUCN.
- Lam, D. P. M., Hinz, E., Lang, D., Tengö, M., Wehrden, H., & Martín-Lopez, B. (2020). Indigenous and local knowledge in sustainability transformations research: A literature review. *Ecology and Society*, 25(1).
- Lumbroso, S. (2019) *Prospective et stratégies pour l'environnement: Entre fabrique des futurs et situation de gestion, quelles prises pour l'action ?* [These de doctorat, Université Paris-Saclay (ComUE)].
- McElwee, P., Fernandez-Llamazares, A., Aumeeruddy-Thomas, Y., Babai, D., Bates, P., Galvin, K., Gueze, M., Liu, J., Molnar, Z., Ngo, H. T., Reyes-García, V., Roy Chowdhury, R., Samakov, A., Shrestha, U. B., Diaz, S., & Brondizio, E. S. (2020). Working with Indigenous and local knowledge (ILK) in large-scale ecological assessments: Reviewing the experience of the IPBES Global Assessment. *Journal of Applied Ecology*, 57(9), 1666–1676.
- Muller, S. (2003). Towards decolonisation of Australia's protected area management: The nantawarrina indigenous protected area experience. *Australian Geographical Studies*, 41(1), 29–43.
- Nadasdy, P. (1999). The Politics of Tek: Power and the "Integration" of Knowledge. In *Arctic Anthropology*, 36 pp. 1–18). JSTOR.
- Nadasdy, P. (2002). "Property" and Aboriginal Land Claims in the Canadian Subarctic: Some Theoretical Considerations. In *American Anthropologist*, 104 pp. 247–261). JSTOR.
- Nadasdy, P. (2005). The anti-politics of TEK: The institutionalization of co-management discourse and practice. *Anthropologica*, 47(2), 215–232.
- Ney, S., & Thompson, M. (2000). Cultural Discourses in the Global Climate Change Debate. In E. Jochem, J. Sathaye, & D. Bouille (Eds.), *Society, Behaviour, and Climate Change Mitigation* (pp. 65–92). Netherlands: Springer.
- Nilsson, A. E., Bay-Larsen, I., Carlsen, H., van Oort, B., Bjørkan, M., Jylhä, K., Klyuchnikova, E., Masloboev, V., & van der Watt, L.-M. (2017). Towards extended shared socioeconomic pathways: A combined participatory bottom-up and top-down methodology with results from the Barents region. *Global Environmental Change*, 45, 124–132.
- Nilsson, A. E., Carlsen, H., & van der Watt, L.-M. (2015). *Uncertain futures: The changing global context of the European Arctic. Report from a scenario workshop in Pajala, Sweden*. Stockholm Environment Institute.
- Nilsson, A. E., Carson, M., Cost, D. S., Forbes, B. C., Haavisto, R., Karlsdottir, A., Larsen, J. N., Paasche, Ø., Sarkki, S., Larsen, S. V., & Pelyasov, A. (2021). Towards improved participatory scenario methodologies in the Arctic. *Polar Geography*, 44(2), 75–89.
- Notzke, C. (1995). A new perspective in aboriginal natural resource management: Co-management. *Geoforum*, 26(2), 187–209.
- Nuttall, M. (2012). Tipping points and the human world: Living with change and thinking about the future. *Ambio*, 41(1), 96–105.
- Oteros-Rozas, E., Martín-Lopez, B., Daw, T. M., Bohensky, E. L., Butler, J. R. A., Hill, R., Martín-Ortega, J., Quinlan, A., Ravera, F., Ruiz-Mallén, I., Thyresson, M., Mistry, J., Palomo, I., Peterson, G. D., Plieninger, T., Waylen, K. A., Beach, D. M., Bohnet, I. C., Hamann, M., & Vilardey, S. P. (2015). Participatory scenario planning in place-based social-ecological research: Insights and experiences from 23 case studies. *Ecology and Society*, 20(4).
- Peterson, G. D., Cumming, G. S., & Carpenter, S. R. (2003). Scenario planning: A tool for conservation in an uncertain world. *Conservation Biology*, 17(2), 358–366.
- Petrov, A. N., Smith, M. S. R., Krivorotov, A. K., Klyuchnikova, E. M., Mikheev, V. L., Pelyasov, A. N., & Zamyatina, N. Y. (2021). The Russian Arctic by 2050: Developing Integrated Scenarios. *ARCTIC*, 74(3). Article 3.
- Raymond, C. M., Fazey, I., Reed, M. S., Stringer, L. C., Robinson, G. M., & Evely, A. C. (2010). Integrating local and scientific knowledge for environmental management. *Journal of Environmental Management*, 91(8), 1766–1777.
- Sami Council. (2019). *The Sámi Arctic Strategy—Samisk Strategi for Arktiske saker—Sámi Árkताल Aigumusat—Securing endurigin influence for the Sami people in the Arctic through partnerships, education and advocacy* (p. 39). Sami Council.
- Sandoval, C. (2000). *Methodology of the Oppressed* (First ed.). University Of Minnesota Press,.
- Sardar, Z. (1993). Colonizing the future: The 'other' dimension of futures studies. *Futures*, 25(2), 179–187.
- Sium, A., Desai, C., & Ritskes, E. (2012). Towards the 'tangible unknown': Decolonization and the Indigenous future. *Decolonization: Indigeneity, Education & Society*, 1(1). Article 1.
- Spielhagen, R. F., Werner, K., Sørensen, S. A., Zamelczyk, K., Kandiano, E., Budeus, G., Husum, K., Marchitto, T. M., & Hald, M. (2011). Enhanced modern heat transfer to the arctic by warm atlantic water. *Science*, 331(6016), 450–453.

- Stein, S., Andreotti, V., Susa, R., Amsler, S., Hunt, D., Ahenakew, C., Jimmy, E., Cajkova, T., Valley, W., Cardoso, C., Siwek, D., Pitaguary, B., D'Emilia, D., Pataxo, U., Calhoun, B., & Okano, H. (2020). Gesturing towards decolonial futures: Reflections on our learnings thus far. *Nordic Journal of Comparative and International Education (NJCIE)*, 4(1). Article 1.
- Stephen, K., Valeeva, V., Gabriel, J., Nikitina, E., Kuznetsov, A., Aksenov, Y., & Semenov, V., (2019) Environment scanning workshop and report 2 (D5.22).
- Tanner, A. (2001). The double bind of Aboriginal self-government. In *Aboriginal Autonomy and Development in Northern Quebec-Labrador* (pp. 396–414). UBC Press.
- Treyer, S. (2006) A quelle raréfaction de l'eau faut-il se préparer ? : Construire une intervention prospective au service de la planification pour les ressources en eau en Tunisie [These de doctorat, Paris, ENGREF].
- Tyler, N. J. C., Turi, J. M., Sundset, M. A., Strøm Bull, K., Sara, M. N., Reinert, E., Oskal, N., Nellemann, C., McCarthy, J. J., Mathiesen, S. D., Martello, M. L., Magga, O. H., Hovelsrud, G. K., Hanssen-Bauer, I., Eira, N. I., Eira, I. M. G., & Corell, R. W. (2007). Saami reindeer pastoralism under climate change: Applying a generalized framework for vulnerability studies to a sub-arctic social–ecological system. *Global Environmental Change*, 17(2), 191–206.
- Vasquez-Fernandez, A. M., & Ahenakew pii tai poo taa, C. (2020). Resurgence of relationality: Reflections on decolonizing and indigenizing 'sustainable development'. *Current Opinion in Environmental Sustainability*, 43, 65–70.
- Zurba, M., Petriello, M. A., Madge, C., McCarney, P., Bishop, B., McBeth, S., Denniston, M., Bodwitch, H., & Bailey, M. (2021). Learning from knowledge co-production research and practice in the twenty-first century: Global lessons and what they mean for collaborative research in Nunatsiavut. *Sustainability Science*.