



Organizational learning in regional governance: A study of the Arctic Council

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This publication is the unabridged version of Chapter 6 in the Arctic Resilience Report, published November 2016 and available at:
<https://www.sei-international.org/publications?pid=3051>

Cover photo: Arctic Council meeting in Yellowknife, NWT, Canada, showing the typical layout of the meeting room at a Senior Arctic Officials meeting © Arctic Council Secretariat / Linnea Nordström

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STOCKHOLM ENVIRONMENT INSTITUTE

Working Paper No. 2016-14

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PREFACE

After several decades of focus on global processes in environmental politics, there is a re-emerging interest in international regions as venues for collaboration around shared environmental challenges. A regional focus makes it easier to take specific physical, cultural and political features into account and can potentially also reduce the number of stakeholders that need to be involved in the decisions. The Arctic is an example of how such a regional focus in international governance has not only led to political decisions that benefit the environment, but also created communities of practice and activities that uphold the notions of the Arctic as an internationally recognized region.

But regional governance also faces a dilemma when it needs to find its specific role in a complex international governance landscape, as well as in relation to what is often referred to as “fit”. This notion captures an idea that there is some ideal scope and scale of governance in relation to the challenges that need to be met. But the concept of fit is problematic in a globally interconnected world. In the Arctic, many of the drivers of change relate to global processes, such as climate change, long-range transport of pollutants, and volatile resource markets, which raises questions about what role a regional governance body should play in relation to other international governance bodies. In the construction of mandates for regional international governance, there is also a tension in relation to national interests and to local and subnational agency and responsibilities. In order to find its own unique niche, any regional governance body will therefore by necessity need to be adaptive to the political context in which it is situated. However, if it is to make a difference, it also needs to be able to take on the issues facing the region in ways that affect its environment and the well-being of people living there.

This paper explores how the Arctic Council has developed over time to meet three important challenges facing the Arctic: pollution, climate change, and the expansion of extractive industries. The Arctic is changing rapidly in a multitude of ways – environmental, social and economic – and the purpose of this study is to analyze when and how the Arctic Council as an organization has been able to learn in ways that have made it possible to take on new issues in spite of the challenges of fit for a regional governance body. The paper was developed in context of the Arctic Resilience Assessment and is an unabridged version of the chapter Learning to Live with Change, published in Arctic Resilience Report (Nilsson and Meek 2016). The production of the full chapter as a separate report has been supported by the project Arctic Governance and the Question of Fit in a Globalized World, funded by the Swedish Research Council Formas.

Stockholm October 2016
Annika E. Nilsson

SUMMARY

Rapid change and uncertainty create new demands on governance structures, especially to accommodate new knowledge and take action to respond to new priority issues. This study focuses on organizational learning in Arctic regional international governance. It specifically addressed how the Arctic Council has responded to global pressures from pollution, climate change and increasing demand for resources and its links to extractive industries. While the Arctic Council has been able to accommodate some issues that were not prominent when its structure was first created, the current set-up has not facilitated the inclusion of new issues and perspectives. There is thus a need for the Arctic Council to think about ways in which learning can be facilitated, especially for issues requiring a broad range of expertise or which may be politically contentious. As challenges extend across spatial scales, the notion of governance fit is better applied to the organizational capacity for learning than to identifying the best scale and scope of governance arrangements.

1. INTRODUCTION

As the Arctic's sole circumpolar high-level policy forum, the Arctic Council has potential to connect decision-making at the local and international levels. While the Arctic Council has played this kind of bridging role on some issues, it has been less active in relation to other issues. This report discusses how the notion of "adaptive governance" could help the Arctic Council to be more nimble in responding to rapid environmental and social change. We specifically focus on learning as a central aspect of governance (see Figure 1). We also analyze how the Arctic Council has taken on three global drivers of change: pollution, climate change, and demand for natural resources and its link to extractive industries. The report concludes with a discussion of how the Arctic Council might improve its ability to respond to rapid environmental and social changes, and also to the inherent uncertainty of governing in the context of non-linear, uncertain, and potentially transformative changes.

2. ADAPTIVE GOVERNANCE AND BEYOND

The Arctic Resilience Interim Report highlights responsiveness to change as a central aspect of governance in the "Anthropocene" (Kofinas et al. 2013). This includes understanding change through systematic social and ecological monitoring and data collection, as well as through new ways of communicating across scales. The literature on resilience has identified "bridging organizations" as key features of successful management at the local level because they can facilitate communication across levels (Olsson et al. 2007). Given the potential for transformative change in the Arctic, there is also a need to create processes that facilitate reflection about underlying assumptions and which take different perspectives into account, in order to provide a more nuanced understanding of changes and challenges.

Wyborn (2015) summarizes adaptive governance as "decision-making that anticipates, learns from and responds to change", and puts forward adaptive co-management as an important extension of the concept. Co-management has been developed in several contexts of resource management within the Arctic, and it requires that different knowledge systems and perspectives be shared through partnership and inclusive decision-making. So, adaptive co-management is an approach that merges the goal of continued learning with the partnerships that are central for co-management regimes. However, while this kind of learning aims to make the current mode of management more effective, it does not necessarily shift any of its underlying assumptions. As a means to do so, Wyborn therefore sets out the idea of "co-productive governance", which demands attention to the dynamic interplay among context, knowledge, process, and visions of governance. It includes a readiness to re-evaluate not only specific policies, but also overarching assumptions and mental models, including how and for what goals we make joint decisions in

society. Co-productive governance highlights the normative (what we morally should do) and cognitive (what we know and think) elements of governance, and also addresses how these elements emerge in specific contexts.

Historically, shifts in the overarching logic of norms and goals in international decision-making have taken place in reaction to new major challenges combined with the space for a wider range of voices in the discussion. One example is the focus on sustainable development as a framework for international environmental governance that has its roots in the 1980s and became institutionalized at the 1992 UN Conference on Environment and Development in Rio de Janeiro. This focus highlighted tensions and links between environmental, social and economic development, and also brought a new normative emphasis on responsibility for future generations (World Commission on Environment and Development 1987). Moreover, new knowledge and new mental models affected how environmental issues were viewed in society, including the notion that many environmental processes are global in nature, requiring international cooperation.

Another example is the birth of circumpolar cooperation, which was a response to a combination of new challenges, including new knowledge about the impacts of pollution in the Arctic and an increasing need for cross-border collaboration. In hindsight it is easy to understand how political structures and decision-making develop in response to change. However, with rapid social and environmental change creating new pressures on policy-making every day, and with scientific consensus on anticipated change, there is a need to look critically at the capacity for learning within current structures, and how that capacity could be improved.

There are many definitions of learning. One of the more relevant ones for the study of governance is Sabatier's notion of policy learning as "relatively enduring alterations of thought or behavioural intentions that result from experience and that are concerned with the attainment or revision of the precepts of one's belief system" (Sabatier 1987, p.673). In this definition, learning goes beyond acquiring new factual knowledge and includes using it to revise basic premises or beliefs.

Others have categorized learning as either single, double, or triple-loop learning (see Figure 1). Single-loop learning includes new knowledge within existing ways of framing an issue, while double loop learning is more fundamental in that it includes a reassessment of the operational framework of beliefs, norms and objectives (Siebenhüner 2002). Siebenhüner goes on to describe triple-loop learning as "learning to learn", that is, when an organization reflects on the procedures by which it collects, evaluates and takes action on new knowledge. Chapin et al. (2009) also suggest that altering the rules of decision-making is part of triple-loop learning.

What types of learning are evident within the Arctic Council? What structures and practices within it can facilitate different types of learning? Koivurova et al. (2015) describe a shift in emphasis from early efforts to create normative frameworks to scientific assessments as an example of learning and adaptation. Efforts to create guidelines for activities in the Arctic had limited influence, including those on Environmental Impact Assessments that were never put into practice. More recently, the Arctic Council has had to adapt to increasing attention on the Arctic and has responded by strengthening its organizational structure. Koivurova et al. (2015) argue that these developments illustrate how the soft-law character of Arctic cooperation has allowed enough flexibility for the Arctic Council to successfully navigate its role in a complex governance landscape, where due attention is needed to both international and national processes. Another important factor is that the Arctic Council has created a platform for building epistemic communities, including scientists, government officials and indigenous peoples.

Within this overall success as an adaptive governance regime, the picture is more mixed. While, the Arctic Council has played an important role for policy learning in some areas, it has been less successful in others. It is therefore pertinent to look in more detail at when and why policy learning has or hasn't taken place. The following sections look at three different challenges facing

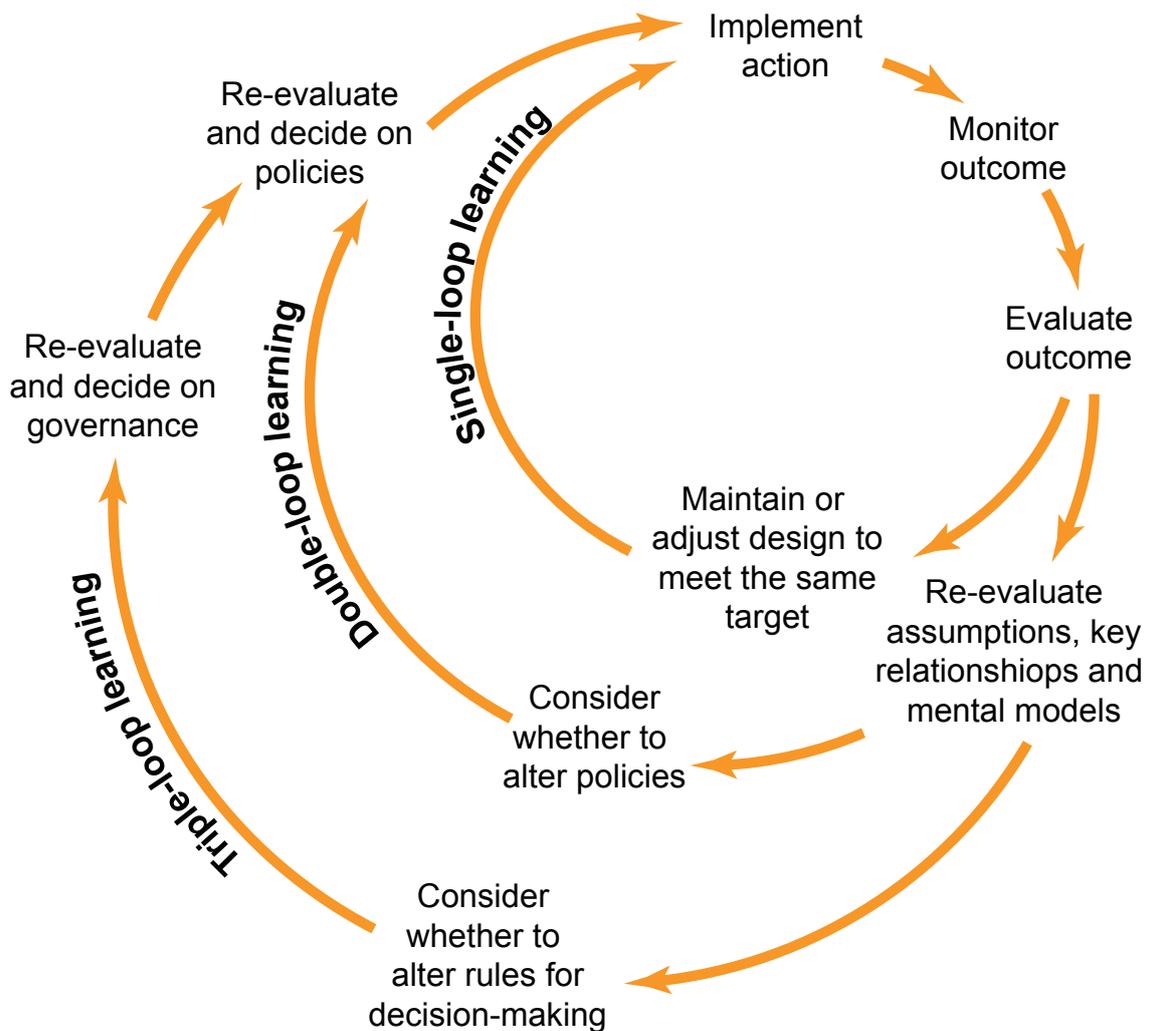


Figure 1: In single-loop learning, new knowledge is added within an existing conceptual framing, whereas double- and triple-loop learning requires reassessing old beliefs, norms and objectives. Figure adapted from: Chapin et al. (2009).

the Arctic – persistent organic pollutants, climate change and global resource demand linked to extractive industries – that do not have a perfect fit with the Arctic Council’s geographical scope and its mandate as a circumpolar forum for cooperation, because they have both global and local dimensions. We examine the question: when and how has the Arctic Council changed its position or its way of working in response to new information? The purpose of this analysis is to identify how the Arctic Council could become more effective as a learning organization in ways that reach into the underlying assumptions behind its activities, while also building on its achievements.

3. PERSISTENT ORGANIC POLLUTANTS

Pollution has been a central issue for Arctic circumpolar political cooperation since the early 1990s. It was a core part of the Arctic Environmental Protection Strategy (AEPS), and, together with sustainable development, is also central for the Arctic Council. Pollution has a clear organizational home in the Arctic Monitoring and Assessment Programme (AMAP) Working Group, which has the mandate to “propose actions to reduce associated threats for consideration by governments.”

The pollution issue that has received the most attention is persistent organic pollutants (POPs). The story of the science and policy of POPs in the Arctic has been documented by several people who were active in the policy processes (Downie and Fenge 2003; Stone 2015), but also as part of the cognitive work that circumpolar cooperation has enabled (Schram Stokke 2006; Nilsson 2012). It is often heralded as an example of successful Arctic cooperation, and is therefore a useful example for analyzing whether there are particular features of Arctic cooperation that have facilitated this success.

Arctic work on POPs almost co-evolved with the international politics of chemicals, which contributed to its success when networks that were created for other reasons could be easily integrated into the new international cooperation of the Arctic Environmental Protection Strategy (AEPS). For example, Canada had been running its Northern Contaminants Programme since the 1980s with well-established routines for communication not only between scientists and the policy sphere, but also with indigenous representatives. Internationally, negotiations were already under way to include POPs in the UN Economic Commission for Europe (UNECE) Convention on Long-range Transboundary Air Pollution (CLRTAP). Some of the same people took part in the negotiations to establish the AEPS. It is therefore not a coincidence that there was a good fit between the POPs issue and the structure of Arctic cooperation. And when AMAP published its first major assessment in 1997 (AMAP 1997), some of the findings presented in the chapter on POPs had already become part of the international negotiations under way through CLRTAP. What Arctic cooperation through AMAP was able to achieve was to focus the world's attention on the heightened susceptibility of the Arctic region to the accumulation of POPs in both people and the environment, as evidenced by the preamble in the 2001 Stockholm Convention on Persistent Organic Pollutants (2001).

Since then AMAP has published several updated assessments that include attention to new chemicals, new knowledge about impacts, signs of the effects of policy action, and how levels of POPs in the environment may be affected by climate change (AMAP 2002; Macdonald et al. 2002; AMAP 2009b). From the perspective of understanding the role of the Arctic Council in the continued work on chemicals policy, it is important that some of the ideas of monitoring from AMAP were "exported" to the international conventions, which gave the Arctic and AMAP a specific role in providing updated information on both old and new chemicals in the Arctic environment. In spite of the fact that some of the specific individuals have since been replaced by others, the links between AMAP and the POPs convention, and the related epistemic community, have remained and even expanded. Through AMAP, the Arctic Council thus served as a bridging organization that made local Arctic issues a global concern.

Given the success of the Arctic Council in influencing global policy processes, the need for organizational learning may not seem acute: the working model has been a success. However, the details of how the POPs issue has developed in the Arctic Council show that policy learning has taken place. One of the most important ways relates to a finding in the first AMAP report: that there were also substantial local sources of POPs *within* the Arctic. The major initial framing of the POPs issue was that these chemicals were transported to the Arctic by air and to some extent water and accumulated in the Arctic because of the cold conditions and the nature of the marine ecosystems, which have many trophic levels in the food web and fat as a key source of energy (AMAP 1997). These characteristics contribute to bio-magnification of POPs and high levels in top predators. With this framing, international regulation was a necessity as emissions from anywhere in the world can eventually reach the Arctic. However, it soon became clear that POP levels in some places were higher than could be easily explained by long-range transport, and scientists started to turn their attention to local sources. These included emissions from burning trash, but also from dumped toxic material and continued use of some POPs, especially in Russia. While these sources would be covered by the global convention, the Arctic Council also acknowledged that circumpolar cooperation had a special role to play in taking care of them. In 2000 the Council endorsed and adopted the Arctic Council Action Plan to Eliminate

Pollution of the Arctic (Arctic Council 2000a). In addition to POPs, the work would focus on heavy metals and radioactive pollution, which had also been a focus of the first AMAP assessment. In 2006 this plan was transformed into a new working group and renamed the Arctic Contaminants Action Program (ACAP). Its mission is to act “as a strengthening and supporting mechanism to encourage national actions to reduce emissions and other releases of pollutants”, and it has a budget to back up this mission.

In summary, the co-evolution of Arctic cooperation and the emergence of POPs as an environmental and health concern in the Arctic, both scientifically and politically, created a good fit between the organizational structure of the Arctic Council, exemplified by AMAP, and the actions needed to meet the challenge. Moreover, when new knowledge revealed local and regional sources of POPs in the Arctic and a complementary *modus operandi* was needed, an action plan was formulated and later successfully turned into a separate policy initiative and working group. On one level, the conditions and degree of success are unique. But AMAP’s assessment and Arctic Council initiatives have served a similar role in relation to the Minamata Convention on Mercury (Koivurova, Kankaanpää and Stepień 2015), which may indicate some organizational learning across issue areas about how to navigate global environmental politics in a way that focuses attention on Arctic concerns.

4. CLIMATE CHANGE

The evolution of attention to climate change in Arctic circumpolar cooperation has been described in some detail (Nilsson 2007; Koivurova et al. 2009; Nilsson 2012). In short, climate change was mentioned as a potential concern when circumpolar political cooperation was first formalized in the AEPS, but it was not prioritized because it was seen as a global issue that should primarily be handled by global cooperative mechanisms, such as the Intergovernmental Panel on Climate Change (IPCC) and the United Nations Framework Convention on Climate Change (UNFCCC). The first major AMAP assessment (Weatherhead 1998) gave some attention to climate change, but did not highlight specific policy action on it, only stating that Arctic countries should support the UNFCCC process. However, for the scientific community, Arctic climate change was a major issue (Nilsson 2007; Wormbs et al. forthcoming). By the end of the 1990s, climate science had advanced far enough that it was reasonable to assume that the impacts in the Arctic would be more severe than elsewhere, but the knowledge about regional climate dynamics and their potential impacts was limited. Moreover, concerns were growing both in the scientific community and among the Arctic’s Indigenous Peoples about the slow progress in international negotiations, creating strong incentives for a thorough assessment of the impacts of climate change in the Arctic. These interests merged with AMAP’s effort to follow up on its first major assessment, and in 2000 the Arctic Climate Impact Assessment (ACIA) was launched. Four years later its plain language summary report was released (ACIA 2004), followed by the full assessment report (ACIA 2005).

The ACIA process had features of double-loop learning. First, the assessment process was set up differently from previous assessments in that it included collaboration between two working groups, AMAP and Conservation of Arctic Flora and Fauna (CAFF), as well as with a separate organization, the International Arctic Science Committee (IASC), which brought in broader expertise than there would have been had ACIA been set within one single working group. Moreover, the Arctic Council recognized the need for social and economic expertise and requested that this be included in the assessment. The assessment was also the first within the Arctic Council to integrate Indigenous Knowledge in a systematic manner. As a result of the new knowledge from the assessment process, the Arctic Council, in the 2002 Inari Declaration, recognized climate change as a new issue of concern and expressed its intent to “reinforce dialogue on climate policy and help deal with vulnerability and adaptability” (Arctic Council 2000b). This new policy stance did not immediately translate into policy action, however, and the framing that climate change policy should mainly be a global concern remained.

Because the ACIA was not a standard working group activity and its policy implications were politically controversial for some member states, it was not self-evident how it should be followed up on. Impacts of climate change were also relevant across the different working groups. In practice, immediate follow-up action was limited to launching the Arctic Marine Shipping Assessment (AMSA), which examines the need for new regulations of marine shipping as a consequence of the receding ice cover. AMSA is led by the Working Group for the Protection of Arctic Marine Environment (PAME), where it has a natural fit with its mandate. AMSA's first report was issued in 2009 (Arctic Council 2009a) and since then several follow-up reports have been published. AMSA is in fact one of the few Arctic Council assessments that has had its recommendations followed up on in a structured manner.

Efforts were made to create a "focal point" on climate change as a means to link activities across the working groups, but this initiative vanished fairly fast. Also, the Salekhard Declaration directed the Sustainable Development Working Group to draw on expertise from the other working groups and other stakeholders to learn about best practice and potential adaptation action (Arctic Council 2006). However, these efforts only resulted in small-scale activities, including compiling findings and recommendations developed by past Arctic Council assessments that could inform adaptation strategies, and information about existing adaptation efforts in Arctic states and regions. The next steps to develop knowledge on climate change and its impacts were an assessment focusing on the cryosphere (SWIPA) and an update of the ACIA with modest ambitions that resulted in the 2009 report Update on Selected Climate Issues of Concern (AMAP 2009a), both led by AMAP.

Following the publication of Update on Selected Climate Issues of Concern and a report on the Greenland ice sheet as part of the SWIPA project (AMAP 2009c), the 2009 Tromsø Declaration spoke about the urgency of action on climate change and called for states to commit to climate-change action through the UNFCCC and to recognize the need for adaptation actions (Arctic Council 2009b). However, these calls were not accompanied by any specifics on what they would entail for the Arctic Council itself. So, in this case, it appears that the structure of the Arctic Council did not facilitate the kind of double-loop learning that would have shifted how members of the Council framed its role in relation to climate policy. Mitigation of climate change was still seen as a global concern rather than one in which members states should collectively take a lead.

There is one exception. The Arctic Council did take on the issue of short-lived climate forcers by setting up a task force in 2009 "to identify existing and new measures to reduce emissions of these forcers and recommend further immediate actions that can be taken." This can be seen as the first, but very limited, attempt to start addressing the pressures that contribute to climate change in the Arctic. This task force has since delivered several reports that clearly show that while short-lived climate forcers are important for Arctic warming, they represent only a fraction of the warming potential from carbon dioxide (Arctic Council 2011; Arctic Council 2013a).

When SWIPA presented its report in 2011, the results confirmed earlier assessments of rapid climate change with major impacts in the Arctic (AMAP 2011). By this time, the 2007 record low sea ice minimum had turned the world's attention to climate impacts in the Arctic and the 2007/2008 International Polar Year had brought a wealth of new knowledge about climate change, including studies on vulnerability and adaptation. Within the Arctic Council, however, it was still difficult to identify a locus of responsibility for this issue which negatively affected its ability to act. Various activities were initiated and carried out in different contexts, including the Arctic Marine Shipping Assessment (Arctic Council 2009a), attention to the impacts of climate change on biodiversity in the Arctic Biodiversity Assessment (CAFF 2013), ongoing work on climate modeling within AMAP, and some efforts to support sharing of information on adaptation, but it was difficult to get consensus about the need for an assessment that would give a more overarching picture, even though a proposal for such an assessment (the Arctic Change Assessment – ACA) was prepared. Based on intense negotiation between member states, attention was instead focused on adaptation in the project called

Adaptation Actions for a Changing Arctic, with various activities led by different working groups. A major forthcoming output is a set of pilot sub-regional assessments focusing on the Barents region, Davis Strait-Baffin Bay, and the Bering-Beaufort-Chukchi region.¹

The new focus on sub-regions rather than the circumpolar scale is especially relevant for adaptation issues. The shift in scale creates a new setting for bringing different types of expertise together, including a broader set of stakeholders, such as local decision makers and businesses. It is too early to judge the impacts of the new focus, but the ambitions of engaging more broadly with regional actors may in the longer run lead to an improved and more nuanced understanding of climate change challenges across the Arctic. However, the link between the different working groups is still very weak, and so far the AACA process has not led to a major reframing of how the Arctic Council organizes its work to better address climate change. For example, the different parts of the AACA packet have been carried out as separate exercises. Part A, completed by the SDWG, was essentially a compilation of assessments and reports prepared by Arctic Council working groups over the previous ten years with findings and recommendations that could inform adaptation options and actions (Arctic Council Sustainable Development Working Group 2013). Part B was a study led by Norway and Russia carried out by a consultant (Arctic Council 2013b) that focused on the adaptation activities that were being implemented by Arctic Council member states at national, sub-national, regional and local levels. Part C is a major assessment process led by AMAP. Parts A and B were finalized in 2013, while Part C is set to be finalized in 2017. Recently, some informal discussions have started across the different working groups about the need for rethinking the working group structure, an issue that was also brought up at a workshop organized by the Arctic Resilience Assessment in Tromsø in January 2015. The time may therefore be ripe for a more thorough analysis of the demands that climate change and its impacts place on the organizational structure of the Arctic Council.

The SDWG has supported some work on climate adaptation, which includes the projects EALAT and EALLIN run by the Association of World Reindeer Herders, which focus on the impacts of climate change on reindeer herding. Other activities include its sponsorship of Arctic Human Development Report (AHDR), with a first report presented in 2004 (AHDR 2004) and a second in 2014 (Larsen and Fondahl 2015). Neither report focuses on climate change directly; rather they focus on social and cultural issues, where climate change is an increasingly important part of the context. While the 2004 AHDR, which was launched at the same time as the ACIA, mentioned the impacts of climate change in its introduction as an example of global connections and how the Arctic is an environmental linchpin, it does not integrate climate change into the analysis of social processes. In the AHDR-II, climate change appears as one of three common threads throughout the report, together with gender and globalization, and there is no question that it is part of the social realities of the region. However, aside from a few authors of the AHDR-II who have also been involved in climate related research, there are no systematic links between the AHDR process and the work on climate change carried out in the Arctic Council working groups. While the amount of work put into analysing human development in the Arctic in recent years, along with an increasing number of research projects with integrative ambitions, not least in connection with the International Polar Year 2007-2008, offers much potential for integrated social, cultural and biophysical analysis of climate change, the Arctic Council has not been able to take full advantage of this potential.

In summary, in spite of an acknowledged need for better knowledge about the complexities of adaptation to climate change and policy action, the Arctic Council has had trouble finding new ways of working that are better suited to meet this need than the structures created for addressing quite different issues.

1 See: www.amap.no/adaptation-actions-for-a-changing-arctic-part-c

5. GLOBAL RESOURCE DEMAND AND EXTRACTIVE INDUSTRIES

Extractive industries have played a major role in shaping social development in many parts of the Arctic. This includes industrial development and infrastructure related to oil and gas, as well as mining and other activities related to mineral resources. AMAP's first assessment on Arctic pollution issues (1997) assessed impacts of some extractive industries in the chapters on heavy metals and hydrocarbons. The assessment focused on environmental impacts from pollution, rather than social or economic issues related to extractive industries. The assessment of environmental impacts from oil and gas activities was followed by AMAP's 2007 Oil and Gas Assessment, which provided a thorough background on oil and gas activities, as well as discussion of the social effects and governance responses (AMAP 2007; AMAP 2010). It recommended that the consequences of oil and gas activities should be given increased priority through research, assessment, and guidelines for improved management. With reference to the transboundary nature of pollution from oil and gas activities, the recommendations also called for bilateral and multilateral coordination on preparedness and response to oil spills. This was followed up in the 2008 Tromsø Ministerial Declaration, where the Arctic Council member states decided "to strengthen cooperation related to the prevention of, and response to, accidental spills of oil and hazardous substances in the Arctic" (Arctic Council 2009b). Later on, this decision became the basis for negotiations on the Agreement on Cooperation on Marine Oil Pollution Preparedness and Response in the Arctic, which is the second legally binding agreement negotiated under the auspices of the Arctic Council. Moreover, in the Tromsø Declaration the Arctic Council members "encourage future national, bi-national and multinational contingency plans, training and exercises, to develop effective response measures."

Without a doubt, oil and gas issues are one area where the Arctic Council members have moved from knowledge and assessment to action aimed at preventing pollution, framed as part of protecting the Arctic environment. By contrast, the social aspects of oil and gas industrial development have not been specifically followed up on. The most prominent consideration of social impacts can be found in a few case studies presented in AHDR-II, one focusing on indigenous-industrial relations in Russia (Forbes in Forbes and Kofinas 2014), the other discussing Greenland's legal framework for non-renewable resource exploitation (Lennert in Forbes and Kofinas 2014). However, the AHDR-II was not an Arctic Council report, and thus it is unclear how the Arctic Council will follow up on it. The limited discussion of the social impacts of extractive industries might suggest that the Arctic Council member states do not see this as a task for the Arctic Council. Young and Kankaanpää discuss the broader issue of resource governance and suggest that the cooperation "is not designed to address domestic concerns like establishing and operating co-management regimes governing human-environmental interactions on a local or sub-regional scale" (Young and Kankaanpää in Forbes and Kofinas 2014). Young and Kankaanpää also note that SDWG could potentially play a much stronger role in incorporating issues related to resource management than it has done to date, but that "resultant activities would be politically sensitive, requiring the Council to take an interest in activities occurring within the jurisdiction of individual states" (pp 284-5). However, it would not require adjustment in existing structures of authority, they conclude.

Mining issues have not been thoroughly discussed by the Arctic Council and have been treated mainly as a potential source of heavy metals in the environment (AMAP 1997; AMAP 1998; AMAP 2002). Mining also has major social impacts and is an engine for infrastructure development, but this aspect has not been focused on in any major Arctic Council assessment. It is mentioned many times in the Arctic Human Development Report-II, for example, in discussion about demography, impacts on subsistence activities, the Arctic economy, and the path dependent nature of northern development (Larsen and Fondahl 2015), but without specific recommendations. During the Swedish Chairmanship (2011–2013) the Arctic Council initiated some work on corporate social responsibility, and during the Canadian Chairmanship (2013–2015) the Arctic Economic Council was formed for discussion of best practice among economic actors in the Arctic. However, it does not appear that the Arctic Council sees itself as having any special responsibility for

mining, neither on pollution nor social issues. While there is no explicit rationale for excluding these issues, it seems that Arctic Council implicitly views mining issues as not a primary concern for circumpolar political cooperation.

The challenges in understanding extractive industries as part of social-ecological systems is thus partly related to how the Arctic Council organizes its assessment, but also to political priorities about the Council's role in relation to other levels of governance. At a more general level, the lack of attention to mining issues raises a need to better understand the factors that lead to an issue being seen as relevant for the Arctic Council or not. Sometimes the exclusion of an issue can be a matter of political choice. One example is the specific exclusion of military issues from the Arctic Council mandate, and another is the general avoidance of fishery issues. Perceived overlaps with existing national regulations can also explain why some initiatives have trouble getting traction within the circumpolar cooperation, for example CAFF's effort to promote protected areas in the Arctic countries (Koivurova, Kankaanpää and Stepien 2015). It is nevertheless relevant to also assess to what extent the organizational structures create obstacles for bringing important concerns to the fore.

6. DISCUSSION

Summing up the case studies above, the Arctic Council's organizational structure has been able to accommodate some new issues that were not prominent when the structure was first created (e.g. climate change and the increasing need to understand social dimensions of environmental challenges). But it is also clear that the current structure does not facilitate the inclusion of new issues and perspectives, partly because knowledge networks are organized within working groups, each with their respective sphere of interest. For example, in spite of the increasing impacts of mining in the Arctic, this issue has not been a focus of any scientific assessment. For climate change the initial response of the Arctic Council was slow, as was the follow-up after the ACIA, with the exception of AMSA with its clear organizational home in PAME.

It is also a challenge to take the step from scientific assessment to addressing the source of the pressure on the environment and social development. While there are successes, such as the role that the Council has played and continues to play in international chemicals management and emerging cooperation on preventing oil spills, it also might have acted more purposefully on addressing emissions of greenhouse gases. It is clear that, so far, the Arctic Council has found it difficult to overcome the political challenges that spill over from global climate politics, even if climate change is often described as one of the major pressures facing the region.

How can the successes and problems be understood in light of insights from learning in other settings? Studies of social learning and environmental governance have identified several organizational features that increase the capacity for social learning. They include openness and transparency in decision-making processes, participation, dialogue, trust, and social networks that cut across various communities of practice. Studies of mechanisms of social learning highlight issues of participation (e.g. who is present and power relations), the process (e.g. the nature of participation and facilitation), the horizontal and vertical links to processes in other organizations or at other governance levels, and how different norms shape social interactions in specific institutional contexts (Mostert et al. 2007; Pelling et al. 2008; Siebenhüner 2002). Such norms can relate to boundary management (Guston 2001; Miller 2001), that is, how the boundary between policy and science is organized and negotiated. Another feature is the extent to which the norms allow for so-called shadow systems, which are channels of communication where issues can move forward even if they are difficult to handle within the formal decision-making processes (Pelling et al. 2008). Last, but not least, is the issue of how the institutional context contributes to trust (Pahl-Wostl et al. 2007; Mostert et al. 2007). How have these features played out in the Arctic Council in the three case studies?

Broad participation appears central to the Arctic Council's success on the issue of persistent organic pollutants, where actors with influence and knowledge about ongoing policy processes appear to be key to making the scientific assessment directly useful in creating new policy. Moreover, the early participation of Indigenous Peoples in this dialogue was also important, helping to create a cross-scale link in which Arctic Council activities served as a connecting point between national and, to some extent, local concerns and global processes. This participation appears to have made the new knowledge from the assessment salient to key policy actors, a feature that, together with credibility and legitimacy, is crucial for environmental assessment to be successfully incorporated into policy (Mitchell et al. 2006).

On the surface, it would seem that the Arctic Council could have served a similar role on climate change, in terms of generating knowledge that directly influenced policy. However, while the ACIA and later Arctic Council assessments focusing on climate change have informed the IPCC, they have not had substantial impacts on climate policy. Because links to the global policy processes were present in the ACIA policy negotiation (e.g. through the participation of people who also acted as national negotiators in the UNFCCC) the bottleneck lies elsewhere, or rather, the same bottlenecks that were present at the global level also applied in the Arctic Council. Based on studies of the ACIA process and its immediate follow-up, lack of trust was identified as one of the major issues, including a lack of confidence on the part of some in the integrity of the scientific process, which added to the challenges caused by strong national interests and different perspectives among the Arctic Council member states. Issues of communication between the Senior Arctic Officials and the working groups most likely added to the difficulties. Scientific credibility as such was not in question; the challenges were related more to the process of transforming scientific insights into policy recommendations (Nilsson 2012).

Trust in this case is about all parties having confidence in the legitimacy of processes used for knowledge production and decision-making. Such confidence, along with a sense that all parties are genuinely interested in listening to each other's concerns, is likely to become increasingly important as Arctic residents and decision-makers face choices about how to move forwards where different interests may interfere with each other. Such trust usually requires transparency and willingness for all parties to participate, as well as opportunities to do so. At the same time, the Arctic Council has grown, with new observers making it more challenging to create an informal atmosphere of trust. Together with the fact that the Arctic Council faces more contentious issues, it cannot be taken for granted that Arctic actors have shared interests and shared perspectives. Arctic international cooperation has in a sense become more like international cooperation in general, where the building of trust and transparency requires concerted efforts. The legitimacy of the assessment processes and their links to policy processes are crucial, pointing to the central role of reflecting on how the relationships between basic knowledge production, assessments and policy processes are managed.

While in many ways the Arctic Council has been successful in adapting to new challenges by taking on innovative activities, especially in the realm of knowledge production, there have also been limitations in its ability to redress some of the real problems facing people living in the Arctic. Given the increasing need for action and the growing number of interested actors, some of these problems are likely to be exacerbated in the future. Some of the limitations of the Arctic Council have to do with the appropriate scale of governance in relation to the issues to be tackled. This is often termed the "fit" of governance (Folke et al. 2007; Young 2002; Galaz et al. 2008). It is inevitable that regional organizations face challenges in addressing problems that stem from global processes. Likewise, circumpolar cooperation is not likely to be able to provide an adequate setting for addressing community concerns that requires knowledge about the local social and environmental context and engagement from local actors. Also, when national interests are central, some issues are more likely to be perceived as national rather than international concerns, making Arctic Council members unwilling to engage with them in the Arctic Council setting. Moreover, the Arctic Council is a soft-law body and is thus dependent on its

member states for translating normative goals to national policies and also for pushing agreed priorities in international negotiations.

One way to overcome this inevitable challenge for political decision-making at the circumpolar level is to create conditions that favour vertical links and communication across political levels. In the case of persistent organic pollutants, participation by actors engaged at different levels of governance, from national to international, contributed to the success, while for the politically more contentious issue of climate change the lack of perceived fit created challenges. For oil and gas, it appears that the Arctic Council has been able to carve out a niche of international cooperation where the fit is moderately good because of a need to collaborate across national jurisdictions without it being useful to frame the practical collaboration as a global concern. For mineral resources and mining, one could argue that the issue does not fit within the mandate of the Arctic Council based on the fact that there has been no articulated need for international collaboration in addressing potential social and environmental challenges related to mining. The extent to which the Arctic Council should engage in the issue would depend on the extent to which it should engage in broader issues of sustainable development within the member states. The issue of mineral resources and mining would thus be part of a much broader discussion of the role of the Arctic Council for sustainable development across the circumpolar North.

In spite of some issues appearing to have a better fit than others, whether an issue is indeed taken up by the Arctic Council is a matter of political negotiation, in which knowledge and learning is only one aspect to take into account and where the issue of fit becomes part of a social negotiation (Lebel et al. 2005; Brenner 2001). However, in a world where interactions across scales and connectivity is the norm rather than the exception, and when rapid change creates a need for adaptive governance, it could be useful to think about the notion of fit as the capacity for an organization to learn and be adaptive to new challenges, instead of focusing on how its mandate fits within the specific scale or scope of an issue. Thus, in order to assess fit and to support the Council's organizational development, it may be relevant to explicitly examine the structures that bridge across scales and issue areas, as well as those that provide space for innovation and reframing of issues, and also help the Council pick up on new developments that do not fall into the fields of expertise and interests of the current working groups. Moreover, there appears to be a need for more ways to create links between the expert communities associated with the different working groups, especially between the natural and the social sciences.

7. CONCLUSIONS

Rapid change and uncertainty create new demands on governance structures, especially to accommodate new knowledge and take action to respond to new priority issues. While the Arctic Council has been able to accommodate some issues that were not prominent when the working group structure was first created, including climate change, the current set-up has not facilitated the inclusion of new issues and perspectives. There is thus a need for the Arctic Council to think about ways in which learning can be facilitated, especially for issues requiring a broad range of expertise or which may be politically contentious. As challenges extend across spatial scales, there is a risk that responsibility will be placed elsewhere simply because the Arctic Council is not seen as the ideal policy venue in scope and scale for the challenges at hand. Therefore, the notion of governance fit is better applied to the organizational capacity for learning than to identifying the best scale and scope of governance arrangements.

REFERENCES

- ACIA (2005) *Arctic Climate Impact Assessment*. Cambridge University Press, Cambridge, UK.
- ACIA (2004) *Impacts of a Warming Arctic: Arctic Climate Impact Assessment*. Cambridge University Press, Cambridge, UK.
- AHDR (2004) *Arctic Human Development Report*. Stefansson Arctic Institute, Akureyri, Iceland.
- AMAP (2011) *Snow, Water, Ice and Permafrost in the Arctic (SWIPA): Climate Change and the Cryosphere*. Arctic Monitoring and Assessment Programme, Oslo, Norway.
- AMAP (2010) *Assessment 2007 - Oil and Gas in the Arctic: Effects and Potential Effects. Vol 1*. Arctic Monitoring and Assessment Programme, Oslo, Norway.
- AMAP (2009a) *AMAP 2009 Update on Selected Climate Issues of Concern (Observations, Short-Lived Climate Forcers, Arctic Carbon Cycle, Predictive Capability)*. Arctic Monitoring and Assessment Programme (AMAP), Oslo, Norway.
- AMAP (2009b) *Arctic Pollution 2009*. Arctic Monitoring and Assessment Programme, Oslo, Norway.
- AMAP (2009c) *The Greenland Ice Sheet in a Changing Climate. Snow, Water, Ice and Permafrost in the Arctic (SWIPA)*. Arctic Monitoring and Assessment Programme (AMAP), Oslo, Norway.
- AMAP (2007) *Arctic Oil and Gas 2007*. Arctic Monitoring and Assessment Programme, Oslo, Norway.
- AMAP (2002) *Arctic Pollution Issues 2002*. Arctic Monitoring and Assessment Programme, Oslo, Norway.
- AMAP (1998) *AMAP Assessment Report: Arctic Pollution Issues*. Arctic Monitoring and Assessment Programme, Oslo, Norway.
- AMAP (1997) *Arctic Pollution Issues: A State of the Arctic Environment Report*. Arctic Monitoring and Assessment Programme, Oslo, Norway.
- Arctic Council (2013a) *Arctic Council Task Force on Short-Lived Climate Forcers - Recommendations to Reduce Black Carbon and Methane Emissions to Slow Arctic Climate Change*. <https://oaarchive.arctic-council.org/handle/11374/80>.
- Arctic Council (2013b) *Taking Stock of Adaptation Programs in the Arctic*. <http://www.amap.no/documents/doc/aaca-part-b-taking-stock-of-adaptation-programs-in-the-arctic/1060>.
- Arctic Council (2011) *An Assessment of Emission and Mitigation Options for Black Carbon for the Arctic Council. Technical Report of the Arctic Council Task Force on Short-Lived Climate Forcers*. Arctic Council. <https://oaarchive.arctic-council.org/handle/11374/926>.
- Arctic Council (2009a) *Arctic Marine Shipping Assessment 2009 Report*. <http://www.pame.is/index.php/projects/arctic-marine-shipping/amsa/amsa-2009-report>
- Arctic Council (2009b) 'Tromsø Declaration on the Occasion of the Sixth Ministerial Meeting of The Arctic Council. 29 April, 2009. Tromsø, Norway'. <http://hdl.handle.net/11374/91>
- Arctic Council (2006) 'The Salekhard Declaration on the Occasion of the Arctic Council Fifth Ministerial Meeting. 26 October 2006. Sakhelard, Russia'. <http://hdl.handle.net/11374/90>

- Arctic Council (2000a) 'Barrow Declaration on the Occasion of the Second Ministerial Meeting of the Arctic Council. 13 October 2000. Barrow, Alaska, United States'. <http://hdl.handle.net/11374/87>
- Arctic Council (2000b) 'The Inari Declaration on the Occasion of the Third Ministerial Meeting of the Arctic Council. 10 October 2002. Inari, Finland'. <http://hdl.handle.net/11374/88>
- Arctic Council Sustainable Development Working Group (2013) 'Adaptation Actions for a Changing Arctic (a)'. <http://www.amap.no/documents/doc/aaca-part-a-final-synthesis-report/1059>.
- Argyris, C. and Schön, D. (1996) *Organizational Learning II: Theory, Method and Practice*. Addison-Wesley, Reading, MA.
- Brenner, N. (2001) 'The limits to scale? Methodological reflections on scalar structuration'. *Progress in Human Geography*, 25(4). 591–614. doi:10.1191/030913201682688959.
- CAFF ed. (2013) *Arctic Biodiversity Assessment*. CAFF International Secretariat, Akureyri, Iceland.
- Chapin, F. S. , Folke, C. and Kofinas, G. P. (2009) 'A Framework for Understanding Change'. *Principles of Ecosystem Stewardship*, C. Folke, G. P. Kofinas, and F. S. Chapin (eds.). Springer New York. 3–28.
- Downie, D. and Fenge, T. eds. (2003) *Northern Lights Against POPs*. McGill-Queen's University Press, Montreal & Kingston.
- Folke, C., Pritchard, L., Berkes, F., Colding, J. and Svedin, U. (2007) 'The problem of fit between ecosystems and institutions. Ten years later'. *Ecology and Society*, 12(1). 30. [online] URL: <http://www.ecologyandsociety.org/vol12/iss1/art30/>
- Forbes, B. C. and Kofinas, G. P. (2014) 'Resource governance'. *Arctic Human Development Report. Regional Processes and Global Challenges*. J. Nymand Larsen and G. Fondahl (eds.). TemaNord, 2014:567 Nordic Council of Ministers, Copenhagen, Denmark. 255–298.
- Galaz, V., Olsson, P., Hahn, T., Folke, C. and Svedin, U. (2008) 'The problem of fit among biophysical systems, environmental and resource regimes, and broader governance systems: Insights and emerging challenges'. *Institutions and Environmental Change. Principal Findings, Applications, and Research Frontiers* MIT Press, Cambridge, MA. 147–86.
- Guston, D. H. (2001) 'Boundary organizations in environmental policy and science: An introduction'. *Science, Technology & Human Values*, 26(4). 399–408.
- Kofinas, G. P., Clark, D. and Hovelsrud, G. K. (2013) 'Adaptive and transformative capacity'. *Arctic Resilience Interim Report 2013*, Arctic Council (ed.). Stockholm Environment Institute and Stockholm Resilience Centre, Stockholm, Sweden. 73–93.
- Koivurova, T., Kankaanpää, P. and Stepień, A. (2015) 'Innovative Environmental Protection: Lessons from the Arctic'. *Journal of Environmental Law*, 27(2). 285–311. doi:10.1093/jel/equ037.
- Koivurova, T., Keskkitalo, E. C. H. and Bankes, N. (2009) *Climate Governance in the Arctic*. Environment & Policy. Springer, Dordrecht.
- Larsen, J. N. and Fondahl, G. (2015) *Arctic Human Development Report. Regional Processes and Global Challenges*. TemaNord, 2014:567 Nordic Council of Ministers, Copenhagen, Denmark. <http://urn.kb.se/resolve?urn=urn:nbn:se:norden:org:diva-3809>.
- Lebel, L., Garden, P. and Imamura, M. (2005) 'The Politics of Scale, Position, and Place in the Governance of Water Resources in the Mekong Region'. *Ecology and Society*, 10(2). 18. [online] URL: <http://www.ecologyandsociety.org/vol10/iss2/art18/>

- Macdonald, R. W., Harner, T., Fyfe, H., Loeng, H. and Weingartner, T. (2002) *AMAP Assessment 2002: The Influence of Global Change on Contaminant Pathways To, Within, and From the Arctic*. Arctic Monitoring and Assessment Programme (AMAP), Oslo, Norway.
- Miller, C. (2001) 'Hybrid management: boundary organizations, science policy, and environmental governance in the climate regime'. *Science, Technology & Human Values*, 26. 478–500.
- Mitchell, R. B., Clark, W. C. and Cash, D. W. (2006) 'Information and Influence'. *Global Environmental Assessments: Information and Influence* MIT Press, Cambridge, MA. 307–38.
- Mostert, E., Pahl-Wostl, C., Rees, Y., Searle, B., Tabara, D. and Tippett, J. (2007) 'Social Learning in European River-basin Management: Barriers and Fostering Mechanisms From 10 River Basins'. *Ecology and Society*, 12(1). 19 [online] URL: <http://www.ecologyandsociety.org/vol12/iss1/art19/>.
- Nilsson, A. E. (2012) 'Knowing the Arctic: The Arctic Council as a cognitive forerunner'. *The Arctic Council: Its place in the future of Arctic governance*, T. S. Axworthy, T. Koivuova, and K. Hossain (eds.). Munk-Gordon Arctic Security Program, Toronto, Canada. 190-220.
- Nilsson, A. E. (2007) *A Changing Arctic Climate. Science and Policy in the Arctic Climate Impact Assessment*. Dep. of Water and Environmental Studies, Linköping University. <http://www.diva-portal.org/smash/get/diva2:23295/FULLTEXT01.pdf2007>
- Nilsson, A. E. and Meek, C. L. (2016) 'Learning to live with change'. *Arctic Resilience Report*, M. Carson and G. Peterson (eds.). Stockholm Environment Institute and Stockholm Resilience Centre, Stockholm. Chapter 6.
- Olsson, P., Folke, C., Galaz, V. and Schultz, L. (2007) 'Enhancing the Fit through Adaptive Co-management: Creating and Maintaining Bridging Functions for Matching Scales in the Kristianstads Vattenrike Biosphere Reserve, Sweden'. *Ecology and Society*, 12(1). 28. [online] URL: <http://www.ecologyandsociety.org/vol12/iss1/art28/>
- Pahl-Wostl, C., Craps, M., Dewulf, A., Mostert, E., Tabara, D. and Taillieu, T. (2007) 'Social Learning and Water Resources Management'. *Ecology and Society*, 12(2). 5 [online] URL: <http://www.ecologyandsociety.org/vol12/iss2/art5/>
- Pelling, M., High, C., Dearing, J. and Smith, J. (2008) 'Shadow Spaces for Social Learning: a Relational Understanding of Adaptive Capacity to Climate Change within Organisations'. *Environment and Planning*, 40. 867–84.
- Sabatier, P. A. (1987) 'Knowledge, Policy-Oriented Learning, and Policy Change. An Advocacy Coalition Framework'. *Science Communication*, 8(4). 649–92. doi:10.1177/0164025987008004005.
- Siebenhüner, B. (2002) 'How Do Scientific Assessments Learn? Part 1. Conceptual Framework and Case Study of the IPCC'. *Environmental Science & Policy*, 5. 411–20.
- Stockholm Convention on Persistent Organic Pollutants (2001) 'Stockholm Convention on Persistent Organic Pollutants'. <http://chm.pops.int/TheConvention/Overview/TextoftheConvention/tabid/2232/Default.aspx>.
- Stokke, O. S. (2006) 'International Institutions and Arctic Governance'. *International Cooperation and Arctic Governance: Regime Effectiveness and Northern Region Building*, O. S. Stokke and G. Hønneland (eds.). Routledge, London, England. 330–54.
- Stone, D. P. (2015) *The Changing Arctic Environment: The Arctic Messenger*. Cambridge University Press, New York, NY.

- Weatherhead, E. C. (1998) 'Climate change, ozone, and ultraviolet radiation'. *AMAP Assessment Report. Arctic Pollution Issues* Arctic Monitoring and Assessment Programme, Oslo, Norway. 717–74.
- World Commission on Environment and Development (1987) *Our Common Future*. Oxford University Press, Oxford, England.
- Wormbs, N., Döscher, R., Nilsson, A. E. and Sörlin, S. (forthcoming 2017) 'Bellwether, Exceptionalism, and Other Tropes: Political Co-production of Arctic Climate Modelling'. *Cultures of Prediction in Atmospheric and Climate Science*. M. Heymann, G. Gramelsberger and M. Mahoney (eds.). Routledge, London. Ch. 4
- Wyborn, C. (2015) 'Co-productive governance: A relational framework for adaptive governance'. *Global Environmental Change*, 30. 56–67. doi:10.1016/j.gloenvcha.2014.10.009.
- Young, O. R. (2002) *The Institutional Dimensions of Environmental Change. Fit, Interplay, and Scale*. MIT Press, Cambridge, MA.

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