

# Arctic Futures

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## 1. Introduction

What are the political, economic and social consequences of a melting Arctic? Is the Arctic set to be the scene of conflict and rivalry, or will common challenges foster peaceful cooperation? Will the region turn into an economic powerhouse? How will the people that are living in the region be affected?

Over the last few years these questions have been frequently asked. The future of the Arctic has become an issue of significant public concern. There has been a strong upsurge in political meetings and academic conferences dealing with the development of the Arctic, and a number of reports, books and articles have appeared, highlighting the history, present state and future challenges of the region.

As part of the Fram Centre activities, a group of researchers in Tromsø decided to take a closer look at this literature. We wanted to identify the basic assumptions, analytical approaches and future images that characterise current thinking about the Arctic. The work was carried out in 2011.

## 2. Aim and scope of the project

The overall aim of the project has been to analyse and learn from the ways in which the future of the Arctic has been thematised and dealt with in recent years. More specifically, we wanted to:

1. Start making an inventory of future-oriented Arctic studies. What kinds of studies have been performed, and what are the topics they are covering?
2. Clarify the origin and purpose of the studies. What is their background? How were they initiated? What are their objectives?
3. Scrutinise the methodological foundation of the relevant studies. Are they expert-based or involving a broader set of stakeholders? Which methods and tools have been applied? On which types of evidence and assumptions do they rely?
4. Gain insight from the content of the various studies. What are considered to be the main trends and driving forces that are shaping the future of the Arctic? What kinds of futures do they actually depict? What are the main elements of uncertainty?

The project started with an extensive search for literature. We looked for publications that were focusing on the Arctic (either in general or major sub-regions), dealt with socio-

economic and political aspects, had a view to the future, and were published during the last ten years.

By using the Web of Science, Google Scholar and other Internet sources we compiled a list of more than a hundred studies. We examined them briefly and excluded those that did not fulfil the criteria listed above. In the following we provide a survey of some 40 books, reports and articles, which have been reviewed by means of a template that was developed at an early stage of the project.

The selected literature is in no way the complete stock of future-oriented Arctic studies. We have omitted a number of interesting scientific publications that were deemed to be either too specialised or paying too little attention to future developments. We also acknowledge the significance of our own geographical location and the language barriers. The survey is limited to studies written in Norwegian, English and German, and notably Norwegian studies are covered well. Hence, there certainly is a bias in the selected literature.

### **3. An overview of the literature**

What are the studies focusing on? What is their central subject matter? We have clustered the literature into three groups according to the major topics: Climate change, new economic activities, and issues related to politics, governance and security.

#### **Climate change and its social impacts**

Almost all of the studies include some sort of outlook on Arctic climate change. As the type, magnitude and speed of climate change has a profound bearing on ecosystems and society, a certain understanding of the changes of the climate system is required. The issue is, nevertheless, treated differently in our literature.

The Arctic Climate Impact Assessment (Arctic Council 2004a) is the report that draws most heavily on natural scientific research. Here, knowledge about changes in the physical climate is treated in parallel with impacts upon society, and the two issues are partly integrated in the popular summary report. Some specialised studies on climate adaptation also contain nuanced analyses of current and future changes in temperatures, precipitation, sea levels, etc. (cf. Øseth 2010). Likewise, many reports on Arctic shipping elaborate on shifting sea ice volume and extension as a condition for increased Arctic shipping (cf. Brunstad 2007; Mariport Group 2007; Arctic Council 2009; DNV 2010; Stephenson et al. 2011).

In the broader oriented literature on the Arctic, some authors summarise main findings from the natural sciences and even interview climate scientists about the processes involved and their predictions about future climate change. But most typically, climate change just constitutes the backdrop. The authors present some general statements about a warming Arctic, which then serves as a starting point for their discussion of particular topics. Yet, changes in the political-economic climate regime may be mentioned as a framing condition that will influence the development in the Arctic in general or affect sectors such as petroleum or shipping in particular (cf. Brunstad 2007, Oljedirektoratet 2007, Ecologic Institute 2010).

#### **Natural resources and economic activity**

Economic development is a major topic in the future-oriented Arctic literature. Some sectors clearly stand out:

## **Petroleum**

The future potential for petroleum development is covered in all the general books on the Arctic and several of the reports and articles (e.g. Anderson 2009; Howard 2009; Sale & Potapov 2010; Harsem et al. 2011). The Arctic Oil and Gas Assessment (Arctic Council 2007) is a thorough pan-Arctic study, but it is surprisingly weak on future prospects. The bulk of the studies seem to concentrate on single regions. The Barents Sea has attracted significant attention in Norway, and we have found seven studies that try to foresee how proven and unproven resources can be developed and the economic benefits that might accrue, especially to Northern Norway (Barlindhaug 2005, 2006; ECON 2006; Arbo et al. 2007; Hernes et al. 2007; Blakkisrud 2008; Oljedirektoratet 2011). A comprehensive study of Northwest Russia has also been undertaken, with oil and gas development as the central topic because of its relevance for Norwegian industry (Brunstad et al. 2004). We expect that many similar studies have been performed in other regions, but our survey only contains two reports from Alaska and one from Canada (Northern Economics 2009; Rabinowitz 2009; Fekete Associates & Vector Research 2005).

## **Mining**

Mining is frequently referred to as a growth industry in the Arctic. However, it is mostly discussed at a general level. We have identified only two studies that provide overviews of known resources in sub-regions and discuss potential future developments (Slotfeldt-Ellingsen & Sandvik 2009; Lian 2010). Again, we will assume more specialised literature is available, both in each of the Arctic states and in different types of economic analyses. Nevertheless, mining is a rather new topic on the Arctic agenda, and more studies will probably be undertaken in the next few years.

## **Shipping**

Shipping and the prospects of new shipping routes is a topic extensively covered. Most prominent is the Arctic Marine Shipping Assessment (Arctic Council 2009), a comprehensive assessment of most aspects of Arctic shipping. Fairhall (2010) mainly gives an historical account of the maritime activities in the Arctic, and Brunstad (2007) provides a good analysis of drivers behind Arctic shipping including three scenarios. We have also reviewed four reports that can be labelled feasibility studies of Arctic shipping (Niini et al. 2006; Mejlænder-Larsen & Espeland 2009; DNV 2010; Stephenson et al. 2011).

## **Fisheries**

This sector is not well covered in the literature we have surveyed. The Arctic Climate Impact Assessment (Arctic Council 2004a) has a chapter discussing possible effects of climate change on selected fish stocks and fisheries. Opportunities for new fisheries are also briefly touched upon in, for instance, Emmerson (2009). There is a biological literature on Arctic fisheries that we have not surveyed, but as far as we are aware of, no newer or more in-depth assessments of Arctic fisheries have been undertaken after the Arctic Climate Impact Assessment (Arctic Council 2004a).

## **Politics, governance and security**

Maritime delimitations, international relations and governance issues play a prominent role in the literature. A core element in many of the stories about the Arctic is that there is a race for territories taking place. Some authors, like Emmerson (2009), give a retrospective account of how the borders between the Arctic nations were established, and we learn about the great polar explorers and adventurers. Today, the remaining delimitation issues are related to marine boundaries and the extended continental shelf. Several books explore the unresolved

issues and explain the law of the sea. Most of them also contain predictions about the future, considering the likelihood of peaceful collaboration versus rivalry and great power games (cf. (Seidler 2009; Howard 2009; Sale & Potapov 2010; Fairhall 2010). Here it is emphasised that conflicts and security problems can have other roots than border issues, like competition for resources and conflicts over shipping routes and access to marine areas.

Some studies go more in detail on security issues. Byers (2009) focuses on Canadian sovereignty over its Arctic territories and potential threats to it, making a case for the need for better response capabilities. In military planning, the Canadian air force has studied future challenges for the defence of the Canadian Arctic, while changing patterns of maritime traffic has been explored in order to give recommendations to the US Navy (Billyard et al. 2010; Ducharme & Brightman 2011). International Institute for Strategic Studies has provided a broad analysis of security threats in the Arctic, also originating outside the region (IISS 2008). Diesen (2008) goes into thinking the unthinkable; what is the regional conflict potential in the Arctic, and what would a possible military conflict look like?

### **Holistic studies**

A few of the books explore what are considered to be the major driving forces that will shape the future. Smith (2011) looks at the Northern hemisphere in 2050 and predicts a completely new role for the Northern regions. Rasmussen (2011) also explores which driving forces that will shape the future of the Arctic. Similar approaches are found in studies of Northern Norway (Blakkisrud 2008; Olsen & Iversen 2010). Brigham (2007) represents a rare and bold attempt at making broad scenarios for the future of the whole Arctic. We have found only one similar study, though it is narrower in scope by mainly concentrating on the EU – Arctic relations (Ecologic Institute 2010).

## **4. Background and purpose of the selected studies**

Why have the studies been undertaken? Who have initiated them and for what purpose? The literature we have surveyed has different origins. All in all, the studies can be divided into four:

Firstly, there are a number of reviews or formal assessments undertaken with a mandate from a political body. These include five assessments commissioned by the Arctic Council ministers (Arctic Council 2004a, 2004b, 2007, 2009, 2010) and various reports from national governments or their agencies (for instance, Faggruppa 2005; Øseth 2010, Lian 2010). The European Commission and Nordic Council of Ministers also have ordered reports about the future of the Arctic (Ecologic Institute 2010; Rasmussen 2011). The main aim of these studies is to raise public awareness and to provide a knowledge base for policy decisions.

Secondly, several reports are commissioned by private companies and business associations, sometimes with joint public financing. The studies of future petroleum development are mostly financed by the oil industry (Brunstad et al. 2004; Fekete Associates & Vector Research 2005; Barlindhaug 2005, 2006; ECON 2006; Arbo et al. 2007; Northern Economics 2009). Other studies with similar origin cover Arctic marine shipping, the future of a region, and the visions and prospects associated with an Arctic city hosting the Winter Olympic Games (Brunstad 2007; Olsen & Iversen 2009; Blakkisrud 2008). When such studies are made publicly available, the main aim is usually to justify strategic business initiatives,

influence key policy-makers and mobilise public support. That is, they are made to influence the strategies of others than those who commissioned them.

Thirdly, quite a few of the studies are independent initiatives from the author *himself* (yes, there are no women among them). One author raising an Arctic agenda, reporting from the scientific literature, travelling in the region and making interviews, could be characterised as a genre in itself (travelogues). Anderson (2009), Seidler (2009), Hannemann (2010), Fairhall (2010), Emmerson (2010) and partly Smith (2010) belong to this category. These studies have been written either to inform the general public, to stimulate debate or to disperse the results from scientific and technical studies.

Even though we have few studies in our survey that could be characterised as typically scientific or mainly research oriented, this is a fourth category that should be mentioned. Some of the studies try to break new ground, and some stand out more clearly as academic contributions. Among these, we would include Mejlænder-Larsen & Espeland (2009), DNV (2010) and to some extent IISS (2008).

A common denominator of most of the studies is that they have been launched to prepare for some kind of response to the future developments that are explored. They are written for different audiences, but as they have been made public, the results may reach beyond the intended target group.

## 5. Methodological approaches

How have the studies been undertaken? Are they written by experts alone or do they involve relevant stakeholders? What methods and tools have been applied? Studies concerning the future of the Arctic are diverse in both scope and methodological approach. They can be characterised in different ways, based on whether or not they make explicit images of the future, how many or what kind of future images they make, how they study driving forces, whether or not they include wildcards and so on. In this section we will shed light on the methodological aspects of the studies we have reviewed.

### Participation

Most of the studies are expert-based in the sense that they have been performed by consultants or researchers. This is typical for all the four categories mentioned in section 4. The main exemptions are the assessments commissioned by the Arctic Council, which have involved a comprehensive set of authors, peer reviewers and government agencies in the Arctic states. In the development of the Arctic Climate Impact Assessment (Arctic Council 2004a), indigenous groups took part, and the Arctic Maritime Shipping Assessment (Arctic Council 2009) were partly based on two scenario workshops and town hall meetings.

In two of the studies, the future images that were developed clearly rested on dialogue-based tools and a process involving a number of participants (Olsen & Iversen 2009; Ducharme & Brightman 2011). Similarly, reference groups, workshops and seminars also made up an important part of other projects (i.e. Brunstad et al. 2004; Brunstad 2007; Barlundhaug 2006; Arbo et al. 2007; Lian 2010; Ecologic Institute 2010).

## Sources of information

Anticipating the course of the future requires information about past developments and the current state of affairs. Future studies usually employ several and quite different sources of information. Many of them rely on available statistics from national and international agencies. In the Norwegian studies, data from Statistics Norway, the Norwegian Petroleum Directorate, the Directorate of Fisheries, the Norwegian Coastal Administration and other public agencies are frequently used. Other important sources are the reports from the Intergovernmental Panel on Climate Change (IPCC) and the Arctic Climate Impact Assessment, as well as figures from the International Energy Agency (IEA), the U.S. Geological Survey and the International Monetary Fund (IMF). With the Arctic Marine Shipping Assessment as the main exception, very few collect their own data. Scientific publications are referred to in several studies, but press releases, newspaper articles, consulting reports and interviews seem to be more common sources.

## Methodology

While all the studies have a view to the future of the Arctic, there is a huge variation in how the ideas about the future are spelled out and how they are arrived at.

## Implicit futures

Many of the studies concentrate on major trends that will shape the future and do not present explicit images of the future (e.g. Arctic Council 2007; Fairhall 2010; Seidler 2009; Smith 2011). That is, they leave it to the readers to draw the implications and to envisage what lies ahead. Still, many of them have a clear implicit message or convey facts and thought-provoking reflections that give hints about the future and choices to be made. The weakness of such studies is that uncertainties are often downplayed, leaving little scope for developing a preparedness for dealing with unexpected events.

The rest of the studies we have reviewed provide explicit images pertaining to the future of the Arctic. This is done in a more or less disciplined and rigorous way, and by introducing different levels of uncertainty. Five slightly overlapping approaches can be discerned.

## Visions

While most future studies contain two or more future images, some only present one in the form of a vision (e.g. Barlindhaug 2005; ECON 2006; Blakkisrud et al. 2008). The visions depict what might come true under a certain set of conditions – either as a desired outcome or as an outcome that must be avoided. Typical for these studies is that they have the future as their fixed place and have a retrospective look on how this future state was reached. In most cases they are stories about how it would look like if everything went right, according to the hopes of the relevant audience.

The main purpose of visions is normally to create consensus among decision-makers about goals and the strategies and measures that must be taken in order to realise these goals. Discontinuities and radical shifts may be part of the story, but there is only one final outcome.

## High probability scenarios

Scenarios typically seek to identify driving forces, trends and critical uncertainties, and to explore how these might unfold and determine future conditions, opportunities, threats and obstacles. The high probability scenarios concentrate on one or more trends that are considered major and likely to have a high impact. In these studies it is assumed that the most important drivers for future development are known. What are under scrutiny, are their strength, interaction and perceived outcomes. This seems to be the most common approach.

Many of the scenarios are based on high or low values for some key parameters (Barlindhaug 2006; Slotfeldt-Ellingsen & Sandvik 2009; Olsen & Iversen 2009; Lian 2010; Faggruppa 2005; IISS 2008; Billyard et al. 2010). As one of the alternatives is usually preferred, this means that a positive development is contrasted with a negative or no-growth alternative.

In some cases the two extremes are supplemented by a “middle way” scenario, where the one in the middle stands out as the most realistic one, even though, in fact, it is no more reasonable or reliable than the others (cf. Rabinowitz 2009). In the EU Arctic Footprint and Policy Assessment Report (Ecologic Institute 2010) the scenarios were built around given combinations of four main drivers. By attributing different levels of change to each of the four variables, three scenarios were constructed implying high, medium and low EU footprints in the Arctic.

### **Simulations**

Scenarios can also be developed on the basis of complex formal models which require substantial amounts of data. The Arctic Climate Impact Assessment (Arctic Council 2004a) and the NorACIA programme (Øseth 2010) are comprehensive studies of this kind. They build on climate models which simulate the interactions of the atmosphere, oceans, land surface, and ice. Similar to the high probability scenarios, these studies rest on the assumption that the most important variables and their relationships are known and can be specified, but formal models can better demonstrate the interactions, and the outcomes of alternative causation and feedback mechanisms can be simulated.

In our sample, simulations are also applied in some of the studies on Arctic shipping (Niini 2006, Mejlænder-Larsen & Espeland 2009; DNV 2010). These are basically feasibility studies, testing out under which conditions new shipping routes or technological solutions are viable and their sensitivity to different factors. Peters et al. (2011) combine several types of models and assess future petroleum and shipping activities and their resulting emissions to air, while Valsson & Ulfarsson (2011) provide rough estimates of future activity structures.

### **Qualitatively different scenarios**

Another approach is to emphasise trends and driving forces that might have a high impact, but which are also associated with high uncertainty. Here, the scenarios are built around the main aspects of uncertainty rather than the most probable trends, which are included with slight variation in all the scenarios anyhow. In these studies a number of qualitatively different scenarios are presented. The studies also investigate the series of actions, events and circumstances that are generating the alternative futures. In our review, Arbo et al. (2007), Brunstad et al. (2004), Brunstad (2007), Brigham (2007), Brigham (2008), and Arctic Council (2009) are among the studies adopting such an approach.

### **Games**

A well-known but not frequently used method for studying the future is games. Games are well suited when interaction among key actors may take the course of development in different directions. Games are primarily employed in a military context (Billyard et al. 2010; Ducharme & Brightman 2011). In the Strategic War Game (Billyard et al. 2010), the main sources of uncertainty are introduced by the actions of the three players: the Air Force, the Canadian government, and adversaries that challenge the Canadian territorial boundaries. Their assumed mutually dependent actions determine the multiple outcomes of the games. By running several games under various contextual conditions, the study summarises the outcomes in two scenarios, a worst and a best case. In this respect, even though the study

starts from an entirely different methodological standpoint, it resembles the high/low scenarios mentioned earlier.

## 6. Images of the future

What are the main drivers of change in the Arctic, according to the literature we have reviewed? What images of the future are conveyed? Do the images contain wildcards that alter or modify the line of development significantly?

### Driving forces

The message from all the publications is that the Arctic and the associated policies and activities will develop into a future state that is different from the present. Climate change is the driving force emphasised by almost all the publications. This is made explicit already in the introductory sections or it reads more indirectly, like in Brigham (2007). But not all studies include climate aspects. In several of them this issue is omitted due to their thematic focus, geographical delimitation or time horizon (e.g. Barlindhaug 2006; Billyard et al. 2010; Brunstad et al. 2004; ECON 2006; Olsen & Iversen 2010; Oljedirektoratet 2007). Furthermore, climate change rarely appears as the sole driving force. Typically, it is paired with driving forces relating to the demand for Arctic resources and the geopolitical circumstances.

Two main storylines can be discerned: The first starts with climate change and receding sea ice cover, and concentrates on expanding economic activity in the Arctic. Here, population growth, increasing globalisation, high demand for oil, gas and other natural resources, technology development, and the search for new shipping lanes are most frequently mentioned as major driving forces. The second concentrates on issues relating to politics, governance and security. In this context, the end of the cold war, the economic and political interests of the Arctic states and other global players, the United Nations Convention on the Law of the Sea, and disputed boundaries play a central role.

### Future prospects

As already alluded to, the studies differ both in time perspective and scope. The bulk of the publications employ a long time perspective, of 20 years or more, but some operate with a shorter time span. There are also a few that address the future in general, without mentioning any specific time horizon (e.g. Anderson 2009; Rabinowitz 2009; Seidler 2009). The variation is also great when it comes to thematic and geographical coverage. About half of the studies focus on single sectors and specific countries and regions, while the other half is cross-sectoral and looks at the Arctic in a larger context. They contain from only one and up to eight images of the future at the most (Olsen & Iversen 2008).

The studies provide a rich account of trends, driving forces and challenges. Overall, it appears clearly that the Arctic is destined to become a region of greater economic and political importance. The general assumption is that the marine Arctic will become more accessible as the ice is melting. It is also assumed that the region has great resource potentials. Thus, the Arctic will see an increase in oil and gas development and shipping. Several other industries are mentioned too, notably mining and mineral industries, fisheries and lumbering, but these are largely neglected in the studies we have reviewed.



Even though the economic activities are expected to expand, there are disagreement and uncertainty regarding their scale and scope. It is pointed out that the reduction in the extent, thickness and age of the Arctic Ocean sea ice does not mean that the ocean will become ice-free, even during the summer season. Drifting ice represents a permanent risk. Oil and gas operations in ice-infested waters are challenging, and the great distances to the main markets imply that the costs of transportation and infrastructure will be high. While many cite the U.S. Geological Survey's estimates of undiscovered Arctic oil and gas resources, only Peters et al. (2011) carry out their own assessment of future oil and gas production. Similarly, Arctic shipping is expected to be increasing, but in the coming decades this will primarily be driven by the extraction of resources from the region and cruise tourism. Most likely, destination shipping will play a more prominent role than transcontinental shipping.

In some of the literature it is asserted that an Arctic "gold rush" is on the way. Unsettled boundaries and a fight for resources have ignited a "scramble for the Arctic" (e.g. Borgerson 2008; Seidler 2009; Sale & Potapov 2010). In the future, the Arctic will be witnessing increasing rivalry and conflict. However, the dominant view is that peaceful cooperation will prevail in the Arctic. There might be competition and tensions that involve the threat of using military power, but it is not expected that conflicts will escalate into full armed confrontations and war between states (cf. Diesen 2008; IISS 2008; Howard 2009; Brigham 2010).

Several arguments are put forth to substantiate this position: Firstly, the valuable natural resources in the Arctic are mainly located within the undisputed exclusive economic zones of the Arctic coastal states. Secondly, what appears as attempts at land grabbing by the Arctic coastal states is actually sparked off by the United Nations Convention on the Law of the Sea and the procedures laid down for delineating the outer continental shelf. Thirdly, the Arctic coastal states have declared that they will adhere to international law and solve all disputes peacefully. The Arctic Council is also gaining ground as a high-level intergovernmental forum for addressing the key issues faced by the Arctic governments, the indigenous people of the Arctic, and other stakeholders. Fourthly, resource exploitation in the Arctic and the challenges of climate and environmental change will require cross-border scientific and technological cooperation, which is already well developed in the field of research and monitoring. Fifthly, while the chance of limited military conflicts should not be ruled out, no states will presumably benefit from a large-scale war over Arctic resources or territories. So given that political and military leaders act rationally, the Arctic will not turn into a combat zone.

But acknowledging the limited value of predictions, many of the studies try to stretch imagination in order to capture the range of new and unforeseen directions in which the future may evolve. In Brigham (2008), for instance, four scenarios are developed for Arctic shipping, based on a matrix created by two framing factors: the level of demand for and trade with Arctic resources, and the degree of stability of rules for marine use. The four scenarios are labelled Arctic Race (high demand and unstable governance), Arctic Saga (high demand and stable governance), Polar Lows (low demand and unstable governance), and Polar Preserve (low demand and stable governance). Even single studies thus provide alternative stories of the future, and the interesting question is how they identify and explore the driving forces, trends and critical uncertainties that shape the possible and plausible outcomes.

A common feature of all the literature we have reviewed is that the main forces of change are emanating from outside the Arctic. The people of the region, their local governments, businesses and associations, only play a marginal role.

## Uncertainties and wildcards

Change processes are seldom linear. Instead, they are complex and disorderly. Wildcards are those low-probability, high-impact events they may have a disruptive effect and cause discontinuity. To what extent are such disruptive elements considered in our sample of literature?

In some studies, like in Smith (2011), a number of uncertainties are explicitly excluded. He assumes that there will be no large conflicts, no radical technological breakthroughs, no change in major laws and treaties, no high impact events, etc. In this way he can concentrate on those drivers and trends that are deemed to have a basic and foreseeable effect. Most of the studies are not that explicit. Here, the key drivers have different degrees of uncertainty attributed to them. Hence, their range of variation indicates the level of uncertainty in terms of outcomes.

In the studies focusing on the exploitation of natural resources, global trade patterns, world market prices, infrastructure investments, the development of surveillance and control systems, transit fees, future climate policy, legal frameworks, and tensions and disputes over sovereignty and jurisdiction in Arctic waters are among the factors that can make a difference (e.g. Brunstad 2007; Brigham 2008; Conley et al. 2012). Russian politics is also a major source of uncertainty. As Russia is the largest stakeholder in the Arctic, exerting great influence on future economic activities as well as governance and security conditions, the twists and turns of Russian politics are of vital importance (cf. Blakkisrud et al. 2008; Seidler 2009; Rabinowitz 2009; Billyard et al. 2010).

However, several studies also consider additional wildcards. It can be major oil spills, shipping disasters, foreign ships that enter into national territorial water without consent, conflicts in other parts of the world that spill into the Arctic, terrorist attacks, etc. Such events may be included in the storylines, but in some cases the wildcards are brought in after the presentation of the scenarios, as the question is raised: “what if...?” (e.g. Brunstad et al. 2004; Hernes et al. 2007; Arctic Council 2009; Ducharme & Brightman 2011). The introduction of wildcards then serves as a starting point for a discussion of the scenarios and their foundation.

In future studies, uncertainties abound. There is no crystal ball into which the future can be gazed. When reliable predictions and forecasts are in short supply, thinking in terms of alternative futures might be the only option for robust policy-making and strategy development. Hopefully, our review will stimulate further thoughts and reflections on the future of the Arctic. We hope that others will supplement with more reviews, and that these activities will contribute to a better foundation for future oriented studies of this rapidly changing region.

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