2018 North Pacific Arctic Conference Proceedings

The Arctic in World Affairs

A North Pacific Dialogue on Arctic 2030 and Beyond—Pathways to the Future

Edited by

Robert W. Corell, Jong Deog Kim, Yoon Hyung Kim
Arild Moe, David L. VanderZwaag, Oran R. Young

KMI KOREA MARITIME INSTITUTE

EAST-WEST CENTER

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This volume, *A North Pacific Dialogue on Arctic 2030 and Beyond—Pathways to the Future*, from the 2018 conference, was edited by Robert W. Corell, Jong Deog Kim, Yoon Hyung Kim, Arild Moe, David L. VanderZwaag, and Oran R. Young.

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Preface

The North Pacific Arctic Conference (NPAC), now in its ninth year, provides a venue for off-the-record engagement among policymakers/practitioners and scientists/analysts regarding Arctic issues of mutual interest to leading North Pacific Arctic states (Canada, Russia, and the United States) and non-Arctic states (China, Japan, and Korea). NPAC aims to anticipate and react to emerging policy issues and to promote improved understanding of major options for addressing them among these six states —both in the setting provided by the Arctic Council and in other contexts. All six states are members of the G-20. Together, they account for more than 50 percent of the world's greenhouse gas emissions as well as a large share of global commerce.

Specifically, NPAC endeavors to identify emerging key policy-relevant Arctic issues by considering contemporary global political, economic, and environmental realities and exploring alternative ways to frame them. One goal is to improve the dialogue between practitioners (including government officials, industry executives, Indigenous leaders, and civil society leaders) and analysts (including scientists, engineers, emerging young specialists and other experts) from the Arctic region and beyond. NPAC further seeks to develop effective strategies for communicating emerging key policy findings and the results of relevant scientific research to a range of targeted audiences.

Earth has entered an unprecedented era of transformative change in which human actions have joined biophysical forces as drivers of multifaceted developments on a global scale. The world of the future will differ profoundly from the relatively stable climate that humans have experienced over the past 10,000 years. Global forces are already generating rapid and far-reaching ecological changes in the Arctic. In turn, developments in the Arctic are intensifying both the scale and the pace of global environmental, political, and economic transformations in lower latitudes. Efforts to address Arctic issues constructively must recognize these developments as a point of departure.

Human actions on a global scale are interacting with biophysical forces to increase the complexity and volatility of the Earth's systems. Over the past several years, many governments, research organizations, and individual authors have issued reports indicating that the major drivers of change at the global level stem from human activities, with far-reaching consequences.

These reports include the 2018 Intergovernmental Panel on Climate Change's *Global Warming of 1.5℃*, the U.S. National Intelligence Council's *Global Trends 2030* report "Alternative Worlds" (2012) and its "Paradox of Progress" report (2017), the European Union's *Global Trends to 2030* report, the United Nations' *Global Sustainable Development* reports, the OECD study *The Next 50 Years*, the World Economic Forum's *Global Risk* reports, the Australian Government's white papers in 2012 and 2017, and Klynveld Peat Marwick Goerdeler's (KPMG) *Future State 2030*. While the characterization of these large trends varies somewhat from report to report, among those with greatest relevance to the future of the Arctic include the following:

1. The impacts of climate change are unfolding more rapidly in the Arctic than in any other part of the world. The most dramatic example involves sea ice. The annual extent of sea ice at the September minimum has declined by 13.2 percent per decade for a number of decades; the Arctic may be ice-free for several summer months within the next two or three decades. Other developments include the widespread thawing of permafrost and accelerated melting of the Greenland ice sheet.
2. Information and communication technologies are transforming the world.
3. Scientific research underpins education systems and the innovative capacities essential to advance socio-economic sustainability globally and across regions such as the Arctic.
4. Changes in the demographics of the middle classes in many countries have consequences for the North Pacific region.
5. Population growth and rising affluence on a global scale, coupled with increases in the accessibility of the Arctic, may make Arctic hydrocarbons and minerals increasingly attractive.
6. Global supplies of food, energy and water will constitute a limiting condition, triggering a rise in resource nationalism.
7. Under these circumstances, long-range thinking, planning and the development of adaptation strategies will be essential.

NPAC 2018 provided a venue to explore these developments in greater detail and gave voice to new ideas and constructs for the Arctic region that connect to and affect global affairs. The conference provided an opportunity for expert presentations and informal dialogue among knowledgeable individuals on emerging Arctic issues and policy responses. We were particularly pleased to have a significant presence from government policymakers and young analysts as well as Indigenous leaders. While most Arctic forums and websites focus on specific issues, NPAC 2018 sought to provide a more holistic approach for Asia-Pacific states to consider a range of Arctic activities.

We would like to thank the following: Yoon Hyung Kim, Chair of the NPAC Steering Committee, Professor Emeritus at the Hankuk University of Foreign Studies and Senior Fellow at the East-West Center; Robert W. Corell, Principal, Global Environment and Technology Foundation and its Center for Energy and Climate Solutions, United States, and Professor at the University of the Arctic, Norway; Jong Deog Kim, Senior Research Fellow at the Korea Maritime Institute, Republic of Korea; Arild Moe, Senior Research Fellow, Fridtjof Nansen Institute; David L. VanderZwaag, Professor of Law and the Canada Research Chair (Tier 1) in Ocean Law and Governance, Dalhousie University; and Oran R. Young, Professor Emeritus at the Bren School of Environmental Science and Management, University of California, Santa Barbara for coordinating the conference and preparing this volume for publication.

We also thank the members of the NPAC Steering Committee for their continued work on behalf of the NPAC Program. Most importantly, we wish to thank the program panelists for their papers, the commentators, and all the other participants involved in contributing to the success of this conference. We extend our appreciation to Daniel Glick, our copyeditor, for his excellent contribution in preparing the text for publication. We are grateful to Jefferson M. Fox, Charles E. Morrison and Nancy D. Lewis at the East-West Center for their support of the NPAC program. Our sincere gratitude goes to Jaymen Laupola and the other staff members at the East-West Center for their expert management in hosting the conference at the East-West Center in Honolulu, Hawai'i.

Chang-ho Yang	Richard R. Vuylsteke
President Korea Maritime Institute	President East-West Center

EXECUTIVE SUMMARY

Overview: Arctic 2030 and Beyond—Pathways to the Future[1]

Yoon Hyung Kim, Oran R. Young, Robert W. Corell, Jong Deog Kim, Arild Moe, and David L. VanderZwaag

INTRODUCTION

Earth has entered an unprecedented era of transformative change. Human actions have joined biophysical forces as drivers of multi-faceted developments on a global scale. As a result, future climatic conditions will differ profoundly from the relatively stable climate that humans have experienced over the past 10,000 years. These global forces are already generating rapid and far-reaching ecological changes in the Arctic. In turn, developments in the Arctic are intensifying both the scale and the pace of environmental, political, and economic changes in lower latitudes. Efforts to address Arctic issues constructively must recognize these developments as a point of departure.

Human actions on a global scale are interacting with biophysical forces to increase the complexity, dynamism, and volatility of Earth's ecological systems. The ripple effects of these changes are becoming more apparent with every passing year, affecting human societies in subtle and profound ways. Over the past several years, many governments, research organizations, and individual authors have issued reports indicating that the major drivers of change at the global level stem from human activities, largely from the burning of hydrocarbons, with far-reaching consequences for the future. These reports include the 2018 Intergovernmental Panel on Climate Change's *Global Warming of 1.5°C*, the U.S. National Intelligence Council's *Global Trends 2030* report "Alternative Worlds" (2012) and its "Paradox of Progress" report (2017), the European Union's Global Trends to 2030 report, the United Nations' *Global Sustainable Development* reports, the OECD's study *The Next 50 Years*, the World Economic Forum's *Global Risk* reports, the Australian Government's white papers in 2012 and 2017, and Klynveld Peat Marwick Goerdeler's (KPMG) *Future State* 2030. While the characterization of these large trends varies somewhat from report to report, there is broad consensus on certain critical and accelerating megatrends that are transforming the planet.

Among those trends with greatest relevance to the future of the Arctic are the following:

During the 10,000 years of the Holocene, global mean surface temperatures on Earth varied by less than +/- 0.7°C. Now, the global mean surface temperature regime has reached a new high of + 0.9°C. In the Arctic, temperatures have risen 2°C-2.5°C, reaching a level that has not occurred for more than 100,000 years. Temperature increases are now accelerating in a way that threatens the unusually stable climate regime of the Holocene, the era in which human civilization has evolved. As the energy strategies of the past two and a half centuries since the Industrial Revolution enter the 21st century, the impacts of climate change are becoming evident in the form of rising sea levels, more extreme weather events, widespread flooding, and increased desertification. The past four years, including 2018, have been the warmest since the instrumental record began in the 1800s.

More generally, human actions have become dominant forces on a planetary scale. As a consequence of population growth, rising affluence, and technological innovation, humans have transformed half of Earth's available land and appropriated for their own use more than half of the available fresh water. Human actions have triggered a loss of biological diversity that many now regard as the 6th great extinction event. Taken together, these transformative developments constitute what analysts now call the Great Acceleration.

Technological advancements are accelerating as well, with a different kind of transformative power. Dr. Klaus Schwab, the founder of the World Economic Forum and an authority on technological developments, observes that: "*We stand on the brink of a technological revolution that will fundamentally alter the way we live, work, and relate to one another. In its scale, scope, and complexity, the transformation will be unlike anything humankind has experienced before. We do not yet know just how it will unfold, but one thing is clear: the response to it must be integrated and comprehensive, involving all stakeholders of the global polity, from the public and private sectors to academia and civil society.... The possibilities of billions of people connected by mobile devices, with unprecedented processing power, storage capacity, and access to knowledge, are unlimited. And these possibilities will be multiplied by emerging* *technology breakthroughs in fields such as artificial intelligence, robotics, the Internet of Things, autonomous vehicles, 3-D printing, nanotechnology, biotechnology, materials science, energy storage, and quantum computing*." This emerging epoch, which many call the 4th Industrial Revolution, is characterized by a fusion of technologies and socio-economic conditions that is blurring the lines among the physical, digital, and biological spheres. The speed of technological change has no historical precedent; changes are now exponential in contrast to the near-linear pace of past changes.

These developments pose profound challenges of adaptation for both individuals and societies. Dr. Eric Teller of Google's X Research and Development Laboratory has put it this way:

1. *Technological and socio-economic foundations of global societies have changed exponentially, with the rate of change accelerating in the past several decades.*
2. *Human individuals and societies generally adapt more slowly, in an almost linear fashion.*
3. *These two characteristics of modern societies have crossed through time, so that humans are now seemingly unable to adapt adequately and in a timely fashion.*

The impacts of climate change are unfolding more rapidly in the Arctic than in any other part of the world. The most dramatic example involves sea ice. The annual extent of sea ice at the September minimum has declined by 13.2 percent per decade for a number of decades; the Arctic Ocean may be ice-free for several summer months within the next two or three decades. Other developments include the widespread thawing of permafrost and accelerated melting of the Greenland ice sheet. While these changes are opening up access to the Arctic's large reserves of hydrocarbons and minerals, they are also posing severe problems for Arctic communities, such as increased storm surges that lead to coastal erosion and thawing permafrost that leads to the degradation of critical infrastructure.

These regional changes are triggering feedbacks that are significant on a global scale. The albedo of seawater is lower than the albedo of ice, so the decline of sea ice in the Arctic is leading to increased absorption of solar radiation at Earth's surface, which in turn accelerates global warming. The increased accessibility of the Arctic is opening up the prospect of extracting Arctic oil and especially gas in ways that are expected to have significant impacts on global energy markets—and on further climate changes.

Taken together, these developments are complex, transformative, and paradoxical; they are likely to alter human well-being, the security of nations, and governance systems on a global scale.

Efforts to achieve sustainability in the Arctic must come to terms with this new world. NPAC nations must bear in mind several key developments that are essential to the achievement of sustainability, as they seek to prioritize and respond to emerging Arctic issues. These include:

1. Climate change is a dominant factor. Climate change will worsen the outlook for the availability of critical energy and other resources, and will likely intensify the severity of extreme weather events such as hurricanes, major storms, intense rainfall and severe droughts, with wet areas getting wetter and dry areas becoming drier. Human migration in response to climate changes and resource scarcity is likely to increase.
2. Information and communication technologies are transforming the world. New technologies have accelerated the diffusion of information and facilitated better access by developing countries to global knowledge. Science and technology have the inherent capacities to foster the knowledge base needed to address the social, economic, and environmental challenges faced by nations and peoples around the world. Scientific research underpins education systems and the innovative capacities essential to advance socio-economic sustainability globally and across regions such as the Arctic.
3. Population growth is a key factor. Most of the growth in human populations expected in the next 30-50 years will occur in Africa and Asia. Starting from a base of 7.6 billion people today, the UN projects a human population of 8.5 billion in 2030, 9.8 billion in 2050, and up to 11.8 billion by 2100.
4. Changes in the demographics of the middle classes have consequences for the North Pacific region. The middle classes will grow globally, including within the Arctic region, resulting in geopolitical and socio-economic shifts among middle-class nations with consequences for NPAC societies. There will be population growth and demographic shifts, with some movement into the high north as extractive industries develop and seaways open.

5. The Arctic's natural resources will attract global attention. Population growth and rising affluence on a global scale coupled with increases in the accessibility of the Arctic may make Arctic hydrocarbons and minerals increasingly attractive. The Arctic is estimated to hold up to 30 percent of the world's undiscovered natural gas, an energy source seen by some as key to a successful transition from hydrocarbons to alternative sources of energy. However, the move to renewable energy sources has accelerated significantly in recent years, as has the production of shale gas at lower latitudes. Some analysts project that Arctic hydrocarbon production, with its high costs for infrastructure and transport, may not be financially viable in the long-term, especially if global leaders choose to respond forcefully to climate change concerns related to burning hydrocarbons.
6. Important geopolitical shifts are underway. Asia will surpass North America and Europe in global power; it is unlikely that a single hegemonic power will exist in the world by 2030. The power of non-western or middle-tier states will rise and the middle-tier countries will surpass Europe, Japan, and Russia as economic powers, with China's economy overtaking the U.S. to become the world's largest. Four of the eight major nations are prominent in North Pacific affairs. The socio-economic foundations of some nations are likely to become less stable, while others are likely to become stronger, relying on unprecedented technology that will accelerate the occurrence of discontinuities. Some geopolitical strategies are likely to increase conflicts and drive waves of unwelcome change for some nations and peoples. Overall, meeting the needs for governance will become harder.
7. Global supplies of food, energy and water will constitute a limiting condition. Climate and other changes are exacerbating and altering the resilience of the services that ecosystems provide to humankind, which in turn are leading to the prospect of scarcities and a rising concern about the security of supplies of food, energy and water. This is reported by many to be triggering a rise in resource nationalism that is leading to export restrictions on food and other important crops, supplies of water, and mineral resources.
8. Under these circumstances, long-range thinking, planning and the development of adaptation strategies will be essential.

Understanding the significance of these trends is daunting, as they highlight many complex interactions that are accelerating rates of change and societal transformations faster than humankind has never experienced. Increasingly, advanced technologies will enable citizens to engage with governments, voice their opinions, coordinate their efforts, and even enable effective supervision among public authorities.

NPAC 2018 provided a venue to explore these developments in greater detail and give voice to new ideas and constructs for the Arctic region that connect to and affect global affairs.

This volume, reporting on the work of the conference, is organized into five substantive parts in addition to the Overview and this Executive Summary.

Part I consists of four policy perspectives on Arctic 2030 and beyond, highlighting Korea's national Arctic policy priorities along with expert reflections on the Arctic policies of the United States, Russia, and Finland. Part II contains perspectives from three Arctic states, a non-Arctic state, the Indigenous community, and a young analyst on the future of Arctic Ocean cooperation. Part III presents climate change impacts in the Arctic from the perspectives of natural science, climate and health, a non-Arctic state, the Indigenous community, and a young analyst. Part IV includes interdisciplinary perspectives relating to trends in Arctic resource extraction and logistics from global market development, commercial shipping, the 4th Industrial Revolution, Arctic offshore oil development, the Polar Silk Road framework, Sino-Russian trade, and a non-Arctic state. The perspectives in Part V highlight key insights from an NGO, an Arctic state, the international community, a non-Arctic state, and the Indigenous community relating to the UN Sustainable Development Goals and Agenda 2030 in the Arctic. A brief conclusion identifies future directions in the ongoing North Pacific dialogue on the Arctic in world affairs.

PART I. ARCTIC 2030 AND BEYOND: NATIONAL POLICIES AND PRIORITIES

Part I focuses on identifying and articulating the Arctic policies of North Pacific nations, with a particular focus on their long-term priorities for the Arctic. Presentations summarized progress made by the Arctic Council during the Finnish chairmanship and identified the roles of international forums in promoting Arctic cooperation.

Korea

In his keynote address, Ambassador Sei-Joong Kwon, the Republic of Korea's Director-General for Climate Change, Energy & Environmental Affairs Bureau, considers developments in the Arctic from Korea's perspective. The Arctic is changing in transformative ways, warming at twice the global rate. There were record-breaking temperatures in Korea during the summer of 2017. There are consequences resulting from climate and global change across the North Pacific Arctic Region that have global implications for ecosystems, weather patterns, and humans, which have all been documented by global assessments. Sea level rise is occurring and is projected to increase significantly in the decades ahead, with national and international assessments projecting ranges from between two and ten feet of mean global sea level rise by 2100. Changes in the circumpolar region are opening new regional development opportunities that have global implications. These developments heighten the need for close cooperation among the nations of the North Pacific region.

Korea's Arctic policy and approach to these issues is based on the need for partnerships for mutual prosperity and sustainable development, while sharing a commitment to address the threats from climate and global changes. Sei-joong Kwon provides a brief review of the history of Korea's engagement in the Arctic that culminated in 2013 with its admission as an official Observer in the Arctic Council and the announcement of its first Arctic policy. Korea released its second Arctic policy on July 20, 2018 for the period 2018-2022.

Korea seeks to strengthen its economic opportunities in the Arctic, with a special focus on scientific interests and cooperation, which remain at the center of Korea's "science diplomacy" in the Arctic region. Sei-Joong Kwon notes that Korea is committed to increase its scientific presence in the Arctic with an expansion of its research platforms and construction of an additional icebreaker.

Korea is committed to playing an active role in many Arctic activities, including in the Arctic Council and its Working Groups. Korea is currently a partner in several projects such as mapping Indigenous uses of marine resources and the Arctic Migratory Bird Initiative. Korea consults regularly with other states, participating in high-level dialogues with Japan and

China in 2016 and again in 2018.

As a maritime nation, Korea has a special interest in sea routes, particularly as the Arctic Ocean seaways are becoming increasingly accessible. A case in point involves ship building and engineering for the Yamal LNG project. In addition, Korea is a major importer of oil and gas, importing about 98 percent of the fossil fuel required to meet the nation's energy needs.

United States

David A. Balton, a Senior Fellow at the Woodrow Wilson Center's Polar Institute and former Deputy Assistant Secretary for Oceans and Fisheries at the U.S. Department of State, reviews U.S. Arctic policies over the past 25 years. As articulated in a series of policy documents, the U.S. position reflects much more continuity than change. Still, different priorities have emerged as U.S. administrations have changed and as circumstances in the Arctic have evolved. U.S. interests in the region have been long-term and sustained despite rapid changes in the Arctic.

Balton then reviews the policies of the Clinton, George W. Bush, and Obama administrations. The 1994 Clinton policy remained in place until the end of the Bush administration, when a new policy statement emerged in January 2009. The new policy retained all six goals of the 1994 policy with only one small change. President Bush increased the U.S. involvement in Arctic forums. An important policy development was the Ilulissat Declaration in 2008 involving the five Arctic Ocean littoral states.

The Obama Administration undertook another review of U.S. Arctic policy. A new statement on the Arctic appeared in 2013, followed by an implementation plan. The goals of the new statement were very similar to those of previous administrations. The Obama administration's priorities were more focused on climate change, which received very high-level attention. Two important developments during this period were the Paris Climate Agreement of 2015 and the U.S. Chairmanship of the Arctic Council 2015-2017. Obama was the first sitting U.S. president to visit the Arctic. An emphasis on environmental protection in the Arctic became more pronounced in the later years of the Obama Administration. The U.S. took more of a leadership role in the Arctic Council during this period. For example, the United States co-chaired three task forces under the auspices of the Council that produced legally binding international agreements.

U.S. Arctic policy in the Trump Administration so far seems to be an odd mixture of maintaining the same basic goals in the region, combined with a dramatically different approach to climate change issues, which are obviously of great importance to the region. Former Secretary of State Rex Tillerson brought the U.S. Arctic Council chairmanship program to a successful conclusion in May 2017 and reaffirmed the commitment of the U.S. to the Council. However, three weeks after the ministerial, the United States announced its intention to withdraw from the Paris Climate Agreement. Since then, the Trump Administration has devoted virtually no high-level attention to the Arctic.

Changing conditions in the Arctic will require the United States and other states with Arctic interests to develop new approaches, particularly in developing a more integrated international architecture for governing human activities in the region.

Russia

Andrei Zagorski, an international affairs expert with the Primakov Institute of World Economy and International Relations (IMEMO), reviews Russia's Arctic interests and policies, with the proviso that he is presenting a personal view. Nevertheless, Russia's Senior Arctic Official, Vladimir Barbin, is aware of NPAC and will be briefed on the outcome of the discussions.

Russia does not really have a vision for the Arctic beyond 2025 or 2030. Even the current vision is not entirely settled. But the main objectives and priorities of Russian policy are outlined in the Arctic Strategy adopted by the President in 2013. Some of these are: (i) the Arctic Zone of the Russian Federation (AZRF) is being developed to support the Russian economy, (ii) Russia will preserve national security in the Arctic (i.e. sovereignty and sovereign rights) and strive to maintain the Arctic as a conflict-free zone, (iii) Russia will address environmental and human security risks generated by climate change and increased human activities in the Arctic (e.g. marine safety, search and rescue, communications, and hydrological and meteorological services), (iv) Russia will seek to minimize the environmental impacts of developing the AZRF (e.g. hazardous spills, renewable energy, ecosystem-based spatial planning in marine areas, etc.), and (v) Russia will promote regional scientific cooperation.

Zagorski notes that the 2014 State Arctic Program was amended in

August 2017. The program is centered around three clusters or priorities: (i) the Northern Sea Route (NSR) will be developed as a primary supply route, (ii) marine shipping for extracted resources may be the most important element, with Sabetta being the main port for LNG development in the Yamal Peninsula, and (iii) Russia will continue to invest in Arctic technologies and equipment, primarily for the oil, gas, and mining sectors.

Funding of the State Program is a critical issue (estimated to be $3 billion USD[2] to 2025). This does not include defense spending. Funding is to be structured in three phases:

- Phase I: 2015-2017 (not much spending during this planning period);
- Phase II: 2018-2020 (some spending but largely preparatory);
- Phase III: 2021-2025 (the bulk of money to be spent in this phase).

However, funding has not been sufficient since the outset and has not been secured at all for Phase III.

Western sanctions against Russia, in place since 2014, have forced Russia to rely largely on its own resources and technologies in implementing ambitious plans for the development of its Arctic zone. Implementation of this strategy is vulnerable to external shocks. Therefore, Russia seeks to maintain cooperative relations in the Arctic Council as "islands of cooperation." Western sanctions are also the source of Russia's interest in opening relations with China.

The lack of collective security architecture in the Arctic is a matter of concern to the Russian Federation. There is a need to reduce the risks of miscalculations. Securitization of the Arctic may harm cooperation in the region. In 2011-2013, there were initiatives in the Arctic Council featuring non-military security issues, such as search-and-rescue and oil-spill preparedness and response. But annual meetings of the Arctic defense ministers were suspended in 2014. Zagorski suggests that the Council might devote more attention to non-military security issues. The Arctic Coast Guard Forum is one place where work could be discussed. Currently, such discussions have not involved defense establishments.

The Arctic is an essential resource and export-generating base for Russia. In this regard, its role is expected to increase further in the future. Application of the best and most environmentally friendly technologies through expanding international cooperation is an indispensable precondition for the responsible and sustainable development of Russia's

Arctic resources.

Russia appreciates the constructive agenda and work of regional frameworks, and particularly the Arctic Council. If cooperation with traditional partners in the region is further disrupted, however, cooperation with China is one of the main options Russia will pursue under its "partner substitution" policy.

Finland

Timo Koivurova, Director of the Arctic Centre at the University of Lapland, provides an update on Finland's term as Arctic Council chair. Finland is in the first year of its two-year chairmanship, hence many of the Finland chairmanship projects are still working toward their respective goals. There are several factors that limit what a council chair can do during its chairmanship. The Arctic Council has no permanent budget, and it has limited capacity to influence governance of Arctic affairs. Of particular importance is the fact that the Arctic Council operates on the basis of consensus among its members. However, relations between Russia and Western countries are still at a low, which influences the spirit of cooperation.

Finland has emphasized continuity as an important value in managing its chairmanship; the two-year span of the chairmanship is almost never enough time to tackle all issues. For example, Finland is continuing work on black carbon and resilience, efforts that commenced under the previous chairmanships. Finland has been committed to continue the flagship projects started under the U.S. chairmanship. The Arctic Marine Cooperation Initiative has not progressed well. Thinking has now shifted to ways to consolidate the marine policy work in the Council within its existing structures. Finland has led the negotiations for a long-term strategy for the Arctic Council, focusing mainly on setting priorities rather than contemplating structural reforms at this stage. Progress has been slow, and it might be difficult to obtain consensus during the Finnish chairmanship.

Finland has two crosscutting priorities for its Arctic Council chairmanship: (i) climate change, and (ii) the UN's Sustainable Development Goals (SDGs). Introducing the SDGs to guide the work in the entire Arctic Council is a possibility. The Social, Economic and Cultural Expert Group (SECEG) within the Sustainable Development Working Group could be refocused to provide research on the SDGs, thereby helping the SDWG and eventually the whole Council. Finland has four additional priorities during its Chairmanship: (i) environment, (ii) education, (iii) meteorology, and (iv) connectivity. The education, environment and connectivity priorities have progressed according to the goals that were set for them, and these projects will be able to deliver on their objectives. The meteorology priority has progressed surprisingly well and more intense institutional meteorological co-operation is anticipated, which will then help also the relevant Arctic Council working groups.

A number of key issues emerged during the course of the general discussion on Arctic policies that followed these Part I presentations:

Arctic Maritime Cooperation. Arctic States will increasingly face a need for more robust policies and decision-making mechanisms than currently exist, in order to foster Arctic maritime cooperation and to understand the role that human activities play in the Arctic Ocean.

International Relationships in the Arctic Region. How will Russia-West relations, the Paris Climate Agreement, the UN Sustainable Development Goals (SDGs), and a possible agreement on biodiversity beyond national jurisdiction affect the Arctic? What issues of implementation will arise in the Arctic?

Arctic Council Strategies. How should the elements of Arctic institutional architecture already in place, along with those that may come on line in the coming years (including an evolving Arctic Council strategy), interact with one another?

The Role of Other International Venues. The Arctic Council's structure appears to be adequate for the near term, but it is probably not adequate for the long term, especially where management of activities affecting the international waters of the Central Arctic Ocean is concerned. Under the Task Force on Arctic Marine Cooperation, it was contemplated that a new structure would be created, and time was given to develop terms of reference for this body. However, this has not happened. This process will need to be refocused, with the idea that the Council may be the venue to strengthen cooperation in managing the Arctic Ocean. Some have noted that the Arctic Council as an intergovernmental forum does not have the authority to address the evolving need for legal mechanisms to support intergovernmental cooperation. The Arctic nations have increasingly utilized UNCLOS by incorproprating it in their laws and subsequent agreements and, hence it has increasingly formed a basis for governance of the Arctic region.

Scientific Cooperation. Science can provide a basis for engagement, and the resulting scientific knowledge would help guide the policy work. Both the International Arctic Science Committee (IASC) and the International Arctic Social Science Association (IASSA) are relevant in this regard. Greater focus should be placed on Ecosystem Based Management and how to organize scientific work around fisheries by employing, for example, an integrated approach to management that considers the entire ecosystem, including the role of humans.

Ocean Policy Issues. Ocean policy issues are important and should stay within the Arctic Council if possible, as it is the high-level intergovernmental forum that engages the eight Arctic nations, the six Indigenous Peoples organizations of the region, and the 12 official Arctic Council Observer states (including China, Japan and Korea of the NPAC) to participate in the work of the council's Working Groups and Task Forces. There is an emerging sense that the Observer states may need a stronger role in the work of the council. The Council has had a positive influence on international environmental treaty-making processes, involving mercury, POPs, etc. Climate change is an important issue for the region, and it is suggested that the Council should play a greater role in international processes on climate change.

The Arctic Council and Non-Arctic States. The Council is an important body for policy coordination, collaboration and decision-making. But there needs to be more engagement with non-Arctic states. China is a potentially major actor in shipping, trade, etc. Including China and other observers in the Arctic management system would be beneficial.

Indigenous Peoples and Governance. Effective Arctic governance must include respect for and recognition of self-determination and self-governance on the part of Indigenous Peoples.

The Sustainable Development Goals. Attention needs to be given to ways to integrate the SDGs into Arctic policies. In addition, more opportunities are needed for Arctic institutions to contribute data to global systems in relation to weather, shipping etc. Technological breakthroughs can bring solutions to some Arctic problems.

Policy and Engagements. In the policy area, funding is always important. Public-private partnerships will be needed. Relative to the rest of the world, the Arctic states are all wealthy and have potential to invest more public funds in the Arctic. This is also the case for some near-Arctic states. The creation of the Arctic Economic Council reflects an effort to create a business/industry partner to engage with the Arctic Council on certain projects and investments. Connectivity is a key area where investment in infrastructure is necessary. Many companies are responsible actors in the Arctic, and their good practices should inform Arctic governments and governance. Conditions in the Arctic often necessitate government investments and subsidies. Governments frequently fund much of the cost of infrastructure. Public sector and state-run companies are generally the major investors in the Arctic. For example, China is already funding the Polar Silk Road. Novatek, a private company, was expected initially to find its own money for the port of Sabetta. But Russian government investment in icebreakers and subsidies for icebreaker escorts are currently required. Governments also give tax breaks to encourage business activities and investments. Fossil fuel companies should assume more responsibility for carbon-reduction strategies and activities.

Broadening the Role of the Arctic Council. The Arctic Council during the first 10-12 years focused mainly on science-based work, but has gradually shifted to a more policy-related focus under the auspices of foreign ministries. Consequently, funding has been reduced for scientific work because of political concerns among ministers (science ministers were reluctant to fund work where the foreign ministers would take the credit). So perhaps there should be rethinking of the structure of the council so that environment, health, and science ministers can participate and get credit for their contributions.

Arctic Environment Ministerial. Arctic environment ministers met in Rovaniemi, Finland in October 2018, and Finland has also raised the possibility of a Heads of State meeting during its chairmanship. However, institutionalizing the idea raised in the point above has not been a matter for the consideration of the Finnish chairmanship team. Further, the second Science Ministerial took place in Berlin on 25-26 October 2018 and discussed: (i) strengthening, integrating and sustaining Arctic observations, including facilitating access to Arctic data and sharing Arctic research infrastructure, (ii) understanding regional and global dynamics of Arctic changes, and (iii) assessing vulnerability and building resilience of Arctic environments and societies.

Future of Arctic Strategies. There is considerable similarity among the Arctic policy goals of the United States, Russia and China. However, there is a proliferation of Arctic governance mechanisms that make it hard to coordinate and integrate all the arrangements. It might not be realistic to expect the Arctic Council to be a key mechanism to do this integration, given its current constraints on membership. Contrary to the Ilulissat Declaration, some sort of umbrella for all these governance mechanisms might be necessary. However, it is unclear what the alternatives might be, which mechanism/institution might have this capacity, and who the stakeholders would be.

Governance of the Central Arctic Ocean. Governance of future activities beyond national jurisdiction in the Arctic must recognize the roles of existing arrangements and institutions, such as the International Maritime Organization, and the overarching legal framework provided by UNCLOS. Building a governance regime for the Central Arctic Ocean will require synergy among a number of bodies, perhaps through Ecosystem Based Management systems supported by science. Non-Arctic states would need to be involved in this coordination and cooperation. This is what was done in the case of the Polar Code. The Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR) might provide a model for this sort of arrangement. For the time being informal mechanisms might be needed.

Sustainable Development as a Policy Priority. Sustainable development currently appears to be the priority of the Arctic Council, and the SDGs are therefore very relevant. In Finland, implementation of SDGs falls under the Prime Minister's office, so there is a high priority given to them. This is also the case in Sweden. Assignment of responsibility for the SDGs in the bureaucracies of other Arctic states might affect how they are dealt with in the Council. It was noted that there is little if any policy integration for SDGs in Russia, the United States, or Canada.

Observer state policies. Korea has a Sustainable Development Commission and a Green Growth Commission. The Ministry of Oceans and Fisheries also has some responsibility for implementation of SDGs. China's Arctic policy tries to provide some assurance that it respects the sovereignty of Arctic states and respects the legal regime under UNCLOS. But China also asserts rights and interests in initiatives such as the Belt and Road Initiative (BRI), including the Polar Silk Road. It is not entirely clear how China will proceed if efforts to increase the engagement of near-Arctic states in the Council are not adequate. There are some signs that China is disappointed with its role in the Arctic Council since becoming an Observer. China might not see the Council as the primary Arctic institution and appears to be looking for other ways to engage on Arctic issues outside the Council.

PART II. THE FUTURE OF ARCTIC OCEAN COOPERATION

Part II addresses several key questions:

- What are the challenges of implementing the Central Arctic Ocean fisheries agreement?
- What additional cooperative initiatives and measures beyond the Polar Code might be considered to strengthen shipping safety and environmental protection in the Arctic?
- What is the state of play in the Arctic Council's Task Force on Arctic Marine Cooperation, and how might regional marine cooperation be further enhanced?
- What progress has been made in establishing marine protected area (MPA) networks in the Arctic, and what are the main constraints and challenges in this realm?
- What are the opportunities for enhanced marine scientific cooperation?

Other issues and opportunities for cooperation addressed in this session include: (i) cooperation in environmental impact assessments, (ii) strengthening measures to address long-range pollution in the Arctic, (iii) the role of the Arctic Council Arctic Marine Strategic Plan 2015-2025, (iv) methods for bolstering Arctic marine cooperation, and (v) implications for the Arctic of efforts to negotiate an international agreement on biodiversity beyond national jurisdiction.

From the U.S. perspective, former U.S. State Department official David A. Balton (who also contributed to Part I) focuses his presentation on the recently negotiated Central Arctic Ocean fisheries agreement and the many issues that still need to be addressed in this realm. He describes the key elements of the draft terms agreed to by the five Arctic coastal States, the European Union, and four other States (China, Iceland, Japan, Korea) in November 2017. Those elements include: definition of the area covered by the agreement (the high seas portion of the CAO); a commitment by Parties not to authorize their vessels to engage in commercial fishing in the Agreement Area; a pledge to establish rules for exploratory fishing within three years of the Agreement's entry into force; a commitment to establish a Scientific Research and Monitoring Program within two years; convening regular meetings at least once every two years; recognition of the interests of Indigenous Peoples in the conservation and sustainable use of living marine resources and the participation of Indigenous Peoples in the Agreement's implementation; adoption of a step-wise approach whereby the Agreement will have a duration of 16 years but with ongoing review of whether there is potential for commercial fisheries and whether negotiations should proceed to establish one or more regional fisheries management organizations or arrangements; provision for entry into force with all nine states and the EU needing to ratify or accede; and a provision for other states with a real interest to be invited to join the Agreement.

Balton concludes by emphasizing one of the major implementation challenges: fleshing out a Joint Program of Scientific Research and Monitoring. He highlights the difficulty of sorting out the relationships of the joint program with the many other scientific bodies involved in CAO-related fisheries and ecosystem research such as the ICES/PICES/PAME Working Group undertaking to produce an integrated ecosystem assessment of the CAO. He suggests that the best way to carry out the joint program might be through a new Arctic Ocean marine science body.

Robert J. Young, Division Manager of Arctic and Aquatic Research at Fisheries and Oceans Canada, focuses his comments on scientific developments and limitations relating to the CAO fisheries agreement. He notes that fisheries experts from the various parties have already met five times since 2011 to review the current understanding of fisheries that might be of commercial interest; to identify gaps in understanding the marine ecosystems of the CAO and adjacent waters; and to work at designing a Joint Program of Research and Monitoring. He describes how an understanding of oceanography in the region is better than the sparse knowledge of pelagic and benthic fish communities where surveys have been constrained by ice conditions. He highlights that potential development of new commercial fisheries in the CAO appears to be more likely on the Pacific side due to relatively shallower depths and greater loss of sea ice compared to the Atlantic portion. He notes the high degree of speculation surrounding the question of how primary production will evolve in the Arctic with so many complicating factors such as changing water masses, loss of sea ice, wind-induced upwelling events, and ocean acidification. He emphasizes that the CAO is a data-poor region regarding the abundance and distribution of fishes and invertebrates. The high seas database for the CAO documents just 12 species, of which only three might be harvested for commercial purposes (Arctic cod, Polar cod and Greenland halibut).

Young goes on to describe three main challenges facing the scientific program in the future. The first is financial: Who will pay for the expensive scientific expeditions needed? Surveying the ice-free segment of the Pacific gateway has been estimated to cost $2.86 million, while a survey in the ice-covered portion of the Pacific gateway would require $7.05 million. The lack of certainty regarding the availability of sustainable fishable biomass in the region may give some countries pause to contribute financing to a research program. A second challenge will be achieving successful surveys in light of the numerous challenging conditions in the Arctic, including changing ice and weather conditions. A third challenge is developing and signing a data-sharing agreement before the mapping and assessment exercise begins.

Young briefly addresses Canadian plans to contribute to the needed scientific research under the CAO agreement. He notes that Fisheries and Oceans Canada continues to conduct marine research in at least three large marine ecosystems (LMEs) adjacent to the CAO, but that the Canadian government has yet to decide on its contribution, if any, of operating funds, assets and personnel for the CAO program. He concludes by addressing how scientific cooperation might be enhanced in the future. Establishment of a fisheries research and assessment body, supported by parties to the fisheries agreement, is a possibility.

Andrei Zagorski, a Russian analyst who also contributed to Part I, provides a three-part Russian perspective on the future of Arctic Ocean cooperation to 2030 and beyond. He first describes Russian views toward the CAO fisheries agreement and its future implementation. On the subject of a future pathway to facilitate scientific cooperation, he indicates Moscow would likely prefer to organize the exchange of research findings with individual countries rather than a new scientific institution. He notes how Russia insisted during CAO fisheries agreement negotiations on giving coastal states priority in future decision-making as to whether commercial fishing might be allowed. This resulted in a consensus-based decision rule whereby Russia could veto moving to the establishment of an RFMO. Zagorski also surmises that Moscow will in the future prefer the establishment of separate RFMOs in the Eurasian and American Arctic Seas.

A second perspective asks how Russia would view addressing the gaps left by adoption of the Polar Shipping Code. Russia supports discussions within the IMO to extend the code to other ship categories, in particular fishing vessels and pleasure yachts. Russia may be open to considering region-specific measures to ensure effective implementation of the Ballast Water Convention. Russia supports discussions within the IMO's Sub-committee on Pollution Prevention and Response regarding the possible ban on heavy fuel oil (HFO) use and carriage by ships in Arctic waters.

The third perspective involves Russia's view on moving forward in establishing marine protected areas (MPAs) in the Arctic. A comprehensive study on a network of MPAs in the Russian territorial seas completed in 2016 identifies 47 MPAs to be included in a network comprising 25 percent of Russia's territorial seas. These MPAs are being considered in a list of priorities for establishing protected areas in 2020-2030. Russia's basic policies toward establishing MPAs in areas beyond national jurisdiction (ABNJ) include: a preference to deal with fisheries restrictions through relevant RFMOs rather than a universal instrument; establishing MPAs only after collection of sufficient knowledge proving the need to constrain specific human activities; subjecting MPAs to periodic review and possible lifting of limitations; recognizing that sovereign rights of coastal states to exploit natural resources on extended continental shelves should have priority over MPA regulations; and working through sectoral organizations like the IMO.

Sung-Jin Kim, the Republic of Korea's former Minister of Maritime Affairs and Fisheries, gives a non-Arctic state perspective on future Arctic Ocean cooperation to 2030 and beyond by addressing three questions. First, what are the approaches and challenges for non-Arctic states in implementing the CAO fisheries agreement? In Kim's opinion, the establishment of a regional fisheries management organization for the CAO is likely to proceed in the future. He suggests that China, Japan, and Korea could lead scientific surveys of fisheries in the CAO with their research icebreakers. He notes the likely future challenge of balancing the demands of domestic fishing industries with the need to preserve healthy fishery resources and marine ecosystems. He raises the possibility that there might be an NPAC task force to help further explore ways forward in establishing an RFMO and scientific research programs.

Kim then addresses a second question concerning how the role of non-Arctic states might be strengthened in regard to marine environmental cooperation. He advocates that non-Arctic states should move away from an "agenda-taking" role to an "agenda-setting" role. He emphasizes the need for non-Arctic states to become more proactive in participating in global marine environmental agreements and in ensuring effective implementation of international regulatory responsibilities. He gives the example of how Korea might assist in implementing the Polar Code. Korea could, for example: transfer eco-friendly ship construction technology; share experiences of operating advanced ship operation systems; estimate the appropriate fleet size to maintain sustainable shipping routes; and contribute to response systems for oil spills and marine search and rescue.

A third question concerns opportunities for non-Arctic states to strengthen regional marine scientific cooperation. Kim highlights the great opportunity opened by the 2017 Agreement on Enhancing International Arctic Scientific Cooperation, which encourages strengthened cooperation with non-party states. He notes that Korea Polar Research Institute (KOPRI) has already signed 37 MOUs with various research institutes related to Arctic science. He foresees future leadership of China, Japan and Korea in contributing to joint scientific research through use of their icebreakers. Pursuant to the Trilateral Dialogue on the Arctic, held every year, scientific cooperation among China, Japan and Korea can be expected to increase. For example, Korea has proposed sharing Arctic satellite data and China and Japan have shown positive responses. He also emphasizes the promising future contributions of the North Pacific Arctic Research Community (NPARC) towards advancing scientific cooperation. NPARC, initiated by the KMI, is bringing together about 20 research institutes and universities in the region to enhance cooperation at the expert level.

Jim Gamble, former Executive Director of the Aleut International Association and now Senior Fellow at the Institute of the North, first discusses how Indigenous Peoples and environmental NGOs are faring in Arctic Ocean-related cooperation through the Arctic Council and the IMO. He highlights the unique role held of the six Permanent Participants in the Arctic Council, stressing how they have been active on all levels including the negotiation of the three legally binding regional agreements for the Arctic, in the various Arctic Council assessments, in projects of the six council Working Groups, and in council expert groups and task forces. He notes the limitations set for all Observers, including NGOs, where they are invited to contribute primarily at the working group level and where total financial contributions from all Observers to any given Arctic Council project may not exceed financing from Arctic States, unless decided otherwise by Senior Arctic Officials.

Gamble then proceeds to describe how Indigenous Peoples and NGOs have been involved within the IMO. Indigenous Peoples have not played an active role within the IMO and no Indigenous peoples organization presently has IMO consultative status. Of 81 NGOs having IMO consultative status, seven are environmental/conservation organizations, and there have been recent efforts by NGOs to bring Indigenous representatives to attend meetings of the IMO's Marine Environment Protection Committee (MEPC). He highlights some of the positive IMO outcomes that were supported by Indigenous representatives and NGOs. These include adoption of an interim greenhouse gas emissions strategy whereby shipping emissions are to be reduced by at least 50 percent compared to 2008 levels by 2050, and a decision to explore a future ban on the use and carriage of heavy fuel oil (HFO) in the Arctic. Another example of collaboration at the IMO was the approval in May 2018 by the IMO's Marine Safety Committee (MSC) of routing measures and areas to be avoided for the Bering Strait region. He also foresees active future collaboration through the IMO in extending the protections of the Polar Code to cover fishing boats, large yachts and smaller cargo vessels (non-SOLAS vessels).

Gamble discusses the present and future contributions of the traditional knowledge of Indigenous Peoples to Arctic Ocean cooperation. He notes a pending publication by the PAME Working Group on the Meaningful Engagement of Indigenous Peoples and Local Communities in Marine Activities (MEMA), which will provide guidance on the how to ensure effective engagement in the future and emphasize the need for co-production of knowledge. He calls for the development of new Indigenous educational institutions where the melding of scientific knowledge and Indigenous Knowledge can be taken forward.

The role of Indigenous Peoples and NGOs in establishing MPAs in the U.S. maritime Arctic is a final topic. He highlights how full and early consultation and collaboration with Indigenous Peoples, local communities and NGOs in MPA design are critical as seen in attempts to establish National Marine Sanctuaries in Alaska.

Yekaterina Kontar, a post-doctoral fellow from the Science Diplomacy Center at the Fletcher School of Law and Diplomacy at Tufts University and one of NPACs emerging scholar voices, focuses on how cooperation between the United States and Russia might be enhanced in the future through bilateral exchanges of experiences and scientific expertise in responding to disaster risks and losses, such as coastal erosion and Arctic infrastructure damage resulting from thawing permafrost.

The discussion around the themes in Part II led to the identification of a number of questions that would benefit from detailed analysis:

1. What are the options for advancing and better coordinating marine scientific research in the future?
2. How exactly will decisions be made on the need for a new RFMO or similar arrangement in the CAO, and how likely are future disputes over that issue?
3. If the Task Force on Arctic Marine Cooperation fails to deliver on effective ways to strengthen international cooperation, what other avenues might be pursued to advance this agenda?
4. What is the status of cooperation between the Arctic Council and Arctic Economic Council regarding Arctic marine issues and how might that cooperation be enhanced in the future?

PART III. CLIMATE CHANGE IN THE ARCTIC: FUTURE DIRECTIONS FOR ADAPTATION

Session III of NPAC 2018 focuses on the following questions:

- What are major impacts of climate change and pollution in the Arctic?
- What are the major challenges related to climate change adaptation facing Arctic communities, and how can they respond to these challenges?
- How will acidification affect living marine resources in the Arctic, and what will be the consequences for Arctic communities?
- What are Arctic States, local communities, and business communities doing or planning to do in relation to adaptation, and what more could they do?
- What are the opportunities and constraints for the Arctic Council to address adaptation? Can the council's role be increased?

From a natural science perspective, Lars-Otto Reiersen, a Senior Advisor at the University of Tromsø, the Arctic University of Norway, and former Executive Secretary of the Arctic Monitoring and Assessment Programme (AMAP), argues that despite years of work and attention, many pollution

problems in the Arctic have not been solved. It is important to understand the interaction of various pollution problems and climate change. The long-range transport of contaminants includes two main groups of chemicals that are particularly relevant, Persistent Organic Pollutants (POPs) and Heavy Metals (typically mercury). The effects of such pollutants on humans are considerable. In assessments of the health situation in Arctic communities, they must be considered together with the effects of climate change. Climate change is no longer an anticipated development; it is happening now. Even in a relatively optimistic scenario where the world manages to comply with the goals set out in the Paris Climate Agreement, temperatures in the Arctic will increase drastically in the coming decades. Temperatures have already increased significantly. If mitigation efforts are less effective, the result will be even higher temperatures. But in any scenario that is realistic given current projected trend lines, the Arctic will already look very different by 2030. The increased temperature in the winter months for areas north of 60°N will trigger a huge melt of snow and ice, and thawing permafrost will have significant effects on the physical, chemical, and biological environment—and on human societies.

Changes in the thickness and volume of sea ice in the Arctic Ocean are considerable. We have already moved from a situation with stable, thick, multi-year sea ice covering most of the Arctic Ocean to a sea with a winter cover of a maximum 1.5 to 2 meters and a drastic reduction of multi-year ice. The increased water temperature is a key factor here. This change will have effects on the marine ecosystems connected to the sea ice, including mammals that depend on sea ice for reproduction and feeding (e.g. polar bears, walrus and seals).

Observable effects of rising temperatures include: (i) warming of the tundra area with increased growth of bushes and shrubs, leading to a greening of part of the terrestrial area. However, in parts of the northern areas, thawing of the permafrost has caused drainage of surface water so the land is "browning," (ii) permafrost thawing, with effects on the terrestrial ecosystems not only on the tundra, but also on infrastructure such as houses, roads and airports, and (iii) changing species distribution, both in the sea and on land, as many species are migrating north, including parasites, viruses, and new diseases that may affect humans as well as animals.

Global emissions of carbon dioxide increase the amount of CO_2 in the world oceans, making ocean water more acidic. The effects of this increased acidification of Arctic Ocean and northern coastal waters have only partially been analysed. There is still a lack of information from research and monitoring that clarifies even basic mechanisms and interactions between and among marine species. Some analyses indicate that in certain geographical areas along the coastal shelf of Alaska and Siberia, acidification may already be corroding the carbon shells of many species with a fatal effect on some important food sources that support the Arctic food chain.

Engineering solutions that remove carbon dioxide out of biological systems should be encouraged, since even aggressive mitigation strategies are insufficient to avoid disruptive future climate changes. According to modeling work, there is no chance to reach the Paris Climate Agreement goals, even if global CO_2 emissions were to be reduced to zero. Some geoengineering proposals are potentially very dangerous, however. For instance, pumping sulphur into the atmosphere, as has been proposed by some, would not reduce emissions of carbon dioxide, and therefore the acidification of the oceans would continue. The solutions we need to implement today and tomorrow must not create a new pollution problem in the long-term.

Chris M. Furgal, an Associate Professor in the Indigenous Environmental Studies Program at Trent University in Peterborough, Ontario, underlines that environmental, social, genetic and behavioral variables all influence human health regardless of place of residence. When we assess exposure to climate change and its influence on health in Arctic communities, we must also be aware of disparities in basic health status between Indigenous and non-Indigenous Peoples at the national level and even on regional scales in many countries. Significant differences in total life expectancy, the prevalence of many chronic diseases, access to basic and emergency health services, and equitable access to important components of public health infrastructure such as affordable, nutritious food, clean and safe drinking water and adequate housing put many of these populations at greater risk from the threats to health posed by climate change than it does to other segments of the population. In some instances, these factors also significantly dampen the capacity of individuals and communities to adapt. Significant work is needed to improve these foundational aspects of living conditions in the Arctic, which can in turn begin to enhance adaptive capacity to such things as the ongoing impacts of climate change on health.

It is methodologically complicated to isolate climate change impacts in any assessment of human populations, since climate changes interact with or parallel changes produced by other stressors. Among the identified direct health impacts associated with climate change in northern populations, the most commonly observed and reported today are the physical and mental health impacts associated with changes in the ability to pursue aspects of traditional livelihoods safely as a result of increased environmental hazards, such as larger and more frequent storm systems and weather extremes. Impacts of an indirect nature include accidents in the local environment while pursuing traditional livelihoods as a result of decreased ice stability, decreased ground stability and thawing permafrost, and the associated impacts to housing and public health infrastructure in communities and impacts on food and water security.

Climate is not the only driver of change in northern regions and therefore short-term coping or long-term adaptation may take many forms and must consider these multiple driving forces and their interactions. Such things as altering travel routes, enhancing safety measures for land and sea or sea ice-based livelihood activities, adopting and integrating modern technologies such as satellite imagery to help detect safe and unsafe environmental conditions prior to hunting trips, among many other strategies, are already occurring.

Fengshi Wu from the Asia Institute at Melbourne University argues that the potential impacts of climate change in the Arctic are a major concern that motivates all three Northeast Asian Arctic Council Observer states to significantly boost their Arctic-related activities. Given their similar geographic conditions, these three countries share some common concerns related to climate change in the Arctic, such as sea level rise, environmental change along the Pacific coasts, and potential increases in the frequency and intensity of extreme weather events and natural disasters. Japan and Korea pay relatively more attention to the impact on (traditional) fisheries and fishing industries rather than inland agricultural sectors, which China does, as a result of climate change in the Arctic.

These countries all see the potential impact on global shipping routes and consequent changes in trade and economic dynamics due to the melting of Arctic sea ice during summer seasons. Probably more importantly, the three non-Arctic countries are fully aware of the security and strategic dimensions of climate change in the Arctic. For all three countries, the most promising role in future Arctic governance will be in the fields of technological innovation and industrial development.

Kevin Harun, the Arctic Program Director for the NGO Pacific

Environment, argues that one key mitigation measure (not covered by the Paris Climate Agreement) that should be championed by all Arctic nations is the decarbonization of the shipping industry. Currently, it is estimated that the shipping sector produces emissions equivalent to those of Germany. If left unchecked, the shipping sector will account for 17 percent of worldwide emissions by 2050. Short-term measures exist, such as ship retrofits, “slow-steaming,” and energy efficiency and design standards now before the International Maritime Organization (IMO). Reducing greenhouse gas emissions from the shipping industry would also result in less black carbon, which is an accelerator of snow and ice melt in the Arctic.

For rapid mitigation, the energy sector must be aggressively challenged to decarbonize. Many (who have not embraced the need for mitigation) equate energy reduction to a standard-of-living reduction. To the contrary, for example, the United States in recent decades has demonstrated that consumption of electricity can be dramatically reduced while gross domestic product (GDP) rises. In the 1980s, many U.S. power companies projected a significant need for additional power generation which never materialized because measures involving conservation, renewables and efficiency were adopted.

Moreover, new efficiency and renewables technology is closely linked to cutting-edge economies and economic growth. Put simply, the world yearns for innovative products, and those countries that focus on renewables and energy-saving innovations will reap the rewards. Counterintuitively for some, emissions reductions can lead to standard-of-living advances.

Malgorzata Smieszek, from the Arctic Centre at the University of Lapland and another emerging NPAC scholar, argues that in general, adaptation requires primarily domestic policy responses. This contrasts to mitigation efforts, where the need for global action is widely recognized. In the Arctic, adaptation to climate change is apt to occur mainly at the domestic and even local levels, where climate change is seldom the number one item on the agenda. This, in turn, raises a question about the role the Arctic Council can play in those efforts and what it is best positioned to do. Possible future directions for the Council could include continuing with its regional scientific assessment work.

With its experience, the Arctic Council could move on and seek to address existing major research gaps regarding adaptation to climate change: indicators of vulnerability and reference points for assessment of future adaptation actions. This work would certainly benefit from international collaboration, and on a regional scale the Arctic Council is ideally positioned to advance such research.

Seeing that impacts of climate change emerge over a variety of time scales, appropriate adaptation measures to those impacts must be implemented at each stage and with an understanding of their ripple effects. The Council's work can support national efforts and formulation of national adaptation plans with considerations of climate change impacts at the regional level—as it has been doing up to now.

Additionally, the Arctic Council could promote mainstreaming adaptation into both short-term and long-term planning. Mainstreaming would require framing future development plans with the inclusion of projected climate changes and incorporating the adaptation perspective into a wide range of projects, such as social and environmental impact assessments.

Based on its scientific work, the Arctic Council today could adjust its overall message to reflect the results of the SWIPA Report (2017), which shows that even under a moderate greenhouse gas emissions scenario (RCP 4.5) the autumn and winter temperatures in the Arctic will increase by four to five degrees Celsius above late 20th century values by 2050. This message is not yet a part of mainstream discussions about the Arctic. But arguably it should be, seeing that even reaching the goals of the Paris Climate Agreement will not prevent much greater temperature increases for the region in comparison to the rest of the northern hemisphere.

PART IV. TRENDS IN RESOURCE EXTRACTION AND LOGISTICS: GLOBAL DRIVERS AND REGIONAL CONDITIONS

Over the last decade, many have spoken about the great potential for Arctic shipping. No doubt the changing ice situation, coupled with active encouragement from Russia (the country with the longest Arctic coast), spurred interest and attracted international attention. Whereas less than a decade ago there was relatively limited international experience with maritime activities in the Arctic, today both commercial actors and analysts are engaged in detailed studies based on fresh data. It is therefore pertinent to revisit the outlook for Arctic shipping, based on the considerable know-how and expertise developed by stakeholders and analysts, taking into account the implementation of the Polar Code.

Session IV of NPAC 2018 addresses the tradeoffs among commercial, political, social and environmental considerations in Arctic resource extraction and logistics, the future of global demand for Arctic resources, and the shipment of natural gas from Yamal LNG and Arctic LNG 2. The contributions in this part also focus attention on the impact of the 4th Industrial Revolution on Arctic nonrenewable resource development and logistics and on the implications of China's extension of its Belt and Road Initiative to cover the development of Arctic nonrenewable resources.

From a global market perspective, David Pumphrey, a Senior Associate with the Center for Strategic and International Studies' energy and national security program, argues that long-term demand for oil and gas is very uncertain and that there are potentially ample supplies from other less costly regions than the Arctic. The consensus view on the outlook for the oil market is for slow demand growth until the 2030s, when demand will plateau and may begin to decline. Growth in demand for oil and natural gas could be significantly reduced by strong environmental policies. Natural gas demand is expected to increase more rapidly than oil due to fuel switching and industrial demand; electricity generation and transportation are key drivers. Demand growth for gas will be lowered by either less fuel switching or by greater penetration by renewables. In addition, the development of new technologies may radically transform the transportation and energy sectors. The introduction of electric vehicles and autonomous vehicles could transform the automobile industry.

Supplies of both oil and gas look like they will be able to meet expected demand growth without significant increases in prices. Projects will likely need to be able to meet a $70/barrel price threshold to be economic. Energy projects in onshore Arctic areas that have infrastructure to support production activities and transport oil and gas to market as well as projects in ice-free Arctic offshore zones will likely be able to proceed. Projects where there is little infrastructure support and in Arctic offshore areas with significant ice will be challenged under these market conditions, unless there is strong government support through subsidies or tax treatment. The development of strict carbon emission policies would make the investment environment even more problematic for Arctic oil and gas projects. For greenfield projects that are intended to last over a number of decades, the risk of lower oil and natural gas prices resulting from lower demand would create a high risk of financial losses for project and asset stranding.

Substantial government financial support would be required for these oil and gas projects to move forward.

Henrik Falck, a Senior Advisor at the Center for High North Logistics at Nord University in Bodø, Norway, explains that there has been growing use of the Northern Sea Route mostly for shipping to and from the Russian Arctic, with only a limited amount of transit shipping. In the global context, the NSR provides benefits only in a limited number of cases. The Southern Hemisphere, South Asia, and the Middle East are likely to derive little benefit. It is essential to understand the role of various ports. Ports both in Northeast Asia and northern Europe are mainly points of discharge of bulk cargo which originates in the Southern Hemisphere. This means that they do not have much bulk cargo that could profitably be sent via the Arctic. Ports in the Baltic Sea may benefit from the Arctic route since they are loading bulk cargo, but the volumes are small. Bulk carrier ship owners need to consider back haul opportunities and not just the reduction in sailing days. Opportunities for bulk carriers may, however, grow with new ports in the Russian Arctic.

For container ships, scheduling within specific slots is critical to shipping economics, so transits along the NSR that raise risks of delays due to unpredictable ice conditions will likely be of limited interest. Hybrid (container and bulk) vessels may be attractive for some cases as stops can be made to offload equipment and pick up ore. Other issues influencing NSR shipping will include arbitrage opportunities and economies of scale. Destination shipping in the NSR to and from Russian Arctic ports may have the most growth potential. A large increase centered on oil and gas projects in the Ob Bay and Yenisei areas is expected. Transshipment to and from the rivers enabled by new port infrastructure will take a longer time to develop but might have a substantial potential in the future. Russian policies constitute a major uncertainty. There are signals of protectionism, and the international political environment is not conducive for investment. Who will risk building an expensive ice-class vessel for a long-term contract with a Russian company if that company runs the risk of being sanctioned?

Sungwoo Lee and Jisung Jo of the Korea Maritime Institute remark that the Arctic offshore and Siberian regions of Russia would be an ideal testing grounds for automation technology. There are enormous undiscovered oil and natural gas resources in the Arctic both offshore and onshore, and the waterways connecting the Siberian inland with the NSR have the potential to play an important role as a logistics network. Materials and equipment must be brought in to develop resources and build infrastructure. Key problems associated with expanded use include unpredictable and unstable ice conditions, as well as winterization of ships and equipment. There is also a lack of manpower. Technologies and business models emerging with the 4th Industrial Revolution may help overcome these barriers. Technologies that may play a role include automated trucks, vessels, mining systems, unmanned warehouses and drones, the Internet of Things, cloud computing, artificial intelligence, and Prompt Port Facilities. Several new technologies have reached a stage where they can be implemented in the Arctic. But governance and financial challenges remain. The NSR has multiple stakeholders, not only coastal nations in the Arctic, but also non-Arctic nations. Integration and cooperation should be the core concepts in terms of designing governance systems. The Asian Infrastructure Investment Bank and Arctic Development Bank could likely support a master concept applying the 4th Industrial Revolution to the NSR.

Nina Poussenkova, from the Primakov Institute of World Economy and International Relations (IMEMO) of the Russian Academy of Sciences, explains that with large resource reserves, the Arctic region is seen as the next big source of Russian oil and gas production, with some important caveats. The real potential of the Russian Arctic offshore is an open question, however, since so little exploration has been done there. During the early 2000s, the period of high oil prices, the Russian government was upbeat on the future production potential of the Russian Arctic offshore and considered it a national priority. However, recent macroeconomic and political developments have undermined this optimistic outlook. Lower prices, sanctions, shortages of trained personnel and equipment now make this region seem much less attractive commercially, especially in areas east of the Urals and in the ice-covered offshore regions in the east (though it still remains high on the domestic political agenda). There are also concerns related to the technical capacity and manpower for environmentally sustainable development of the offshore Arctic. Institutionally, only Gazprom and Rosneft have access to offshore fields. There is a lack of production and transportation infrastructure, and the Russian shipbuilding industry is in decline. Moreover, several other options for additional oil production onshore exist: enhanced oil recovery including hard-to-recover reserves, small or depleted fields that could be developed by small and mid-size companies. All three alternatives are commercially, socially, technologically and environmentally more attractive than Arctic offshore oil. Development of new Arctic offshore fields, particularly to the east of the Urals, will not be feasible at prices below $90/barrel and will need significant state support, as has been the case with earlier projects (e.g. Prirazlomnoye, the only Russian oil production project in the Arctic offshore). Foreign participation in some form for finance, technology and operations seems necessary. Rosneft established strategic partnerships to develop Arctic offshore reserves with ExxonMobil, ENI and Equinor (formerly Statoil), but they are all currently frozen as a result of sanctions. Because of Western sanctions, both Rosneft and Gazpromneft, the operator of Prirazlomnoye, search for partners in the Asia-Pacific region to work on the Arctic offshore, but so far without significant success. Up to 2035, large-scale oil production on the Russian Arctic shelf is unrealistic. Russian experts and people in the oil industry reluctantly admit that Russia is not ready yet to produce Arctic offshore oil in an environmentally sustainable manner.

Yang Jian from the Shanghai Institutes for International Studies, along with Henry Tillman, the CEO of Grisons Peak LLP and founder of China Outbound Investments, report that in January 2017, China announced a national Arctic Policy that includes the Polar Silk Road, a cooperation framework with Russia, Nordic and East Asian countries for development of the Arctic region. The Polar Silk Road is also a part of the Belt and Road Initiative. The Polar Silk Road means that China has the willingness to build infrastructure in the Russian Arctic region, especially the NSR. The Polar Silk Road is also a proposal for broader international cooperation among Arctic stakeholders for development and governance of the Arctic. The Polar Silk Road is originally a Russian idea. The most important project in the Russian Arctic with Chinese involvement thus far is Yamal LNG; Chinese participation in Arctic LNG 2 is highly likely. COSCO is an increasingly important player in Arctic shipping. Chinese companies are looking into railway projects connecting the Arctic with southern regions in Russia and Europe, as well as participation in a planned trans-Arctic submarine cable project. Chinese enterprises need to be mindful of the fact that the partners along the Polar Silk Road are developed economies making environmental protection a precondition for economic activities in the Arctic. Their GDP per capita, productivity and degree of affluence are higher than China's. Except for Russia, these countries have sound market systems, high standards for labor rights, and norms for protection of the environment. Compared with the BRI cooperation in other regions, cooperation along the Polar Silk Road represents a higher level of technology and two-way flows of technology, capital and information. The social development goals of the advanced Arctic economies are more diversified and comprehensive, and include social justice, ecological balance, economic development, inter-generational equity, enterprise ethics, climate response, etc. The decision-making procedure for social resource allocation is complicated.

Keun-Wook Paik, an authority on Eurasian energy at the Oxford Institute for Energy Studies, observes that unlike Sino-Russian oil cooperation, Sino-Russian gas cooperation during the last two decades failed to deliver any substance prior to Yamal LNG. Chinese financing is indispensable for that project's realization. China is also expected to take part in Arctic LNG 2. Beijing sees the need and merit of diversifying supply sources with the price competitiveness of Arctic LNG 2. LNG from the Arctic is an important back-up in case of supply disruptions from Central Asia. In the coming decade, Qatar, Australia, and the U.S. are set to dominate global LNG supply. As China has no leverage against these major LNG supply sources, China has a strong interest in helping Novatek's rise as a major LNG supplier. Russian LNG can provide supplies and diversity for China as gas demand grows. Due to pro-gas policies in Beijing, China's gas market will grow from 230 BCM to 600 BCM by 2030. The prospect of Sino-Russian LNG trade is very promising. Novatek's projects are cost-competitive. Beijing aims to maximize synergy from combining the BRI and Polar Silk Road Initiative with Arctic LNG supply to China. China can cooperate with Russian firms to build the infrastructure for development of resources and support of NSR shipping. A big question is whether Beijing's commitment will go beyond the Arctic LNG 2's first stage. If China decides to provide significant financing for the Gydan Peninsula's comprehensive LNG export scheme, it will open a new chapter in global LNG supplies in the 2020s.

Natsuhiko Otsuka, a Professor at Hokkaido University's Arctic Research Center, remarks that Japan is currently the world's largest LNG importer—and LNG imports are expected to continue to play an important role in Japan's energy supply. The fifth Basic Act of Energy Policy has set a target for natural gas to supply 18 percent of domestic energy consumption in 2030. Japan imports LNG from a variety of sources, including Russia (Sakhalin 2). Growth in Russia's export of LNG will play a role in meeting this target. But there is considerable uncertainty about how high the demand will be, mainly because it is unclear how much nuclear generation capacity will be restarted and what the role of renewables will be. For these reasons JERA, the LNG purchasing agency, is planning to reduce the amount of LNG bought on long-term contracts in 2030 by almost half compared with today. The apparently successful implementation of Yamal LNG, including the first direct shipments to Asia, has increased attention to that project and Arctic LNG 2 as realistic supply options. Japanese companies were involved in the construction of the LNG plant, and Japanese shipping companies have stakes in some of the icebreaking LNG carriers being built. Arctic shipping is still a difficult activity because of its remoteness, existence of sea ice, harsh weather, unpredictable natural conditions and importance of environmental protection.

In the open discussion period following the Part IV presentations at the NPAC conference, Fereidun Fesharaki, Chairman of FACTS Global Energy Group, presented a long-term oil outlook with slower growth and flat demand for gasoline due to projections of efficiency gains, plug-ins, and electric cars. He predicts global gasoline demand will be flat globally by 2030-35, in Asia by 2040, in China already by 2025. Moving to the supply side, shale/tight oil growth in the U.S. has been robust and production could stay at 10 million barrels per day (mbd). If these trends continue, Fesharaki stated, world markets would not need Arctic oil by the time it might become available, and the most optimistic scenario for Arctic supplies would be 2-4 mbd. Cost is also a driver in considering future supply and demand. Fesharaki noted that production costs in the Middle East still remain around $7/bl. Although costs in the Arctic have come down, producers there still need oil to be at around $75/bl to break even. Big oil companies have become more profitable, enjoying more profits now than when oil prices were at $120/bl, but it is unclear what their long-term investment strategies will be with regard to the Arctic.

Sasha Fesharaki, executive vice chairman of FACTS Global Energy, added that natural gas does not have a supply problem, but perhaps more of a demand problem. The ongoing emergence of renewables constitutes a challenge to traditional hydrocarbon markets. Gas prices must remain low to compete, since in the Middle East, solar power costs are already as low as 3 cents/kwh. It would be difficult for gas to compete at this price. The changing economics of renewable energy production will affect upstream gas investments, including in the Arctic. Arctic gas projects are mega-projects and require long-term investments. However, markets are changing and contracts are trending towards shorter periods. In 2010, 90 per cent of gas sales were on long-term contracts. By 2017, only 80 per cent were long-term contracts. Currently, however, Yamal LNG is very cost competitive compared to other global suppliers.

David A. Balton, a contributor to two NPAC 2018 chapters, raised a critical question that was echoed by other participants: what about Indigenous Peoples in relation to energy and logistics projects? While most agreed it is necessary to include Indigenous perspectives, clearly there is no uniform "Indigenous" voice that speaks for the diverse Indigenous communities across the Arctic. Some want offshore development, but also protections for subsistence whale hunting. Major oil and gas developments can also have positive side effects for Indigenous businesses. Yamal LNG, for example, by creating better transportation and shipping options, also offers the possibility of exporting reindeer meat. Other current and proposed hydrocarbon projects, such as developing Alaskan LNG infrastructure, need to consider short- and long-term cost structures. The current cost for Alaskan LNG is around $11/mbtu (USD/million BTUs), while shale gas is around $7/mbtu. Infrastructure improvements for Alaskan and other Arctic hydrocarbon transportation would require large-scale upstream development, while shale gas can be bought from the grid in lower latitudes, where pipelines are already in place or can be constructed at much lower cost.

Other considerations raised by various participants include observations and questions regarding the evolving relationship between China and Russia: Is there potential competition between the Polar Silk Road and other BRI projects? It was suggested that China is not likely to expand investments in the Arctic quickly, since they are looking at a 20-year timeline. But although China is in a very strong position with regard to Russia right now, others noted that when sanctions are lifted, Russia would have more options for technological and financial partners.

China's evolving role in world affairs and global energy markets was also a discussion topic. China states that it wants to contribute a public good to the world economy. Yet there has not been intensive Chinese attention to the Polar Silk Road up to the present, since Beijing's primary focus is on Asia. China wants to work with East Asian as well as Nordic countries, in addition to Russia. The question is: Will China finance development on the Gydan peninsula, especially since Yamal LNG demonstrated that a mega-project can be successfully executed in Russia. China sees the potential benefits of large scale financing of LNG, and is increasingly confident that Novatek can further reduce costs. On the other hand, Russia has wanted to show they are not totally dependent on China, and Russia is comfortable with its position in the Arctic Council as a way to expand its potential partnerships. It was suggested that Russia's cooperation with China will be on bilateral basis as mutually beneficial goals and terms can be solidified.

In conclusion, Part IV examines trends affecting future resource extraction and logistics possibilities, and explores the many uncertainties influencing the future of Arctic resource extraction. Shifting geopolitical alliances, changing global energy supply-and-demand trends, the rapid pace of technological advances, and the myriad impacts of climate change will all have a bearing on decisions that various governments, private sector actors, and emerging global governance organizations (such as the Arctic Council) will make in the years to come.

PART V. THE SDGs AND AGENDA 2030 IN THE ARCTIC

Session V of NPAC 2018 directs attention to the relevance to the Arctic of the UN Sustainable Development Goals. In 2015, the UN General Assembly adopted a set of 17 Sustainable Development Goals (SDGs) that form the core of the UN's 2030 Agenda for Sustainable Development. These goals are intended to provide guidelines for a concerted effort to make progress on a variety of global priorities during the coming years. Although this effort was not motivated by a concern for conditions prevailing in the Arctic, the SDGs are clearly applicable to the future of the circumpolar North. The contributions to Part V of this volume address both the relevance of specific SDGs to contemporary concerns in the Arctic and insights from the Arctic experience that may prove helpful in thinking about sustainable development more broadly.

Dwayne R. Menezes of the Polar Research and Policy Initiative speaks of the role of NGOs in promoting sustainable development in the Arctic. He tells the story of the development of the Polar Research and Policy Initiative (also known as The Polar Connection) and describes PRPI's experience in organizing a series of high-level policy dialogues on the role of the SDGs in the Arctic. He highlights the importance of encouraging a global discourse on Arctic issues using the holistic framework provided by the SDGs, drawing in prominent individuals and promoting an understanding of Arctic issues in both public and private circles.

In addition, Menezes speaks about the role of non-Arctic states, taking the experience of the UK as a prominent example. He explains the historical role of the UK in the Arctic, its recognition of the Arctic Council as the "pre-eminent intergovernmental regional forum for discussing sustainable development and environmental protection in the Arctic," and its contributions as an Arctic Council Observer state. He also notes that Canada (an Arctic Council member), as well as India, Singapore, and the UK (Arctic Council Observer states) are all members of the Commonwealth of Nations. Furthermore, the UK plays host to a number of organizations, such as the International Maritime Organization, the OSPAR Commission Secretariat, the North East Atlantic Fisheries Commission and Lloyd's of London, whose activities are relevant to the Arctic. The UK also is an important trading partner of all the Arctic Council member states, especially those in the Nordic region and North America. These connections provide a basis for valuable cooperation on issues such as sustainable development within and beyond the Arctic. The UK's commitment to delivering the Global Goals for Sustainable Development in the Arctic region features in the UK's 2018 Arctic policy statement entitled "Beyond the Ice."

Elena Nikitina, from the Primakov National Research Institute of World Economy and International Relations (IMEMO RAN), summarizes her views on the SDGs in the Arctic in five points. First, it is important to understand the importance of synergy between the biophysical and the human dimensions of Arctic systems as well as between regional and global drivers of change. Second, there are tight links among the social, economic, and environmental elements of sustainable development. The challenge is to balance these forces and especially to devote adequate attention to the social dimensions of sustainable development. It is helpful to note that the Arctic's share of Russia's GDP is five times the Arctic's share of Russia's human population. Third, with regard to sustainable development, we are witnessing today a merging of the Arctic agenda and the global agenda. Fourth, the role of the state is critical in implementing the SDGs. But the state cannot achieve this objective alone. Russia traditionally has placed primary emphasis on economic issues, but there are signs of a shift toward greater inclusiveness. Fifth, within the Arctic Council, sustainable development is a crosscutting theme relevant to the activities of all the working groups. So far, the results of the efforts of the Sustainable Development Working Group to promote the fulfillment of the SDGs have been shallow. There is a need to develop a stronger mechanism within the council to address the implementation of the SDGs.

Eeva R. Furman, Director of the Environmental Policy Centre at the Finnish Environment Institute (SYKE), speaks about insights relating to the implementation of the SDGs arising from her work on the preparation of the UN's Global Sustainable Development Report. She emphasizes four points. First, sustainable development is a matter of *long-term* prosperity and success. Second, when it comes to implementing the SDGs, the Arctic has advantages in the form of well-developed institutions that are experienced in working together, considerable experience with public-private partnerships, and strong engagement on the part of Indigenous Peoples. On the other hand, there are strong flows crossing regions, and the boundaries between Arctic and global processes are becoming blurry. Global issues of justice are relevant to the Arctic even though the Arctic states as a group are among the world's wealthiest and most advanced countries. Third, in thinking about 2030 and beyond, we should not become too preoccupied with indicators but rather make good use of scenarios to explore different pathways toward transformation. We need to focus on motivations and incentives to understand what is needed to promote social innovations required to achieve positive outcomes in transformative settings. Fourth, the Finnish chairmanship of the Arctic Council has focused on implementing the SDGs in the Arctic as a matter of priority. A lot of useful groundwork has been done. While it is not easy to measure the success of this effort, it is likely that in retrospect the work on the SDGs will stand out as a significant achievement of the Finnish chairmanship.

Jong Deog Kim and Jeehye Kim from the Korea Maritime Institute speak of Korea's experience regarding the implementation of the SDGs in the Arctic. They mention, among other things, the creation of the national Sustainable Development Commission, Korea's interest in sustainable fisheries, Korea's role in the development of the Northern Sea Route, and the country's substantial investment in Arctic research. They mention an ongoing effort to think about policy through 2050 based on a commitment to implementing the SDGs. The SDGs figure prominently in Korea's July 2018 Arctic policy statement. The Korea Arctic Academy is a particularly significant initiative in this context.

Dalee Sambo Dorough, the new international Chair of the Inuit Circumpolar Conference, articulates her perspective on the SDGs in the

Arctic in several points. From an Indigenous perspective, sustainable development is a matter of maintaining ecological balance and avoiding the depletion of natural resources over time. Indigenous peoples have understood the meaning of sustainability for millennia. It is embedded in their languages and cultures and in Indigenous Knowledge, all of which stress the long-term and the interrelated and indivisible character of the environment. As a result, sustainability is an essential element of human rights.

Respect for and recognition of Indigenous human rights lie at the core of sustainable development in the Arctic. These rights are articulated in the UN Declaration on the Rights of Indigenous Peoples, ILO Convention 169, and the Organization of American States' American Declaration on Rights of Indigenous Peoples. The outcome document from the 2012 Rio Conference, entitled *The Future We Want*, states clearly the importance of participation of Indigenous Peoples in efforts to achieve sustainability. At the same time, there are serious issues of social and economic inequity in the Arctic. Despite the fact that the Arctic states are wealthy countries, Indigenous Peoples, especially in the United States, Canada, and Russia, often suffer from food insecurity, poor health, unequal educational opportunities, and the emotional legacies of colonialism.

National governments have an obligation to provide Indigenous Peoples with the space needed to pursue self-determination and self-governance. In this regard, an emphasis on equality is essential. For its part, the Arctic Council could play a role by developing indicators of sustainable development customized to the conditions prevailing in the Arctic. Procedures for voluntary national reporting under the auspices of the Arctic Council also constitute a promising opportunity.

During Session V of the NPAC 2018 conference, the five authors engaged in a conversation, moderated by the chair. This conversation centered on two main questions: "Does the Arctic have special features that are important in thinking about the implementation of the SDGs?" and "Are there insights regarding governance to be derived from thinking about the implementation of the SDGs in the Arctic?"

Special features of the Arctic. Regarding the first question, the discussion focused on the challenge of translating global goals to make them applicable to local concerns, compiling progress reports on a regular basis, prioritizing the human dimensions of sustainable development, and thinking about sustainability in the Arctic from the inside out rather than from the outside in. Several panelists regarded the strength of Indigenous

Peoples' Organizations and their prominent role in the Arctic Council as special features of the Arctic with regard to implementing the SDGs. A more troubling concern centered on the fact that while economic growth rates in the aggregate are higher in the Arctic than elsewhere, socioeconomic stratification is still severe. Extractive industries such as oil and gas developers contribute to overall production in the Arctic. But the resultant benefits often fail to reach the Arctic's local population. The result is a condition of disparity that can become a serious barrier to the achievement of sustainable and equitable development.

Insights regarding governance. With respect to the second question, the discussion turned to roles for the Arctic Council in the overall effort to implement the SDGs. Despite its soft-law status, the Council can provide guidelines, engage in periodic reviews, prepare report cards, and more generally act to prevent the SDGs from fading from public attention. Panelists felt it important to make use of several strategies at the same time. Combining public and private initiatives, for example, is a helpful approach. Within the Council, the Sustainable Development Working Group has not been as effective as it could be. At the same time, the authors stated that other working groups can play important roles in addressing issues of sustainable development. A useful first step might be to create a task force to conduct an assessment of what the council has already done in this field and what opportunities exist for the future. In addition, decentralization to include Indigenous initiatives as well as local initiatives is an important strategy regarding implementation of the SDGs. The idea of Inuit Marine Protected Areas is an example. A constructive domestic initiative in Russia is the creation of an Interagency Commission for the Arctic.

The final segment of this part of NPAC 2018 took the form of an open discussion between the panelists and other conference participants. Although the discussion was wide-ranging, three broad themes emerged from the ensuing dialogue:

The role of the Arctic Council. Many participants expressed the view that the Arctic Council can play important roles in implementing the SDGs in the Arctic. Specifically, the Council can: (i) translate global goals into regionally appropriate targets, (ii) help to raise awareness regarding the significance of the SDGs, (iii) assist member states in devising strategies to achieve the SDGs, (iv) prepare periodic progress reports or report cards on efforts to implement the SDGs, and (v) generally promote the visibility of the SDGs as overarching objectives for actors at numerous levels. There are, of course, constraints that must be kept in mind. Among these are structural problems regarding the internal organization of the Council. Several participants observed that this is not just a matter of reforming the work of the Working Group on Sustainable Development but rather a broader matter of organizing the Council to work effectively in this area. Relative to organizations like the OECD, the Arctic Council has very limited human resources and financial capacity. Nevertheless, there is a general feeling among the participants that that the Council could become an important player regarding the implementation of the SDGs in the Arctic. Working out the precise nature of this role could become the focus of a strategic plan for the next phase of the Council's work. This could emerge as an opportunity for the Icelandic chairmanship from 2019 to 2021.

Obstacles to effectiveness. There are important obstacles to be considered in this realm that not only affect the work of the Arctic Council, but also affect such governance processes more generally. One has to do with consistency. Sustainable development means different things to different stakeholders. This can become a source of confusion and lead to serious misunderstandings. Another is the common occurrence of ritualism, which can take the form of actors paying lip service to the SDGs without engaging in any serious behavioral adjustments. A third involves the lack of serious political commitment when it comes to exercises in governing through goals. None of these problems suggests any reason to give up on efforts to make progress in this realm. But it is important to take such obstacles into account in designing strategies for implementing the SDGs.

Social learning. The pursuit of the SDGs must be understood as a learning process involving a willingness to take risks, to experiment, to accept failure, and to learn from these experiences. It requires engagement from the local level—in particular, the Arctic's Indigenous Peoples—through the regional level and eventually the global level. Sustainable development is not a challenge that can be put aside once the goals are met initially. Rather, it is a continuing process requiring long-term commitment and engagement on the part of many actors.

NEXT STEPS FOR NPAC

With the overarching theme of *The Arctic in an Age of Global Change* to guide the 2018-2022 series of North Pacific Arctic Conferences, NPAC 2018 focused on *Arctic 2030—Pathways to the Future*.

Going forward, NPAC 2019, in the second year of the new series, will address *Global-Arctic Interactions*. The intent of this framing is to focus on emerging Arctic issues with the rise of the Arctic from periphery to center.

The rise of the idea of the Arctic as a distinct region is attributable to a confluence of several major developments occurring during the final decades of the 20th century. The fading of the Cold War led to a sharp reduction in the earlier preoccupation with the Arctic as a theater of operations for the strategic weapons systems of the two superpowers. The collapse of the Soviet Union and the ensuing period of turmoil in Russia diverted international attention away from the Arctic as a source of raw materials and as a region of interest to international shippers. Commercial shipping along the Northern Sea Route, for example, experienced a sharp decline during the 1990s. From the perspective of the international community as a whole, the effect was to make the Arctic seem increasingly peripheral.

From the perspective of the Arctic states, on the other hand, the Arctic offered attractive opportunities for international cooperation bridging the East-West divide of the postwar era and ushering in an era in which these states found it appealing to treat the region as a zone of peace. The result was the surge of cooperative initiatives throughout the 1990s targeting areas of common concern such as scientific research, environmental protection, and the rights of Indigenous Peoples, while explicitly avoiding contentious issues like military security. In quick succession, the Arctic states launched the International Arctic Science Committee (1990), initiated the Arctic Environmental Protection Strategy (1991), and established the Arctic Council (1996). While the Arctic states were energetically addressing issues on the Arctic agenda, the rest of the world tended to view the Arctic as a remote and peripheral area. Non-Arctic states did not object to the initiatives of the Arctic states. In fact, they found little reason to pay attention to the Arctic at all, except as an area of interest to some members of the science community.

The early years of the 21st century, however, have witnessed a sharp shift regarding these matters. As we have come to understand that the Arctic is experiencing the impacts of climate change more rapidly and dramatically than any other part of the world, the rationale for thinking of the Arctic as a distinct region with a separate policy agenda has faded. A growing number of non-Arctic states have discovered reasons to take an interest in Arctic affairs. Often characterizing their initiatives as contributions to Arctic research or sustainability, these states are attracted increasingly by the economic potential of the region. Paradoxically, the effects of climate change—largely attributed by scientists to human activities linked to the burning of fossil fuels—are making the region more accessible to those interested in the extraction of the Arctic's vast hydrocarbon reserves, mining opportunities, and in the potential of commercial shipping routes traversing Arctic waters.

As a result, Arctic affairs are merging with world affairs. Despite the claims of Arctic states regarding the primacy of their interests in the region, non-Arctic states are engaging actively in international initiatives dealing with a number of Arctic matters (e.g. the Polar Code developed under the auspices of the International Maritime Organization to regulate commercial shipping, and the Central Arctic Ocean Agreement designed to deal with potential fisheries). Many non-Arctic states have articulated Arctic policies and appointed officials with ambassadorial rank to follow Arctic affairs. Applications for observer status at the Arctic Council now come from seemingly unlikely places (e.g. Greece, Turkey). At the same time, we are witnessing the redeployment of military forces in the region, driven more by tensions arising at the global level than by conflicts specific to the Arctic. Research centers across the world, many of which showed little interest in the Arctic in the past, are now organizing conferences on Arctic issues.

Today, the Arctic has become a focus of intense interest in many quarters. Visions of tapping the region's natural resources have driven decisions by companies outside the Arctic to invest in extraction projects (the most notable being investments in the natural gas project on the Yamal peninsula on the part of France's Total and China's CNPC), as well as to produce a new generation of icebreaking LNG tankers in the shipyards of Korea to transport liquid natural gas from the new port of Sabetta. At the same time, growing tensions between Russia and the Western states arising from the reemergence of Russia as a great power and intensified by the annexation of Crimea in 2014 have led some to express concern about the remilitarization of the Arctic. More generally, the pursuit of great power aspirations on the part of Russia and the emergence of China as a global power have put an end to the vision of the Arctic as a peripheral region to be treated as a zone of peace in which the principal concerns center on the pursuit of opportunities to cooperate in dealing with matters of environmental protection and sustainable development. Today, the Arctic is both a high-impact zone for global forces (e.g. the impacts of climate change) and an arena for the pursuit of high politics (e.g. the interplay among China, Russia, and the U.S. in a shifting global order).

A number of other global developments cut across this trend of merging regional and global agendas. Taken together, they suggest that we are moving into an era in which familiar perspectives on international relations are no longer adequate as organizing principles for thinking about Global-Arctic Interactions. Partly, this concerns the impacts of what has come to be known as the Great Acceleration. This recent concept is part of a new era we now think of as the Anthropocene, an epoch during which human activities are reshaping global biophysical systems. Undoubtedly, the most prominent case in point is climate change. Already, the effects of climate change are unmistakable in the Arctic, taking visible form in the recession and thinning of sea ice, intensified storm surges and coastal erosion, the thawing of permafrost leading to the destruction of infrastructure, and rapid changes in the behavior of glaciers, especially in Greenland. There are good reasons to regard these effects as harbingers of increasingly disruptive impacts of climate change that are already affecting areas in the mid-latitudes and will likely accelerate in the not-too-distant future. While the most recent report from the Intergovernmental Panel on Climate Change documents the likely impacts of temperature increases as small as 1.5°C, the Arctic is now providing evidence regarding the consequences of far more dramatic increases in surface temperatures. Nor are the impacts of climate change in the Arctic likely to be limited to the high latitudes. The recession of sea ice is triggering feedback mechanisms that will accelerate the rise in temperature globally. The thawing of permafrost may release large quantities of methane, a more potent greenhouse gas than carbon dioxide, now locked in frozen ground and in methane clathrates in shallow coastal waters. Increasing shifts in the polar vortex may affect weather patterns in the mid-latitudes. A collapse of the Greenland ice sheet, an extreme but plausible event, would raise sea levels around the world by six to seven meters. As a result, an intense interest in Arctic developments is increasingly central to the thinking of those concerned with global environmental change.

In part, the merging of regional and global agendas is attributable to developments in information technology and biotechnology, giving rise to developments we now characterize as the 4th Industrial Revolution, together with new issues in the realm of what we are coming to know as cybersecurity. Developments in artificial intelligence, robotics, big data, the Internet of Things, and 3-D printing have the potential to revolutionize the economic systems of advanced industrial societies. Just as the Arctic's natural resources (e.g. deposits of oil and gas) and shipping routes become more accessible, we may be moving toward a world in which these conventional sources of value are of declining importance. Similarly, the development of increasingly sophisticated capabilities to engage in cyber aggression/warfare may radically reduce the value of conventional military systems and alter the way we think about the distribution of power in international society. Uncertainty is a critical feature of the increasingly complex world brought on by these developments. But any effort to think systematically about Global-Arctic Interactions must take into account the prospect of radical changes in economic and political systems that call into question many of the assumptions we make habitually about the character of the prevailing global order.

NPAC 2019 will provide a venue to explore such developments in greater detail and give voice to new ideas and constructs for the Arctic region nested in and affecting global affairs.

Notes

1. Many of the following points are based on Session Chairs' Reports from the 2018 North Pacific Arctic Conference prepared by Charles Morrison, Bernard Funston, Robert W. Corell, Oran Young, David L. VanderZwaag, Yoon H. Kim, and Arild Moe.
2. All monetary figures in these NPAC 2018 proceedings are in USD with exchange rates from December 2018.

PART I

ARCTIC 2030 AND BEYOND: NATIONAL POLICIES AND PRIORITIES

Korea's Arctic Policy and Activities

Sei-Joong Kwon

Introduction

The Arctic is changing in a transformative way. The region is warming at more than twice the rate as the global average, resulting in a dramatic reduction in sea ice extent and an increase in permafrost thawing. Rising atmospheric carbon dioxide levels are also leading to ocean acidification.

The impacts of these changes are far reaching. In the Arctic, climate changes pose serious threats to the ecosystem and to the lives of humans who live there. Globally, these changes are causing a rise in sea levels, altering weather and climate patterns, and are affecting agriculture, infrastructure, and economics. Korea is also affected by environmental changes in the Arctic. For instance, Korea had record-breaking low temperatures last winter, and record-breaking high temperatures this summer, both related to dynamic global climactic conditions associated with global warming.

These profound climate changes, due largely to human activities, also are increasing accessibility to the Arctic for human activities, which in turn is opening up new opportunities for navigation, resource exploitation, and other commerce in previously inaccessible areas. In view of the challenges that the Arctic faces, as well as the economic opportunities that the Arctic provides, close cooperation among Arctic states and non-Arctic states is essential.

Korea's Arctic Policy

Korea's Arctic policy starts from a firm commitment to a robust partnership among Artic and non-Arctic states for a sustainable future, based on goals of mutual prosperity and collaboration in responding to global threats, including climate change.

Korea's engagement in the Arctic dates back to the 1990s. Korea conducted its first basic survey in the Arctic in 1991. We established the Dasan Arctic research station in Svalbard in 2002, and built our first icebreaking research vessel, the *Araon*, in 2009. Korea joined the Arctic Council as an observer in May 2013, along with China and Japan. In the same year, Korea issued its first Arctic Policy Master Plan for 2013-2017, in order to contribute to a sustainable Arctic future by enhancing cooperation with Arctic states and relevant international bodies such as the Arctic Council.

Korea announced its second Arctic Policy Master Plan (2018-2022) on July 27, 2018. The second Arctic Policy Master Plan built upon lessons learned during the first Arctic Policy Master Plan period (2013-2017). The new plan has four goals:

1. Pursuing win-win cooperation with Arctic communities: The Master Plan seeks cooperation with Arctic countries in shipping, logistics, energy, and fisheries.
2. Promoting Arctic partnerships: Korea will try to expand cooperative activities in the Arctic Council and extend participation in Arctic-related international forums.
3. Strengthening scientific research activities in addressing common challenges in the Arctic: Korea will support scientific research in order to carry out more research on climate environmental changes. The Master Plan also includes building a second ice-breaking research vessel.
4. Strengthening Korea's capacity to pursue Arctic policy: Korea will develop domestic institutional foundations and prepare blueprints for its long-term Arctic policy.

Under the newly adopted Master Plan, Korea will further increase its contribution to promote sustainable development and the protection of the Arctic environment.

Korea is deeply engaged in various projects and activities concerning the Arctic. We have actively participated in the work and activities of the Arctic Council. Korea has regularly attended Senior Arctic Officials meetings and Ministerial meetings. Korean experts have participated in Arctic Council working groups, task forces, and expert groups. More specifically, Korea has served as a partner in working-level projects such as the "Arctic Indigenous Marine Use Mapping Project." More specifically, Korea has served as a partner in working-level projects such as the "Arctic Renewable Energy Atlas" and the "Migratory Birds Initiative."

Korea has pursued cooperation with the Arctic Council member states and its observers. Korea holds bilateral consultations on a regular basis with these member states, including Canada, Denmark, Finland, Iceland, Norway, and Russia. Moreover, Korea took the initiative and launched the Trilateral High-Level Dialogue on the Arctic among Korea, Japan and China in 2016. In addition, Korea is a regular participant in meetings of the Observer States of the Arctic Council and the EU (Warsaw Format).

Scientific Research and Business

To advance Arctic scientific research, the Korea Polar Research Institute has played an important role. Korean scientists have carried out various joint research projects with Arctic states and international scientific institutions such as the International Arctic Science Committee. Korea's scientific findings include outlining the relationship between Arctic warming and severe winter cold in the northern Hemisphere, and the international scientific community has taken note of these discoveries. Korea will continue to conduct collaborative observations and field research in the Arctic to provide further scientific knowledge about the Arctic.

As a maritime nation, Korea is an important stakeholder in developing Arctic shipping routes. Korean companies made the first test navigation through the Northern Sea Route (NSR) in 2013 and sailed the route three times in 2016. Daewoo Shipbuilding & Marine Engineering (DSME), a leading Korean shipbuilding company, received a contract to build a total of 15 ice-breaking LNG carriers for the Yamal project. Korea is also keenly interested in energy resource development in the Arctic, since we are a major importer of gas and oil.

Other Arctic-related Activities

Korea will further develop and expand Arctic education and exchange programs for the next generation. Korea has supported the "Korea Arctic Academy," a youth exchange program in cooperation with the University of the Arctic. Moreover, Korea has launched a new initiative called the "Arctic Science Fellowship Program," targeting early career researchers from Arctic countries.

Korea is actively engaged in international forums on the Arctic, such as the Arctic Frontiers and the Arctic Circle Assembly. This year, the Arctic Circle Forum was held in Korea on December 7-8. The theme was "Asia meets the Arctic: Science, Connectivity and Partnership." The forum included three sessions with sub-themes on Arctic Science, Arctic Innovation, and Asian Perspectives on the Arctic.

In addition, the forum was held back-to-back with the Arctic Partnership Week on 10-14 December. It was comprised of a series of seminars, exhibitions, and events related to the Arctic. In 2017, more than 1,000 participants from Korea and around the world attended the event.

Conclusion

Since joining the Arctic Council in May 2013, Korea has laid the groundwork for international cooperation in the Arctic, based on its first Arctic Policy Master Plan. Korea has established mutually beneficial partnerships with Arctic communities in sustainable development, prosperity, and ongoing contributions to addressing climate change.

This year, Korea announced its second Arctic Policy Master Plan to pursue long-term cooperation with Arctic countries as a responsible, cooperative Arctic partner. Furthermore, Korea prepares to link and coordinate its Arctic policy with the UN Sustainable Development Goals (SDGs). With regard to implementing UN SDGs, it is particularly important to include voices of the vulnerable and the marginalized. To this end, Korea will continue to promote scientific research to address climate change and environmental protection in the Arctic, and enhance its capabilities to support Arctic indigenous communities.

U.S. National Arctic Policies and Priorities Toward 2030 and Beyond

David A. Balton

Introduction

The United States has enduring interests in the Arctic region that have not changed markedly over the years, despite the profound changes that the region itself has experienced and continues to confront. This helps to explain why U.S. national policies regarding the Arctic, as articulated in a series of policy documents issued over the past 25 years, reflect much more continuity than change. Within the broad policy goals found in these documents, however, different priorities have emerged as U.S. administrations have come and gone and circumstances in the Arctic have evolved.

This paper explores both the generally consistent national Arctic policies of the United States since the early 1990s, as well as shifting priorities within those policies. Looking ahead, this paper argues that changing Arctic conditions will require the United States and other States with Arctic interests to consider new approaches, particularly to develop a more integrated international architecture for governing human activities in the Arctic.

U.S. National Arctic Policy Statements

Shortly after President Bill Clinton took office in 1993, the White House initiated a series of high-level policy reviews. One such review resulted in a paper entitled *United States Policy on the Arctic and Antarctic Regions*.[1] Issued in June 1994, it listed a set of six "principal objectives" of the United States in the Arctic region:

(1) Meeting post-Cold War national security and defense needs
(2) Protecting the Arctic environment and conserving its biological resources
(3) Assuring that natural resource management and economic

development in the region are environmentally sustainable
(4) Strengthening institutions for cooperation among the eight Arctic nations
(5) Involving the Arctic's Indigenous Peoples in decisions that affect them
(6) Enhancing scientific monitoring and research into local, regional and global environmental issues

The Arctic experienced considerable change in the ensuing 15 years. In particular, the effects of rapid Arctic climate change became much more apparent in that timeframe. The attention of the Arctic States and others toward the Arctic region certainly increased. The Arctic States created the Arctic Council, which began to evolve in its reach and influence, a process that is certainly continuing today. In the United States, the administration of President George W. Bush nevertheless kept in place the Clinton-era policy paper for quite a few years until, in 2007, it decided to undertake its own review of U.S. policy toward the Arctic.

The extensive policy review sought and obtained input from each of the more than 20 U.S. federal departments and agencies with missions in the Arctic, as well as from the State of Alaska, the Alaska congressional delegation, from Alaska Natives, and from other affected U.S. interests. Less than two weeks before leaving office, President Bush issued a new "Arctic Region Policy" statement.[2] The new document noted the significant developments that had taken place since the 1994 policy statement, including:

- Altered national policies on homeland security and defense
- The effects of climate change and increasing human activity in the Arctic region
- The establishment and ongoing work of the Arctic Council
- A growing awareness that the Arctic region is both fragile and rich in resources

Remarkably, however, the document *left essentially unchanged the six principal objectives of the United States* that the Clinton Administration had articulated 15 years earlier. Indeed, the only change in these six objectives was to replace the phrase "post-Cold War national security and defense needs" with the phrase "national security and homeland security needs relevant to the Arctic region."

The advent of President Barack Obama's administration reshaped U.S. policy on many fronts. But when it came to the Arctic, the "National Strategy for the Arctic Region," released in 2013, once again restated most of the basic goals of the Clinton and Bush policy statements.[3] The 2013 National Strategy, also developed following intensive interagency discussions and consultations with many stakeholders outside the U.S. executive branch, presented three "lines of effort" that the United States would pursue with respect to the Arctic:

- Advance United States security interests
- Pursue responsible Arctic region stewardship
- Strengthen international cooperation

In pursuing those lines of effort, four "guiding principles" would inform U.S. actions:

- Safeguard peace and stability
- Make decisions using the best available information
- Pursue innovative arrangements
- Consult and coordinate with Alaska Natives

To be sure, the National Strategy and its subsequent Implementation Plan[4] reflected a growing emphasis on environmental protection in the Arctic, an emphasis that became even more pronounced in the later years of the Obama administration, as President Obama sought to rally U.S. and other countries' opinions in support of negotiations that produced the Paris Agreement on climate change.

As of this writing, the administration of President Donald Trump has issued no new policy statement with respect to the Arctic Region. As this paper will consider in more detail later, current U.S. national Arctic policy appears to be an odd combination of maintaining the basic goals and policies of past U.S. Administrations in the context of President Trump's announcement in June 2017 of an intention to withdraw from the Paris Agreement, which almost certainly would have significant consequences for the Arctic.

U.S. Approaches to Arctic Council and Other International Arctic Engagement

When the Arctic States were negotiating the Ottawa Declaration to establish the Arctic Council in 1996, the United States took a cautious approach. Most policy makers in Alaska—and others in the United States as a whole—regarded with wariness the proposal to replace the Arctic Environmental Protection Strategy with a new international institution such as the Arctic Council. Largely in response to U.S. views during the negotiation, the Council emerged as a somewhat informal forum for advancing environmental protection and sustainable development in the Arctic, certainly not a formal international organization based on a binding agreement with mandatory financial contributions and a large secretariat. Although foreign ministers of the other seven Arctic States routinely attended the biennial high-level meetings of the Council that followed the establishment of the Council, no U.S. Secretary of State participated in such an event until 2011.

During the George W. Bush Administration, U.S. participation in the Arctic Council grew somewhat more robust. But perhaps the most significant engagement at the international level on Arctic issues in those years took place outside of the Arctic Council: the signing of the 2008 Ilulissat Declaration. While the Declaration includes some notable commitments concerning the Arctic by Canada, Denmark/Greenland, Norway, Russia and the United States, it also makes quite clear what those States did not support:

> …an extensive international legal framework applies to the Arctic Ocean.…This framework provides a solid foundation for responsible management by the five coastal States and other users of this Ocean through national implementation and application of relevant provisions. *We therefore see no need to develop a new comprehensive international legal regime to govern the Arctic Ocean.* (Emphasis added.)

In decade since the Ilulissat Declaration, the approach of the United States toward the Arctic Council and to the broader Arctic governance regime has evolved considerably. For one thing, the attitudes of opinion leaders in Alaska toward the Council became more supportive, as a steady flow of useful products and programs from the Council provided benefits to Alaska without significant costs. During the same period, the widely reported warming of the Arctic has made many Americans more aware of, and concerned about, the region. For these and other reasons, the United States became more engaged in the Arctic Council and other international Arctic initiatives during the Obama Administration than previously. Among other things, the United States since 2010:

- Co-chaired each of the three Arctic Council Task Forces that produced the first binding international agreements among the eight Arctic States[5]
- Supported the establishment of an Arctic Council Secretariat
- Launched and chaired negotiations that produced an agreement on Arctic fisheries
- Actively participated in the successful effort at the International Maritime Organization to produce a Polar (Shipping) Code
- Completed an ambitious and successful chairmanship of the Arctic Council (2015-2017)
- Had a sitting president travel to the Arctic for the first time in its history

Current U.S. Arctic Policy and Priorities

As noted above, the Trump Administration has issued no new national statement of Arctic policies or priorities, although a number of U.S. federal agencies are reportedly working to update their individual Arctic strategy documents. Formally speaking, the 2013 National Strategy for the Arctic Region and its Implementation Plan remain in place as the most recent articulation of U.S. policies and priorities.

The Trump Administration also brought to fruition two high-profile Arctic initiatives launched by the Obama Administration: the 2015-2017 U.S. chairmanship of the Arctic Council; and the conclusion of the Central Arctic Ocean fisheries agreement.[6] The first of these involved something of a high-wire act. When the United States developed and introduced a proposed program for its Arctic Council chairmanship, its officials knew that the two-year timetable would extend into the next administration, one that might have significantly different views. In part for this reason, the proposed program covered a wide range of topics and deliverables—"something for everyone." The other Arctic Council members generally supported and adopted this program.

By the time President Trump took office in late January 2017, the Arctic Council had completed work on most elements of that program. Still, a key question loomed: what would the new U.S. administration think about the program and its deliverables, particularly the significant amount of work relating to Arctic climate change, which the previous Administration had set in motion two years earlier?

Secretary of State Rex Tillerson, in office less than four months, presided over the Arctic Council Ministerial Meeting in Fairbanks, Alaska in May 2017. Although he sought some minor last-minute changes to the text of the Ministerial Declaration, he essentially oversaw the fulfillment of the entire U.S. chairmanship program initiated by his predecessor, John Kerry. Tillerson also signed, on behalf of the United States, the Agreement on Enhancing International Arctic Scientific Cooperation. In his opening remarks to the Ministerial Meeting, he further noted that:

> The Arctic Council ... has proven to be an indispensable forum in which we can pursue cooperation. I want to affirm that the United States will continue to be an active member in this Council. The opportunity to chair the Council has only strengthened our commitment to continuing its work in the future.[7]

In those same remarks, however, Secretary Tillerson also alluded to a decision pending at that time within the Trump Administration, concerning the possible withdrawal from the Paris Agreement:

> In the United States, we are currently reviewing several important policies, including how the Trump administration will approach the issue of climate change. We are appreciative that each of you has an important point of view, and you should know that we are taking the time to understand your concerns. We're not going to rush to make a decision. We're going to work to make the right decision for the United States.[8]

About three weeks later, President Trump announced that the United States intended to withdraw from the Paris Agreement:

> In order to fulfill my solemn duty to protect America and its citizens, the United States will withdraw from the Paris Climate Accord … but begin negotiations to reenter either the Paris Accord or a really entirely new transaction on terms that are fair to the United States, its businesses, its workers, its people, its taxpayers. So we're getting out. But we will start to negotiate, and we will see if we can make a deal that's fair. And if we can, that's great. And if we can't, that's fine.[9]

Although the U.S. decision regarding the Paris Agreement turned largely on issues unrelated to the Arctic, the withdrawal from the Agreement, if actually carried out, could have significant consequences for that region. The Ministerial Declaration that Secretary Tillerson and the other Arctic foreign ministers signed in Fairbanks:

> …noted that the Arctic is warming at more than twice the rate of the global average, noted with concern that the pace and scale of continuing Arctic warming will depend on future emissions of greenhouse gases and short-lived climate pollutants, and reiterated the importance of global action to reduce both greenhouse gases and short-lived climate pollutants to mitigate climate change.[10]

The actions of the United States, the second-largest emitter of greenhouse gases, obviously play an outsized role in the worldwide effort to combat climate change. While the U.S. announcement of its intention to withdraw from the Paris Agreement has not in itself increased U.S. emissions, the Trump administration has taken numerous other steps that are highly likely to result in greater emissions (or at least in a smaller reduction in emissions) than would occur if the climate policies of the Obama administration remained intact.[11]

Another way in which the approach of the Trump administration to Arctic issues has differed from that of the Obama administration relates to the amount of high-level attention devoted to the region. In the Obama administration, the United States, among other things:

- Created a White-House led Arctic Executive Steering Committee to oversee implementation of the National Strategy for the Arctic Region
- Appointed Admiral Robert Papp as Special Representative for the Arctic in the State Department

- As noted above, had a U.S. President travel to the Arctic for the first time

Much of this unprecedented high-level engagement on Arctic issues arose from the confluence of two circumstances: the 2015-2017 U.S. chairmanship of the Arctic Council and the coming to fruition of negotiations on the Paris Agreement. For President Obama and Secretary Kerry, in particular, a focus on the Arctic represented an opportunity to raise awareness of problems relating to climate change and to advocate for strong actions in response.

Under the Trump Administration, the Arctic Executive Steering Committee still exists on paper, but is essentially dormant. The State Department has not replaced Admiral Papp as Special Representative for the Arctic and, indeed, still does not have a Senate-confirmed nominee for either the Under Secretary position or Assistant Secretary position responsible for Arctic issues. As a result, long-serving career officers in the State Department and in the many other U.S. federal agencies working on Arctic affairs are carrying out U.S. policy mostly in the absence of new high-level guidance or direction.

In sum, current U.S. Arctic policy appears to be an odd mixture. On one hand, the Obama-era National Strategy for the Arctic Region remains in place, at least for now. Through former Secretary of State Tillerson (who left office in March 2018), the United States is on record as remaining committed to the Arctic Council. The U.S. has also signed the Central Arctic Ocean fisheries agreement. On the other hand, the Trump administration has very significantly altered U.S. climate policy, at a time when many of the pressing challenges in the Arctic relate to the rapid warming of that part of the planet. The Trump administration has also chosen not to devote significant high-level attention to Arctic matters as a whole.

Looking to the Future: Arctic Governance

What will future U.S. policies and priorities for the Arctic look like? If the past is prologue, and despite current shifts on climate policy, the enduring interests of the United States in the region will lead to a general continuation of the basic objectives that the United States has pursued for several decades.

One area in which U.S. policy may need further development, however, concerns the international architecture for governing human activities in the Arctic, particularly in the Arctic Ocean. Of course, this architecture has already grown rapidly in just the past decade. For example:

- The Arctic Council has evolved into a well-respected and effective intergovernmental forum, often cited as a model of international cooperation.
- Through the Arctic Council, the Arctic States have negotiated and signed three binding agreements.
- The Polar (Shipping) Code entered into force in 2017 and will enhance the safety and environmental security of Arctic shipping in particular.
- Nine States and the European Union have negotiated and signed the Central Arctic Ocean fisheries agreement.
- The Arctic Council has facilitated the creation of several new bodies, including the Arctic Economic Council, the Arctic Coast Guard Forum, and the Arctic Offshore Regulators' Forum.

One additional initiative relating to governance, however, seems to have fallen off track. In 2015, the Arctic Council created a Task Force on Arctic Marine Cooperation to assess future needs for a regional seas program or other mechanism for the Arctic. In 2017, the Council accepted the recommendation of the Task Force that the Council would likely need new institutional capacity in order to address the issues arising from changing circumstances of the Arctic Ocean. The Council gave the Task Force a new mandate to develop terms of reference for a new Arctic Council subsidiary body that would add this needed institutional capacity. Although the Task Force has met twice since receiving its new mandate, it now appears unlikely that it will deliver the requested terms of reference.

The United States—and the other Arctic States—will need to consider next steps carefully in this regard. If, as widely anticipated, human activities in the Arctic Ocean continue to expand in the coming years, Arctic nations, and perhaps other nations with significant interests in the Arctic, are likely to need a more robust mechanism than currently exists to foster cooperation in managing those activities. If the Arctic Council does not establish such a mechanism, the nations concerned will need to consider establishing that mechanism outside the Arctic Council framework.

Another fascinating set of questions relates to the international architecture as a whole: How should the elements of that architecture already in place, and those that may come on line in the coming years, interact with one another? How will developments at the global level, including a possible agreement on biodiversity beyond national jurisdiction, affect or be implemented in the Arctic? Again, U.S. policy—and the policy of other nations concerned—will need to consider these questions carefully.

At present, the Arctic Council appears to be the preeminent international body through which the Arctic States and Arctic Indigenous Peoples can coordinate their work on pan-Arctic Ocean issues. But as the number of other international institutions and agreements affecting the Arctic continue to proliferate, it is not obvious that the Council, as currently configured, can serve as the entity for coordinating all matters. Others have described a possible "Arctic Council System" to serve this purpose,[12] which perhaps could facilitate appropriate coordination of efforts. One could also imagine an overarching or "umbrella" agreement for the Arctic region, although this would seem to run counter to a basic premise of the Ilulissat Declaration that a comprehensive international legal regime for the Arctic Ocean is unnecessary.

In considering future arrangements, another key question will be how the Arctic States should engage appropriately with non-Arctic States. In the Arctic Council, non-Arctic States are merely observers and have no official role in decision making. But on certain Arctic Ocean issues, particularly those relating to marine areas beyond national jurisdiction, non-Arctic States have legitimate, recognized interests that are entitled to be respected. Indeed, in the development of the Polar Code and in the negotiation of the Arctic fisheries agreement, Arctic and non-Arctic States participated essentially on an equal footing.

In sum, as the scope and intensity of human activity in the Arctic Ocean continues to increase in the coming years, policy makers from members of the Arctic Council and interested non-Arctic states alike will need to think beyond the current governance structures in order to coordinate management efforts, protect the environment, promote sustainable use of resources, and prevent conflict.

Notes

1. Presidential Decision Directive/NSC-26, June 9, 1994.
2. National Security Presidential Directive 66/Homeland Security Presidential Directive 25, January 9, 2009.
3. National Strategy for the Arctic Region, May 23, 2013.
4. Implementation Plan for the National Strategy for the Arctic Region, January 2014.
5. Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic (signed 2011); Agreement on Cooperation on Marine Oil Pollution Preparedness and Response in the Arctic (signed 2013); Agreement on Enhancing International Arctic Scientific Cooperation (signed 2017).
6. Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean, signed in Ilulissat, Greenland on October 3, 2018.
7. https://www.state.gov/secretary/20172018tillerson/remarks/2017/05/270813.htm
8. Ibid.
9. https://www.whitehouse.gov/briefings-statements/statement-president-trump-paris-climate-accord/
10. Fairbanks Declaration, paragraph 23, May 11, 2017.
11. EPA Announces Repeal of Major Obama-Era Carbon Emissions Rule, *New York Times*, Oct. 9, 2017.
12. See, e.g., Molenaar, "The Evolution of the Arctic Council and the Arctic Council System," in *The Circle*, Feb. 2016.

Perspective from the Russian Federation

Andrei Zagorski

Introduction

The main objectives of the Russian policy are outlined in the Arctic Strategy adopted by President Vladimir Putin in 2013.[1] These objectives are clustered around five main blocks that have been discussed intensively in the literature:

1. Developing the Russian Arctic economically and socially, while understanding the region as a major current and future resource base of the economy, with high export potential for the nation; particular attention is paid in this regard to developing specific technologies tailored to the harsh Arctic climate conditions.
2. Safeguarding national security in terms of protecting Russian sovereignty and sovereign rights, as well as the ownership of natural resources, while maintaining peace and stability in the region by keeping it free of conflict and strengthening international cooperation.
3. Addressing environmental and human security risks resulting from the observed and anticipated consequences of climate change and increased human activity, particularly by improving maritime safety and developing search-and-rescue capabilities, improving communications and domain awareness.
4. Minimizing the environmental impact of economic and social development of the Arctic, particularly the development of its mineral resources, and ensuring its sustainable development by preventing and responding to eventual hazardous material spills, developing renewable energy resources and introducing integrated (ecosystems-based) management of Arctic maritime spaces, among other efforts.
5. Supporting scientific research to properly inform Arctic policy decisions, and facilitating international scientific cooperation.

As defined in the 2013 strategy, the main challenges confronting Russia in the Arctic include:

- the extremely harsh climate;
- economically underdeveloped (or totally undeveloped) territories;
- low population density and a growing shortage of skilled labor;
- low quality of life of Indigenous populations;
- an insufficient supply of freshwater;
- remoteness of the region from industrial centers;
- high cost and long lead-time of developing mineral resource deposits, due in part to the dependence on supply from other regions;
- high cost of transportation of extracted resources;
- critical state of infrastructure, deficit of state-of-the-art technologies for exploration and development, particularly of offshore hydrocarbon deposits;
- under-development or lack of adequate transport infrastructure;
- very high energy intensity and low efficiency of natural resources extraction;
- gaps in the hydrographic and meteorological services and mapping necessary for ensuring maritime safety;
- insufficient surveillance and domain awareness;
- inadequate communications; and
- increasing anthropogenic impact on the environment creating a danger of irreversible degradation of both marine and terrestrial environments in the Russian Arctic

Any assessment of the challenges generated in the Arctic will concentrate on the consequences of permafrost thawing and coastal erosion resulting from, among other things, warming temperatures and rising sea levels. More recently, the list of inherent challenges is augmented by ongoing restrictions resulting from Western sanctions against Russia instituted in 2014, which have forced Russia to largely rely on its own limited resources and technologies in implementing ambitious plans for the development of its Arctic zone.

State Programs for the Development of the Russian Arctic

Russia's Arctic Strategy that outlines the main objectives of the Russian policy is operationalized in State (federal) programs. These programs usually bring together specific Arctic components of various sectoral programs, such as national programs for the development of the transportation system, increasing energy efficiency, environmental protection, education, science and technology development, fisheries, and the country's maritime doctrine. This work is coordinated by the Russian State Commission, which was established a few years ago in order to coordinate the implementation of Arctic-relevant programs approved by the Russian Government.

The State program for the development of the Russian Arctic was adopted by the Russian government following the endorsement of the 2013 Strategy[2] in April 2014. This occurred at the beginning of the current crisis in relations between Russia and Western countries—and ahead of the significant devaluation of the Russian currency, the ruble, later in 2014 and in 2015. This devaluation, on top of other consequences of the sanctions, spurred the government to amend its Arctic program in August 2017.[3]

The current version of the program concentrates on three clusters (sub-programs):

1. Establishment of *eight support areas* for the development of the Russian Arctic zone (see Figure I.1) in different regions: the Kola (centered around the expansion of the Murmansk port and educational programs aimed at developing Arctic knowledge); Arkhangelsk (centered around ship- and machine-building, forestry, tourism, the eventual construction of a deep sea water port and the Belkomur rail road to connect the port of Arkhangelsk through the Komi region with the Ural industrial region); Nenetsky (centered around prospective offshore oil projects in the Pechora Sea and a series of transport infrastructure projects that includes development of sea ports, as well as rail and road connections); Vorkuta (in the Komi region, centered around coal mining in Vorkuta and the eventual construction of the Belkomur rail road); Yamalo-Nenetsky (centered around the development of hydrocarbon resources of the Yamal and Gydan Peninsulas, LNG production, chemical clusters, and the eventual construction of the Northern Latitudinal rail connection); Taymyro-Turukhansky (centered around mining projects and the construction of a coal terminal in the port of Dixon); North Yakutian (centered around mining and the development of transport connections, including the reconstruction of the Tixi port and a network of airports); and Chukotka (centered around mining

Source: Dmitriy Orlov, 'Развитие Арктической зоны России и основные вызовы для ее осв оения' [Development of the Arctic Zone of the Russian Federation and Main Challenges for its development], REGNUM, 25 Apr. 2018 (https://regnum.ru/news/2407690.html).

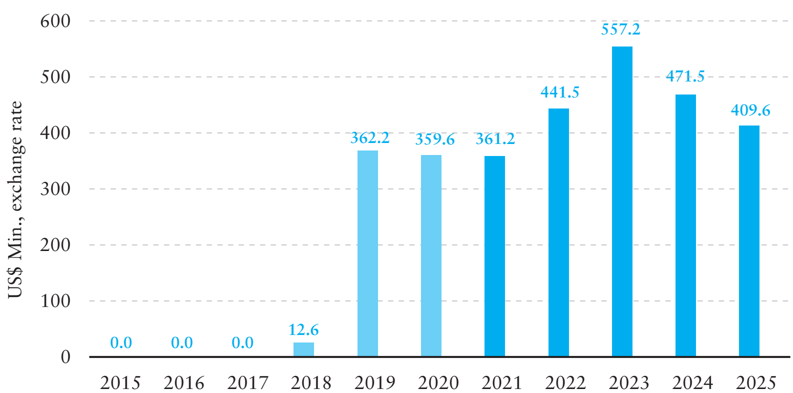
Figure I.1 Support Areas for the Development of the Russian Arctic

projects in the Chayn-Bilibinsky and Anadyr' industrial areas and the modernization of the airport network).[4]

2. Development of the Northern Sea Route (NSR) and the facilitation of vessel traffic in the Arctic.
3. Development of equipment and technologies for the oil and gas and industrial machine-building required for the development of the region's mineral resources.

This focus on industrial development of the region, and particularly on the extraction and eventual processing of its mineral resources, is not surprising. The Arctic zone of the Russian Federation generates 5.6 percent of the country's GDP, and this share is projected to grow to 14 percent in the long run.[5] The Arctic is already an essential resource base and an export-generating region of Russia, and in that regard, its role is expected to further increase in the future. Therefore, Russia's investments in the Arctic infrastructure largely "reflect the region's [relative] centrality to its economy."[6]

The total cost of the program implementation for the Russian budget is assessed at 190.5 billion rubles ($3 billion).[7] However, apart from reasonable doubts as to whether this projected amount would be sufficient to implement such an ambitious program (considering that public funding of defense expenses administered by the Ministry of Defense is included into this amount), this level of public funding is not yet secured. The period of the implementation of the State program, initially scheduled to last until 2020, has been extended to 2025. It is now envisioned in three main phases: 2015-2017, 2018-2020, and 2021-2025. While the first phase is now presented as a period of conceptualization and organizational measures (establishing the State Commission, recalculating the AZRF in its current borders in statistical terms, developing the normative basis etc.), it was not funded from public sources.[8] Now the bulk of funding is supposed to be provided for the respective projects in the extended last phase (2021-2025). However, as explicitly stated in the program, the provision of funding is subject to availability, which is uncertain at this stage (see Figure I.2).[9]



Calculated after: Государственная Программа Российской Федерации ≪Социально-экономическое развитие Арктической зоны Российской Федерации≫ [State Program of the Russian Federation "Social-Economic Development of the Arctic Zone of the Russian Federation"], The Government of the Russian Federation, 31 Aug. 2017, p. 4 (http://static.government.ru/media/files/GGu3GTtv8bvV8gZxSEAS1R7XmzloK6ar.pdf).

Figure I.2 *Projected Public Funding for the State Program «Social-Economic Development of the AZRF»*

Political Perspectives

The underdeveloped elements in the Russian policy to develop its Arctic regions are obvious, and clearly highlight Russia's vulnerability to the volatility of international cooperation and currency fluctuations. This is particularly true with respect to the growing recognition that expanding international cooperation is an indispensable precondition for a responsible and sustainable development of Arctic resources, notably in the application of the best available environmentally friendly technologies.[10]

While current public funding of this ambitious program, based on the concept of import substitution, appears insufficient, insecure, or both, the government in Moscow is building its actions based upon maintaining international cooperation in the Arctic. Should its cooperation with traditional partners in the region be further suspended (such as being subject to ongoing or future sanctions), a policy of "partners substitution" is seen as an option to complement import substitution. China is one of the options being pursued by Russia to reflect this policy strategy of "partners substitution," although this relationship is not yet entirely satisfactory.

Moscow's contemporary Arctic policy is characterized by three main positive experiences and concerns:

1. An explicit appreciation of the generally constructive agenda and work in the regional frameworks and particularly in the Arctic Council.[11] Recent years, although marked by growing tensions in Russia-West and Russia-U.S. relations, have also witnessed examples of successful cooperation in pursuing mutual interests. These include the finalization and entry into force of the Polar Code, the finalization of the agreement on international fisheries in the Central Arctic Ocean, a joint Russia-U.S. submission to the International Maritime Organization concerning vessel traffic in the Bering strait, and the adoption and entry into force of a new legally binding instrument of the member states of the Arctic Council on scientific cooperation.
2. There is a growing concern pertaining to the eventual consequences of suspended military-to military cooperation with the U.S. and other NATO countries, and the suspension of the formation of the cooperative Arctic security architecture that was supposed to help transcending the division lines inherited from the Cold War.[12]

3. There is a continued effort to substitute Western partners in areas of cooperation that have been hurt by sanctions, particularly as it pertains to access to equity markets and technologies in specific sectors covered by sectoral sanctions.

While seeking cooperation with countries outside the Arctic region that have or have not joined sanctions against Russia, Moscow particularly pursues the policy of engaging China, at least as far as funding for anticipated projects is concerned. This has proven to be difficult, although China increased its financial participation in the Novatek's Yamal LNG project, making it feasible (it has been operating since the end of 2017). China now shows interest in stepping into Novatek's Arctic LNG-2 project.[13]

Importantly, Russia seeks to financially engage China in the implementation of a number of infrastructure projects, including the further development of the port of Arkhangelsk, the construction of the Belkomur railroad, and the development of the NSR.[14] Even with the development of broader cooperation in order to more actively engage China in the Arctic, negotiating terms favorable to Russia has proven to be more difficult than many in Russia would have expected. To assist this process, the two countries agreed in 2018 to establish working groups to more fully develop joint Arctic projects, which both believe would be of mutual interest.[15]

Notes

1. 'Стратегия развития Арктической зоны Российской Федерации и обеспе чения национальной безопасности на период до 2020 года' [Strategy for the development of the Arctic Zone of the Russian Federation and the Provision of National Security for the Period Until 2020], *Government of the Russian Federation*. 20 Feb. 2013 (http://static.government.ru/media/files/2RpSA3sctElhA Gn4RN9dHrtzk0A3wZm8.pdf).
2. Additional material is available at: https://www.arcticyearbook.com/commentaries-2013/74-russian-strategy-of-the-development-of-the-arctic-zone-and-the-provision-of-national-security-until-2020-adopted-by-the-president-of-the-russian-federation-on-february-8-2013-pr-232
3. Государственная Программа Российской Федерации ≪Социально-экон

омическое развитие Арктической зоны Российской Федерации≫ [State Program of the Russian Federation "Social-Economic Development of the Arctic Zone of the Russian Federation"], The Government of the Russian Federation, 31 Aug. 2017 (http://static.government.ru/media/files/GGu3GTtv8bvV8gZxSEAS1R7XmzloK6ar.pdf).

4. State Program of the Russian Federation "Social-Economic Development of the Arctic Zone of the Russian Federation," pp. 39-40. See also: Dmitriy Orlov, 'Р азвитие Арктической зоны России и основные вызовы для ее освоения' [Development of the Arctic Zone of the Russian Federation and Main Challenges for its development], *REGNUM*, 25 Apr. 2018 (https://regnum.ru/news/2407690.html); 'Опорные зоны развития составят основу госпрограммы по Арктике' [Support Areas will Provide the Core of the Arctic State Program], *TASS*, 7 Sep. 2017 (http://tass.ru/ekonomika/4543491).

5. These figures are provided in the background materials attached to the 2014 State Program of Socio-economic Development of the AZRF (available to the author). However, in 2016, the Russian State Statistical Committee began recalculating the AZRF contribution to the Russian GDP based on the new (narrower) definition of the borders of the region. According to this recalculation, this contribution in 2014 was estimated at 5.2 percent and at 5.1 percent in 2015. See the data of the Russian Statistical Committee at http://www.gks.ru/free_doc/new_site/region_stat/calendar1.htm. See also: State Program of the Russian Federation "Social-Economic Development of the Arctic Zone of the Russian Federation," p. 92.

6. *Report to Congress on Arctic Operations and the Northwest Passage* (Washington, DoD, May 2011), pp. 9-10 (http://www.defense.gov/Portals/1/Documents/pubs/Tab_A_Arctic_Report_Public.pdf).

7. State Program of the Russian Federation "Social-Economic Development of the Arctic Zone of the Russian Federation," p. 4.

8. This does not imply that no public funding was flowing into Arctic projects at all. It was, but through sectoral programs rather than under the auspices of the State Program.

9. State Program of the Russian Federation "Social-Economic Development of the Arctic Zone of the Russian Federation," p. 4.

10. A.N. Pelyasov (Head), A.V. Kotov, *The Russian Arctic: Potential for International Cooperation*, Russian International Affairs Council (RIAC) Report No. 17, 2015 (Moscow: Spetskniga, 2015).

11. Valeriy Zhuravel', 'Арктический совет: Итоги первого года председат ельства Финляндии' [Arctic Council: results of the first year of Finland's chairmanship], *Nauchno-analiticheskiy vestnik IE RAN*, 2018, no. 3, p. 133. DOI: http://dx.doi.org/10.15211/vestnikieran32018127134

12. 'Statement by Foreign Minister Sergey Lavrov at the Ministerial Meeting of the Arctic Council, Fairbanks, USA, May 11, 2017', *Arctic Council* (https://oaarchive.arctic-council.org/bitstream/handle/11374/2024/EDOCS-4287-v2A-ACMMUS10_FAIRBANKS_2017_Statement_by_Foreign_Minister_of_Russian_Federation_EN.pdf?sequence=1&isAllowed=y).
13. Мониторинг социально-экономического развития Арктической зон ы России. Информационный бюллетень [*Monitoring of socio-economic development of the Arctic zone of Russia. Information Bulletin*, 2018, no 29 (1-30 June), p. 33-34.
14. 'China and Russia Collaborating on Arctic Port' *BRICS Information Portal*, 16 Jan. 2018 (http://infobrics.org/post/26283); F. William Engdahl, 'Strategic China Russia Arctic Cooperation', *New Eastern Outlook* (NEO), 21 Mar. 2017 (https://journal-neo.org/2017/03/21/strategic-china-russia-arctic-cooperation/).
15. *Monitoring of socio-economic development of the Arctic zone of Russia. Information Bulletin*, 2018, no 28 (1-31 May), p. 30-31.

Perspective from Finland

Timo Koivurova

Last year in NPAC 2017, I outlined Finland's Arctic Council Chairmanship priorities. Given that Finland has now been the Chair of the Arctic Council for a little over a year of its two-year Chairmanship, this year I examine the question: *"Has Finland been able to progress in implementing its goals for the Arctic Council Chairmanship?"*

It is not an easy task to evaluate the many projects that are still working towards their respective goals. There are also many ways to evaluate progress. There are a number of projects that are moving ahead, consistent with the timetable and progressing well towards addressing the overall project goals. Here, I examine how Finland has been able to implement its priorities, as well as describing how Finland has been able to lead and extend important projects that were inherited from the United States' Arctic Council chairmanship.

What Are the Limits for the Chair and Finland in Particular to Reach Its Stated Chairmanship Goals?

In order to evaluate progress of Finland reaching its stated Chairmanship goals, it is important to know what the limits are for a Chair to implement its priorities. There are several issues that limit what the Chair can do during its chairmanship.

First, there are limits to what the Arctic Council (AC) can do as a forum with no permanent budget and operating in the "soft law" domain of the international legal system, which frames the capacity to influence governance of Arctic affairs.

Second, there are also inherent limits to what the Chairmanship of AC can implement. Even though the AC is designed to be led by the nation holding the chairmanship, it is not as capable compared to many other intergovernmental organizations.

Third, in order for the Chair to summarize progress, the AC is a consensus-based international organization, hence the Chair works with and engages other AC member states and must include the permanent participants.[1] This requires that the nation holding the chairmanship clearly articulates the objectives of the chairmanship and its proposed projects and activities, recognizing that one or more member states might not agree with the proposed project or activity. This limits progress.

Fourth, there are limits to what Finland can do during its chairmanship. It is important to note that when Finland assumed the chairmanship on 11th May 2017, the geopolitical situation between Russia and the Western states continued to be such that there were real limits to what actions could be taken by the AC. For example, Russia's annexation of Crimea is seen by some nations as illegal, which limits the general developments of activities between Russia and Western states. Seven member states of the AC are still implementing sanctions on Russia, and Russia is implementing sanctions in response. For the AC, this means that the geopolitical environment for Arctic Council co-operation is limiting possible projects and activities within the AC. Fortunately, the AC has been able to continue some important projects and activities despite these problems.

Moreover, it is noted that Finland assumed the chairmanship after a series of chairmanships that instituted fairly strong Arctic Council chairmanship-initiated programs (Norway, Denmark, and Sweden), which meant that they were able to initiate certain changes in the Arctic Council. For example, the Scandinavian chairmanships were able to achieve such actions as establishing a Permanent Secretariat in Tromsø, Norway, resolving the controversy over the criteria for Official Observers, and what rights and obligations such Observers have in the Arctic Council. They also fostered the development of two legally binding agreements.[2] The Canadian Chairmanship was able to catalyse the establishment of the Arctic Economic Council as an independent organization, yet is designed to interact with the Arctic Council. The United States chairmanship opened many ambitious endeavours for the AC, such as the founding of a possible marine commission to coordinate the AC's marine policy work or providing the AC with a long-term strategy. In addition, a science agreement was signed at the 2017 Fairbanks ministerial.

An increasing challenge for any country taking up the chairmanship is also the overview and coordination of a steadily growing number of issues on the agenda. Overall, given the scale of challenges in the Arctic and on the Arctic Council agenda, the two-year span of the Chairmanship is enough time to tackle a number of the important opportunities, which frames the goal of continuously evaluating progress.

Overall, the effects of these developments has been that Finland, a small country executing its chairmanships by itself, finds itself in a situation where the cumulative impact of recent changes in the AC call for the country to continue to work on issues that are still to be resolved. This is why Finland has from the beginning emphasized continuity as an important value in managing its Chairmanship.

Evaluating Progress of Finland in Reaching Its Stated Chairmanship Goals

Initiatives That Finland Inherited from the U.S. Chairmanship

I suggested that it is important to emphasize that Finland has sought to implement all of its goals of its chairmanship. I suggested that an important achievement for Finland is that it was the country that initiated the 1991 Arctic Environmental Protection Strategy, which led to the establishment of the Arctic Council in 1996. Finland is also the only country that has publicly, in its official 2013 Arctic strategy, proposed to explore whether it would be possible to formalize elements of the Arctic Council's co-operation agenda.

The commitment of Finland to international cooperation is evident in how it has lead work on ambitious marine initiatives brought about by the U.S. Chairmanship, even if Finland is not even a coastal state to the Arctic Ocean and its adjacent seas: e.g. establishing terms of reference for a new body within the Arctic Council, the Marine Commission (Task Force on Arctic marine co-operation). It has also led the negotiations for the first ever long-term strategy for the AC—an area of work where a consortium that I lead contributed at the beginning. Finland has diligently taken the work forward in both cases. How has work then progressed in these two extremely important initiatives for the whole Arctic Council?

The Task Force on Arctic marine cooperation was charged to explore whether a Marine Commission could be established that would have competences in marine policy activities. However, it now seems that after two meetings, the agenda has not developed, but rather the Arctic Council is considering other ways to consolidate marine policy activities. There has not been an adequate consensus to start drafting the terms of reference for the proposed Marine Commission and it is likely that this state of affairs will continue until the end of the Finnish chairmanship. The work on the first ever Arctic Council long-term strategy started as suggested by the United States, but no structural reforms are evident in first version of the effort. Still the possibility exists for future Chairs to make structural reforms. The work has progressed during the first year. However, it is not certain that the long-term strategy will progress, given that this is an ambitious new mode of functioning for the AC. I suggested that we wait and see whether enough consensus develops and exists among the member states and permanent participants in this issue area.

Finland's Priorities for Its Chairmanship

As noted above, there have been fairly ambitious efforts by previous Chairs, including efforts to restructure the Arctic Council. Finland's priorities are relatively humble in this respect. The only goal that I would deem as ambitious is to introduce the UN Sustainable Development Goals (SDGs) as a guide for all the AC's work, given that the Arctic co-operation in AEPS and the Arctic Council have never utilized the UN's long-standing agreement to advance sustainable development. Yet, it is fair to ask: "*Would it have been possible for Finland to commence some major ambitious projects, when there are enough ambitious endeavours already launched that need to be advanced?*"

Further, Finland has two crosscutting priorities: (1) climate change, and (2) the 17 UN Sustainable Development Goals (SDG's). Finland has placed an emphasis on the expert group on black carbon and methane (a climate priority). This has not only been done in in accordance with the framework programme by the expert group chaired by Finland, but Finland's President Sauli Niinstö has also advanced this in his bilateral talks with heads of states. He has also proposed black carbon reductions as possible item for an Arctic summit-another proposed meeting in the country's chairmanship programme.

SDG's are very important components for Finland's strategy, both domestically and for its Arctic programmatic interest. However, the Arctic Council has not comprehensively linked its programmatic efforts to UN sustainable development work, although the SDGs are now making inroads into the AC system. This can be seen in the way the Social, Economic and Cultural Expert Group (SECEG) is working to align its new mandate to become the SDG research body of the Council, supporting the Sustainable

Development Working Group (SDWG) and, perhaps later, other component bodies of the AC. Other working groups have also started to align their work under the SDGs, and this will likely move along further in the years to come, especially if the SDGs make it to the long-term strategy. Hence, overall work on this area has gone well, although perhaps Finland would have hoped to see more action during this chairmanship. It is important to keep in mind that SDWG included SDGs as part of its strategic plan, so the uniqueness of Finland taking up the SDGs lies in a strategy to frame the work for the entire Arctic Council. Even if Finland would have hoped to see more immediate results from the SDG work, it seems clear that SDG's now have a reasonable chance of becoming a important part of the matrix on how the working groups approve their projects, at least in the long-term.

The other national priorities are: climate change and SDGs, environment, education, meteorology, and connectivity. These are national priorities in a very limited manner, since being Chair of an intergovernmental forum means that first and foremost the Chair nation is expected to deliver on the objectives of the forum. Finland's four goals are well developed since they both serve in reaching the objectives of the Arctic Council but serve also to consolidate the expertise of Finland in those areas within which Finland already has a strong expertise. The idea behind this is that Finland can become a leader (or one of them) in certain aspects of Arctic expertise.

These national priorities for Finland have been advanced in different ways in the Arctic Council:

- **Education:** A focus on education is advanced within Finland via the projects within the Sustainable Development Working Group that the Chair nation leads. The same applies to environment priorities, such as Environmental Impact Assessments (EIA) in Arctic projects).
- **Task Force on Enhanced Connectivity:** The Task Force was established to advance the connectivity priority, and it follows the earlier work of the Task Force on Telecommunications.
- **Meteorology Focus:** Meteorology has been developed as a joint endeavour between the national meteorological organizations of the Arctic Council and the World Meteorological Organization (WMO). The idea is to clarify which working groups need meteorological cooperation and could utilize its products, such as better ice and weather forecasts and more accurate climate change projections in the

Arctic). Then those AC working-groups could develop their internal strategy and planning documents to include meteorology.

What Has Then Progressed and What Not?

This is not easy to evaluate, but a place to start is to ask whether these goals and objectives have advanced in line with how they were established. Have they progressed along the lines of established goals that were created at the beginning, and will they be able to deliver on those goals? Education and environmental priorities have progressed well, as has the task force on enhanced connectivity. Many believe that meteorological priority is doing surprisingly well. In March 2018, the first Arctic meteorology summit was organized and held, and its results were reported to the SAO.[3] The SAO encouraged all the working-groups to review whether they need further engagement on meteorological cooperation. Currently, the WMO and Finnish Meteorological Institute's (FMI) representative (representing all the eight national meteorological institutions) are making presentations to working groups regarding whether these WG's need more products produced with more concentrated meteorological Arctic cooperation. Already, two working groups have found that more intense institutional meteorological cooperation would help these WG's better achieve their goals. It is hence possible that Finland will raise one science aspect to a new level, which will better serve the working groups on a long-term basis.

Conclusions

This presentation is a mid-term evaluation, and the question has been raised by this NPAC Conference: "*How has Finland's Chairmanship advanced in reaching its stated Chairmanship objectives?*" As I noted earlier, the level of ambition of Finland's Arctic Council chairmanship programme has been modest when compared to previous recent chairmanships. On the other hand, we suggest that the goal of better incorporating the UN SDG's to influence the work of the Arctic Council should be seen as important and ambitious. This is especially noteworthy, given that the Arctic Council has not fully addressed the UN SDGs and the UN sustainable development program more generally, even if it has specifically worked on sustainable development via the SDWG.

The progress regarding projects that Finland inherited from the United States has been modest, such as work to more fully develop the terms of reference for a possible marine commission and the first ever long-term strategy. Yet Finland has tried to advance both projects with due diligence. The reason why these projects have had problems in going further relates to the high ambition level of both of them, which is causing difficulties in forging a consensus among member states and permanent participants.

In summary, Finland has sought to be a committed and active Chair. It has moved forward all those projects that it inherited from the United States and has diligently tried to see how much consensus there might be to take these further. In some cases, there is clearly a lack of consensus, such as for the founding of a new body associated with the Arctic Council, the Marine Commission. However, in assessing the progress regarding achieving Finland's goals for its chairmanship, overall they have gone as planned. At this time, I suggest that all of the projects will deliver on what has been planned, and the meteorology priority in particular appears to making substantial progress within the Arctic Council system.

Notes

1. The Arctic Council is an intergovernmental forum that promotes cooperation, coordination and interaction among the Arctic States, Arctic Indigenous communities and other Arctic inhabitants on common Arctic issues. The central focus of the Arctic Council is on issues of sustainable development and environmental protection in the circumpolar Arctic.
2. First, Agreement on Enhancing International Arctic Scientific Cooperation (signed 2017) and second, Agreement on Cooperation on Marine Oil Pollution Preparedness and Response in the Arctic (signed 2013)
3. SAOs are the Senior Arctic Officials from each of the eights Arctic member States of the Arctic Council (see: https://arctic-council.org/index.php/en/about-us/member-states)

PART II

THE FUTURE OF ARCTIC OCEAN COOPERATION

The Arctic Fisheries Agreement: Looking to 2030 and Beyond

David A. Balton

Introduction

Near the end of 2017, negotiations concluded successfully among nine States and the European Union on an unusual agreement concerning future Arctic fisheries. The Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean (the Agreement) was signed on October 3, 2018 and is expected to enter into force in the near future. This paper outlines the origins of, and motivations behind, the Agreement, as well as the process by which the Agreement was negotiated. It then describes in general terms the basic elements of the Agreement and offers some thoughts on the contribution that the Agreement will likely make to the evolving international architecture for governing the Arctic Ocean.

Origins of the Agreement

For the purposes of this paper, the Central Arctic Ocean refers to marine areas highlighted in both shades in in Fig II.1 below—that is, both the high seas portion and the adjacent areas under national jurisdiction.

At present, there is very little commercial fishing in any parts of the area under national jurisdiction indicated in in Fig II.1 below. As for the high seas portion of the Central Arctic Ocean, an area of roughly 2.8 million square kilometers (approximately the size of the Mediterranean Sea), there is no record of any fishing at all at any time in human history. That is because the high seas portion has been ice-covered year-round—until recently.

The dramatic reduction in Arctic sea-ice coverage coverage, particularly in the past decade, has left part of this area uncovered by ice for at least several months a year. If, as expected, current trends continue, a larger percentage—perhaps even the entire high seas area—will be ice-free for part of the year in the foreseeable future. Although there have been no stock assessment surveys in the high seas area of the Central Arctic Ocean,

Figure II.1 *Central Arctic Ocean (1)*

the best scientific evidence currently available indicates that, at present, it is unlikely that there are sufficient quantities of fish in the high seas area to support a commercial fishery. But that too may change as the Arctic ecosystems continue to undergo profound transformations.

In one sense, the Bering Sea faced a somewhat similar circumstance several decades ago. Until the 1980s, there was very little commercial fishing in the high seas portion of the central Bering Sea, often referred to as the "Donut Hole." But the establishment by the United States and the former Soviet Union of exclusive economic zones in the mid-1970s, and the ensuing limitations on fishing by foreign vessels in those zones (particularly the U.S. zone) in the years thereafter, prompted vessels from Japan, China, Korea and Poland to initiate a large fishery for pollock in the Donut Hole starting in the mid-1980s. That fishery collapsed from overfishing in 1992, and has never recovered.

With the memory of that fishery collapse still fresh, the United States began to worry that an unregulated fishery in the central Arctic Ocean might lead to similarly disastrous consequences. In 2008, Congress passed a Joint Resolution, which President George W. Bush signed into law, calling for "an agreement or agreements for managing migratory, transboundary, and straddling fish stocks in the Arctic Ocean and establishing a new international fisheries management organization or organizations for the region." Until any such agreement might come into force, the Joint Resolution also called upon the United States to "support international efforts to halt the expansion of commercial fishing activities in the high seas of the Arctic Ocean."[1]

In 2009, the United States adopted its first Arctic Fisheries Management Plan, which essentially prohibited commercial fishing within its exclusive economic zone in the Arctic Ocean, in order to "protect the fish resources… against the potential onset of unregulated commercial fishing by initially prohibiting commercial fishing until sufficient information is available to enable a sustainable commercial fishery to proceed."[2] Like the Joint Resolution, this action arose from a striking alignment of interests within the United States, as it had the support of the relevant sector of the U.S. fishing industry, Alaska native groups, the State of Alaska, the U.S. environmental community and the U.S. federal government. Several years later, the Government of Canada took similar steps to forestall commercial fishing in its Arctic waters in the Beaufort Sea, steps that almost certainly reflected a similar alignment of interests within Canada.

Negotiating the Agreement

Soon after Congress passed the Joint Resolution, the United States initiated discussions with the governments of the other States whose fisheries zones bordered the high seas area in the Central Arctic Ocean: Canada, Denmark, Norway and Russia; first individually, then as a group. Although it took several years, these governments eventually negotiated and signed the "Oslo Declaration" in 2015.[3] This non-binding statement included two key commitments by these governments, namely, to:

> …authorize their vessels to conduct commercial fishing in this high seas area only pursuant to one or more regional or subregional fisheries management organizations or arrangements that are or may be established to manage such fishing in accordance with recognized international standards; and establish a joint program of scientific research with the aim of improving understanding of the ecosystems of this area and promote cooperation with relevant scientific bodies,

> including but not limited to the International Council for the Exploration of the Sea (ICES) and the North Pacific Marine Science Organization (PICES).[4]

The Oslo Declaration also acknowledged that other States had interests related to this matter and looked forward to working with such States "in a broader process to develop measures consistent with this Declaration that would include commitments by all interested States."

In parallel with the discussions that led to the Oslo Declaration, the States concerned initiated a series of scientific meetings focused on questions concerning the potential for fisheries to occur in the central Arctic Ocean, and the effects that such fisheries might have on the relevant ecosystem(s). Over the same period, a significant number of non-governmental initiatives and academic conferences around the world started calling attention to the effort to prevent unregulated fishing in the Central Arctic Ocean.

In 2016, the United States invited delegations from the Oslo Declaration signatories, as well as from China, Iceland, Japan, Korea and the European Union, to a meeting in Washington, D.C., thus launching the "broader process" envisioned in the Oslo Declaration. Over the course of six negotiating rounds, these delegations hammered out the text of the Agreement, concluding on November 30, 2017. In February 2017, the delegations undertook a "legal and technical" review of the Agreement text and decided upon a number of non-substantive changes to the draft. On October 3, 2018, all nine States and the European Union signed the Agreement at a ceremony in Ilulissat, Greenland.

Basic Elements of the Agreement

Agreement Area. As its title indicates, the geographic scope of the Agreement covers the high seas portion of the Central Arctic Ocean, as indicated in the Fig. II.2 map, below. That said, the Agreement envisions that scientific work carried out pursuant to it will consider both that high seas area and the adjacent areas under national jurisdiction. The Agreement also calls upon the Parties to cooperate to ensure the compatibility of conservation and management measures for fish stocks that occur in areas both within and beyond national jurisdiction in the central Arctic Ocean, consistent with Article 7 of the 1995 United Nations Fish Stocks

Agreement.

No Unregulated Commercial Fishing. Like the Oslo Declaration, the Agreement commits Parties not to authorize their vessels to engage in commercial fishing in the Agreement Area, with only limited exceptions. The negotiators of the Agreement recognized that a small percentage of the Agreement area is within the geographic scope of the North-East Atlantic Fisheries Commission (NEAFC), as shown in the map below. In the event that NEAFC were to authorize commercial fishing in that area of overlap, the Parties to the Agreement that were also members of NEAFC could allow their vessels to engage in commercial fishing pursuant to the NEAFC rules.

The other basic exception to the prohibition on commercial fishing might arise if and when the Parties decide to replace the Agreement with one or more traditional international fisheries agreements to establish one or more new regional fisheries management organizations (RFMOs) or arrangements. In such a circumstance, the Agreement allows the Parties—

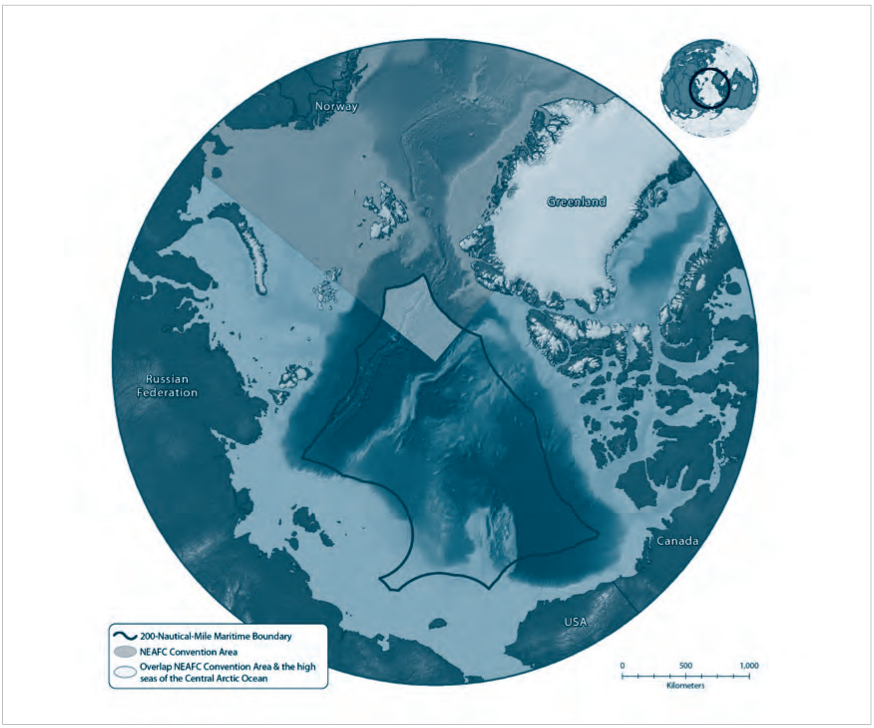


Figure II.2 *Central Arctic Ocean (2)* as a group—to authorize commercial fishing to take place while the new agreement or agreements are under negotiation, provided they have also agreed on mechanisms to ensure that any such fishing is sustainable. Any such fishing must not undermine the foundational commitment to conduct fisheries in a manner that protects the ecosystems of the area.

Exploratory Fishing. The Agreement also allows the Parties to undertake exploratory fishing in the Agreement Area, albeit under limited and tightly controlled circumstances. Within three years of the Agreement's entry into force, the Parties are to establish rules for such exploratory fishing. Those rules must, inter alia, ensure that: such fishing is consistent with sound science; impacts on fish stocks and ecosystem(s) are minimized; all data derived from such fishing is shared; and all Parties are notified of such fishing.

Joint Program. The Agreement commits the Parties to establish a Joint Program of Scientific Research and Monitoring as a complement to national scientific programs that a number of the governments in question already operate. The primary goal of the Joint Program is to improve understanding of the ecosystems of the Agreement Area and, in particular, to help the Parties foresee the prospects and potential effects of commercial fishing in that area in the future.

Regular Meetings. The Parties will meet at least once every two years to review implementation of the Agreement. Prior to each such meeting, a scientific meeting will occur. At their regular meetings, the Parties will review available scientific information and make decisions as appropriate. All decisions on matters of substance will require consensus among the Parties.

Inclusion of Arctic Indigenous Peoples. The Agreement recognizes the interests of Arctic Indigenous Peoples in the conservation and sustainable use of Arctic living marine resources. Even more importantly, the Agreement allows for the participation of Arctic Indigenous Peoples in its implementation and will provide a vehicle for incorporating indigenous and local knowledge in relevant decisions made pursuant to the Agreement.

Step-wise Process. The Parties do not envision the Agreement as a permanent one. Rather, the Agreement anticipates that, at some point in the future, it may be possible for commercial fishing to take place in the Agreement Area on a sustainable basis. With that in mind, the Agreement establishes an initial duration period of 16 years from entry into force, after which the Agreement will be extended for additional five-year periods unless any Party objects to any such extension. In the event that the Agreement terminates in favor of one or more agreements establishing new RFMO(s) or arrangements, the Parties will ensure an effective transition between regimes.

Entry into Force. In order for the Agreement to enter into force, each of the nine States involved in the negotiations as well as the European Union must ratify it. After it enters into force, the Parties may invite other States with a real interest in the Agreement to accede.

Conclusions

The Agreement represents an unusually robust example of the "precautionary approach to fisheries management" in action.[5] With no commercial fishing currently occurring in the high seas portion of the Central Arctic Ocean, and with none expected in the immediate future, concerned States and the European Union have nevertheless taken action to prevent the initiation of such fishing in an unregulated and potentially unsustainable manner. The Agreement, if properly implemented, will instead ensure that commercial fishing does not start in this area until there is adequate scientific information in hand with which to manage such fishing properly, as well as an adequate regulatory regime in place through which to develop and enforce appropriate controls on such fishing.

The Agreement also takes its place among a growing number of binding agreements relating to the Arctic region that States have negotiated in the past decade. Those other agreements include three treaties negotiated under the auspices of Arctic Council (the 2011 *Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic*, the 2013 *Agreement on Cooperation on Marine Oil Pollution Preparedness and Response in the Arctic*, and the 2017 *Agreement on Enhancing International Arctic Scientific Cooperation*) as well as Polar Code developed through the International Maritime Organization.

The establishment of the Joint Program for Scientific Research and Monitoring will also contribute to the growing understanding of the Arctic Ocean. The Joint Program will likely create relationships with a number of other scientific bodies currently focusing, at least in part, on the Arctic Ocean, including one or more of the Arctic Council working groups, ICES and PICES. Indeed, as the implementation of the Agreement moves forward, the Parties might usefully consider whether the best way in which to carry out the mandate of the Joint Program might be through a new Arctic Ocean marine science body.

The period during the Agreement was under negotiation coincided with a series of meetings within the United Nations towards a possible global agreement on the conservation and sustainable use of biodiversity in marine areas beyond national jurisdiction. Negotiations on such an agreement began in earnest in September 2018. At this point, it is difficult to predict when—or even whether—such an agreement will enter into force or what it will obligate its parties to do.

If such an agreement becomes a reality, it will presumably apply to the high seas portion of the Central Arctic Ocean, the very area covered by the Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean. Even so, the parties to the Arctic Fisheries Agreement may not all become parties to the global “BBNJ” agreement. In short, some fascinating and potentially difficult questions may arise in the future concerning the interplay between the two treaties.

Another question hanging over the future of the Arctic fisheries agreement concerns the relations between the Russian Federation and the other parties. Despite serious friction in those relations arising from differences over Ukraine, Syria, and other matters, the Russian Federation and other relevant States have managed to cooperate closely on most Arctic issues over the past decade or longer, including in the Arctic Council and during the negotiation of the Agreement. For implementation of the Agreement to succeed, however, that same high level of cooperation will need to continue.

Chances of continued cooperation in implementation of the Agreement look promising at present. The interests of Russia and those of the other parties to the Agreement—particularly Canada, Denmark/Greenland, Norway, and the United States—appear to coincide. Whatever their differences regarding situations elsewhere in the world, those parties share a desire to prevent unregulated commercial fishing from beginning in a high seas area adjacent to their respective fisheries zones.

Notes

1. Public law 110-243, June 3, 2008.
2. Fisheries of the United States Exclusive Economic Zone Off Alaska; Fisheries of the Arctic Management Area; Bering Sea Subarea, 74 FR 27498.
3. The Kingdom of Denmark signed the Oslo Declaration in respect of Greenland.
4. Declaration Concerning the Prevention of Unregulated High Seas Fishing in the Central Arctic Ocean, signed 16 July 2015.
5. Cf., Article 6 of the 1995 United Nations Fish Stocks Agreement ("Application of the Precautionary Approach").

A Canadian Perspective

Robert J. Young

What Is the Scientific Understanding of the Central Arctic Ocean Fish Populations and Marine Ecosystems?

The Central Arctic Ocean (CAO) marine ecosystem has been a remote, isolated and generally inaccessible area to fisheries scientists and oceanographers. Consequently, scientific understanding of the CAO's fish populations and marine ecosystems is limited. However, recent changes in marine conditions in the region have led to a reassessment of our understanding of the CAO ecosystem. For example, the ACIA (2005) suggested that fish stocks from sub-Arctic regions adjacent to the Arctic high seas region could expand northwards into the CAO. Some fish species found in adjacent waters could be present in the CAO, where appropriate habitats (depths) are available, but estimates of population size and productivity are lacking. Similarly, the underlying ability of the CAO to sustain fish populations is suspected to be low—yet remains unknown.

In 2010, the United States initiated a discussion with the other four states bordering the CAO (Canada, Greenland/Denmark, Norway and Russia) to develop an agreement to prevent illegal, unreported and unregulated (IUU) fishing in the High Seas CAO. The Nuuk agreement in 2014 and the Oslo Declaration that followed in 2015 committed the signatories to prevent high seas fishing by vessels registered by the coastal countries, and established a joint program of scientific research to promote cooperation among relevant scientific bodies and improve the scientific understanding of fish stocks in the High Seas CAO as well as the ecosystems that support them. Subsequently, the five coastal states and five additional nations (Iceland, Korea, Japan, China and the European Union) reached an agreement to prevent unregulated fishing in the CAO. This agreement states that, "The Parties agree to establish, within two years of the entry into force of this Agreement, a Joint Program of Scientific Research and Monitoring with the aim of improving their understanding of the ecosystems of the Agreement Area and, in particular, of determining whether fish stocks might exist in the Agreement Area now or in the future that could be harvested on a sustainable basis and the possible impacts of such fisheries on the ecosystems of the Agreement Area."

The political and diplomatic process to prevent unregulated fishing in the CAO has had a parallel scientific process (meetings of scientific experts on Fish Stocks in the Central Arctic Ocean, FiSCAO) since the Agreement's inception. Fisheries experts from the various parties have met five times since 2011. The purpose of those meetings was to a) review the current understanding of fisheries resources that might be of commercial interest in the CAO, b) identify gaps in our understanding of the marine ecosystems in the CAO and adjacent waters consistent with an ecosystem based approach to fishery management (EBFM), and c) design the Joint Program of Scientific Research and Monitoring Central Arctic Ocean and Adjacent Seas (JPSRM)—to determine the distributions and abundances of species with a potential for future commercial harvests in the High Seas CAO; quantify ecological linkages between potentially harvestable stocks and adjacent shelf ecosystems; and detect changes in fish populations, dependent species, and supporting ecosystems over the next 10-30 years. My summary is based in large part on the reports of this process.

Geographic Focus

This paper discusses the high seas portion of the CAO (Figure II.3), which encompasses the area outside the exclusive economic zones (EEZ) of the five Arctic coastal nations. Marine science has a poor understanding of the region's ecosystem compared to other large marine areas, due to the paucity of systematic temporal and spatial surveys of the marine ecosystem in this region. Surveys of the pelagic and benthic fish communities are particularly sparse because of the severe ice conditions that have been historically present, whereas the understanding of the oceanography is better.

The Protection of the Arctic Marine Environment Working Group (PAME) of the Arctic Council delineated 18 Large Marine Ecosystems (LME) in the Arctic (Skjoldal and Mundy 2013). The Central Arctic LME primarily includes the deep Arctic basins of the high seas area of the CAO and has eight LMEs adjacent to it that lie almost exclusively within the EEZ's of the coastal nations. The adjacent LMEs are important because there are known oceanographic and likely significant ecological linkages between the Central Arctic LME and the adjacent LMEs. The coastal states conduct important, ongoing oceanographic and fisheries surveys in the

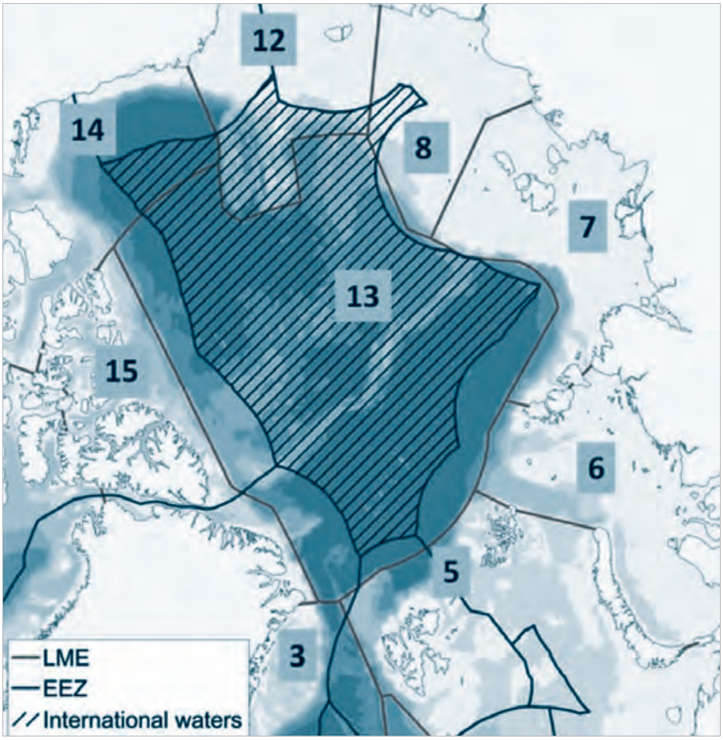


Figure II.3 *The High Seas Portion of the Central Arctic Ocean (cross-hatching), the Central Arctic Large Marine Ecosystem (LME) and the Eight Adjacent LMEs (FiSCAO 2017 – 13 Central Arctic, 3 Greenland Sea, 5 Barents Sea, 6 Kara Sea, 7 Laptev Sea, 8 East Siberian, 12 Northern Bering-Chukchi Seas, 14 Beaufort LME, 15 Canadian High Arctic)*

adjacent LMEs. Accordingly, changes that are observed in ecosystems by national programs within the EEZs may be early indicators of the onset and nature of changes that may ultimately occur in the High Seas CAO.

Environmental Conditions in the CAO

FiSACO (2018) considered the Pacific and Atlantic entrances to the CAO to be important locations for the expansion of the distribution ranges of fish into the CAO. With respect to the potential development of new commercial fisheries in the CAO, the Pacific and Atlantic entrances are environmentally quite different. For example, the high seas entrance in the Atlantic portion of the CAO occurs beyond the shelf break at significant depths (> 1000 m; FiSACO 2018). On the Pacific entrance, the depths are relatively shallow, < 60 m in some locations of the Bering Strait.

For millennia, the CAO has been covered by multi-year ice, making the area relatively remote and isolated. However, the most pronounced change in the CAO is the reduction in the extent and composition of sea ice induced by a climate that has warmed over the last 30 years at a rate approximately twice that of the global average (AMAP 2011). The synergistic effects of albedo reductions in the CAO with general warming and increased freshwater inputs have exacerbated the decline in sea ice. Consequently, the summer sea ice extent in the Arctic is decreasing at a rate of 13.2 percent per decade with projections of ice-free summers by mid-century. The age of the ice in the Arctic is also changing rapidly. The proportion of multiyear ice has declined from about 50 percent in the 1980's to < 20 percent today (Figure II.4).

The decline in sea ice extent is not uniform across the Arctic. The loss of sea ice in the Atlantic portion is considerably less than on the Pacific side. As a result, in the summer/fall the sea ice has retreated to the point where the Chukchi plateau north of the Bering Strait is at times largely free of ice. The combination of relatively shallow entrances and significant loss of sea ice compared to the Atlantic entrance characterized by deeper water

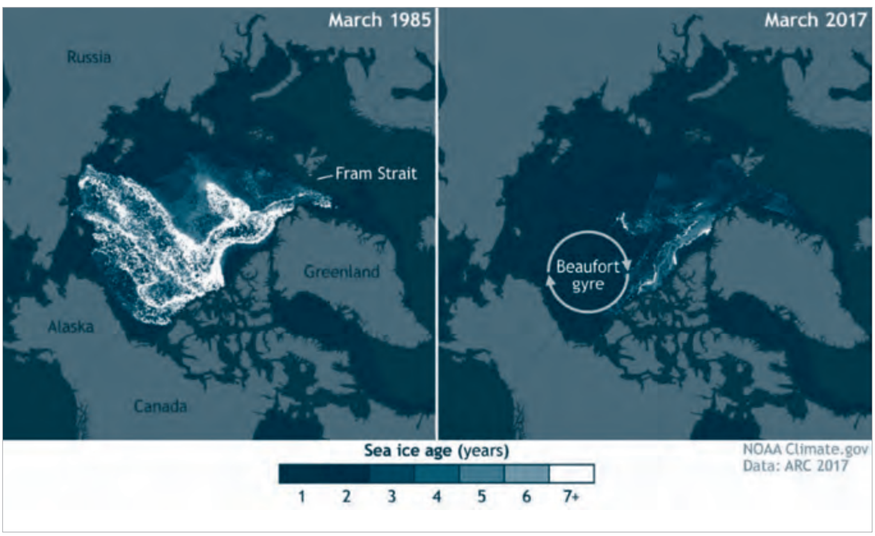


Figure II.4 *The Proportion and Spatial Distribution of Multiyear Ice Has Declined Significantly since the 1980's. Multiyear Ice Now Consists of Less Than 20% of Arctic Sea Ice.*

and lower loss sea ice imply that any new fisheries might be observed first in the Pacific Arctic.

Changes in Arctic sea ice have important ecological impacts. For example, multiyear ice has many ice-associated species that are unique to this habitat. The loss of this multiyear ice habitat would have negative impacts on these communities. In addition, the loss of sea ice will affect the amount and form of primary productivity. The decline in sea ice extent will shift production from ice-associated algae to open water pelagic production. The impact on total production, a key to any future fisheries in the region, is the subject of speculation at this time.

The CAO is characterized by stratified water masses (freshwater, Pacific, Atlantic origin), which could limit primary production even when future scenarios of open water production are considered, causing the CAO to remain a low production region. Productivity will likely remain low if there is no increase in nutrient availability concurrent with the loss of sea ice.

However, there are possible scenarios that could result in higher primary production. The current stratification could break down if some oceanographic scenarios come to fruition, leading to greater concentrations of nutrients available to primary producers. The increase in summer/fall open water will increase wind induced upwelling events that will result in local hot spots of primary production in areas adjacent to slopes. Consequently, the reduced sea ice extent could result in higher primary productivity in the CAO. However, the magnitude and fate of the increased productivity will vary regionally, and potential uptake by higher trophic levels is the subject of ongoing research (Hallowed et al. 2018).

The global atmospheric conditions contributing to climate warming and the loss of sea ice also contribute to increased ocean acidification (OA). Some areas in the Arctic Ocean are vulnerable to OA because the calcium carbonate minerals in Pacific water entering the Arctic are under-saturated and the chemical processes occurring in open water exacerbate the condition. With under-saturation conditions, the resulting chemical balance favours calcium carbonate dissolution into sea water. Thus, OA negatively affects the ability of organisms that require calcium carbonate (e.g. shelled molluscs, larval fish) to form bony or hard structures. For example, aragonite under-saturation occurs at relatively shallow depths in the Beaufort Sea, leading to direct evidence of biological impacts of OA from dissolution damage to pteropod (small, shelled zooplankton) shells (Andrea Niemi, DFO Winnipeg, personal communication). OA could have a negative impact on future fisheries development if OA negatively affects ecosystem productivity and these effects become widespread across the CAO.

Fish Species, Distribution and Abundance in the CAO

The shelf areas and the upper slopes of marine systems are the most productive habitats for demersal species. Those areas are limited in the CAO, which consists mostly of deep abyssal waters. Many productive areas fringe the CAO but exist mostly within the 200 nm limit of the adjacent countries. The production of pelagic species is relatively high in sub-Arctic waters generally (e.g. Bering Sea, Barents Sea), resulting from the intersection of nutrient-rich cold waters and relatively amenable environments (e.g. temperature, insolation). Consequently, the habitat area in the CAO available for future range expansions of demersal or benthic species is limited, while the potential area in the CAO available to pelagic species is quite large. However, the pelagic area is likely of limited productivity due to a) seasonally pulsed and weaker insolation, b) significant nutrient limitations in the water column itself, and c) a generally colder system. Consequently, the overall fisheries productivity in the CAO is uncertain despite the inevitable changes that climate change could bring to the marine ecosystem.

The CAO is a data-poor region with respect to the occurrence, abundance and distribution of fishes and invertebrates. The volume of scientific research in the region has recently expanded, generating a rapidly growing body of literature (e.g. ICES 2018), especially concerning environmental and abiotic conditions. Even with reduced summer sea ice and thus increased access to the area, knowledge regarding fishes and key invertebrates remains limited. By contrast, the LMEs surrounding the CAO are relatively well studied (Figure II.4). For example, Coad and Reist (2018) have published a comprehensive compendium of marine fishes occurring in the Canadian Arctic and similar compendia exist for other areas adjacent to the CAO. FiSCAO (2018) expects that changes observed through research and monitoring in the adjacent LMEs will be harbingers of similar changes in the high seas. Accordingly, there is great need to continue and extend research and monitoring in both the CAO and the adjacent LMEs. It is important to remember that Arctic ecosystems, both territorial waters that support commercial fisheries and frontier areas like the High Seas CAO, have not yet reached a state of ecological equilibrium since the last glaciation. Species excluded by glaciation are still returning to Arctic waters and northward range expansions and population growth are ongoing processes that have been accelerated by anthropogenic climate change and consequent accelerated sea ice loss. Historic patterns of change observed in sub-Arctic marine ecosystems are expected to be mirrored in adjacent Arctic ecosystems, modified by decreases in annual light availability and growth periods correlated with latitude (i.e. light and growth decrease as one approaches the pole).

FiSCAO (2018) noted that any future management of fishes in the CAO should follow ecosystem-based fishery management principles. Consequently, fishing nations will need to regularly gather information on the population dynamics of fishes, invertebrates, and mammals along with oceanographic and environmental data.

The surveys conducted in the LMEs adjacent to the High Seas CAO document a large number of species. The FiSCAO (2018) database contains 339 fish and invertebrate species of which 133 species have some commercial value. In contrast, the database for the High Seas CAO documents just 12 species, of which only three have been harvested for commercial purposes (Arctic cod *Arctogadus glacialis*; Polar cod *Boreogadus saida*; Greenland Halibut *Reinhardtius hippoglossaides*). However, the low species richness currently recorded in the region is likely partially a reflection of the low sampling effort that has occurred in the region to date.

As noted above, the environmental conditions in the Pacific and Atlantic entrances to the CAO are quite different. This is also true of species that could expand their range northward as a result of a changing climate (Fossheim et al. 2015). Fisheries scientists expect that most northward range expansions will originate in extended shelf areas that are adjacent to the CAO and have relatively shallow depths. Most of the areas in the CAO that are less than 1000 m are adjacent to Bering, Chukchi and Laptev Seas. Consequently, the Pacific Arctic has a substantial number of commercial fish and invertebrate species that could expand their range into the High Seas CAO under a more favourable marine climate. FiSCAO (2018) reports that the joint surveys of the Norwegian and Russian governments have observed fish species that are found only in the northern areas of the Barents Sea, while other species appear to be expanding their northern ranges. The range of Greenland Halibut is expanding north of Svalbard, and the distribution of pelagic species such as mackerel, herring, and blue whiting have extended northward considerably in the Atlantic Arctic. Nevertheless the changing environmental conditions (e.g., warming faster, earlier seasonal ice loss) in the Pacific Arctic appear to be more conducive to receive commercial fish and invertebrate species.

The persistent ice cover in the High Seas CAO has precluded systematic surveys of fish distributions and abundance. There are no published abundance estimates for fish species in the CAO. However, a number of estimates of fish abundance have been made in the surrounding LMEs, where commercially harvested species are the subject of stock assessments (e.g. NAFO 2018). The FiSCAO group that was asked to develop a joint program of scientific research to support the agreement to prevent IUU fishing in the region has recommended an international survey to establish a baseline for the marine community, including fishes, invertebrates, mammals and birds, supporting ecosystem elements such as primary and secondary food web components, and environmental conditions in the region (FiSCAO 2018). In addition, the parties share an ambition that the synergistic effect of collective action will rapidly address the identified gaps in fisheries science in the region.

What Are Likely to Be the Main Challenges in Finalizing and Implementing a Joint Scientific Research and Monitoring Program Under the New CAO Fisheries Agreement?

Delegates attending the fourth meeting of FiSCAO (2017) agreed to a strategy to address knowledge gaps related to commercially significant fishes and invertebrates in the CAO from 2018 through 2022. The strategy consists of four parts, beginning with a mapping program to determine the distribution and abundance of important species to assess the presence of commercially significant biomasses of existing species. A snapshot of supporting ecosystem components (e.g. forage species and primary producers), predators and environmental conditions will also be taken during this phase. If commercially significant biomass is present, the experts recommend that regular stock assessments using standard international protocols be initiated. If not, the FiSCAO (2017) recommends assessing environmental triggers or indicators of change (e.g. primary productivity, sea ice conditions, etc.) both within the CAO and in adjacent LMEs. Areas within the High Seas CAO would be re-surveyed when trigger or indicator thresholds are exceeded in adjacent LMEs. Third, the group recommends ongoing stock assessment and ecosystem modeling of new and existing data. This would include projecting future states of fish communities by modeling a range of potential future environmental scenarios. Finally, FiSCAO (2017) recommends the parties to CAO fisheries agreement agree on a scientific coordinating body for the data and model outputs generated by the scientific research and monitoring program. The coordinating body would use the information generated by the program to advise the parties to the fisheries agreement on the status of commercially important fishes and invertebrates in the CAO.

I believe that there are three main challenges facing the scientific program, none of which would make the strategy outlined by FiSCAO (2017) impossible or improbable to implement. The first is a financial question: Who will pay for the scientific expedition(s) to map the distribution and abundance of fish and invertebrates in the CAO? A synoptic survey will entail the deployment of multiple ships, both icebreakers and fishing trawlers, staffed by inter-disciplinary science teams from the nations party to the fisheries agreement as well as the deployment of a range of moorings, acoustics, under-ice fish sampling and subsequent data analysis. FiSCAO (2017) estimated the cost of a survey conducted in conjunction with the MOSIAC (Multidisciplinary drifting Observatory for the Study of Arctic Climate) to be \$1.84 million. This survey would map fish distributions in deep waters north of 80°N in the Atlantic gateway. They estimate the costs of surveying the ice-free zone of the Pacific gateway at \$2.86 million, and \$7.05 million to survey the ice-covered portion of the Pacific gateway. The initial mapping exercise would require about \$11.75 million in operational funding, the deployment of ships and other assets currently in use by other national programs and reassignment of a large scientific team. In addition, there will be an additional cost of \$250,000 for ongoing data analysis and management. Member nations would be asked to make these contributions to the program with considerable risk regarding the sustainable fishable biomass, if any, and its future allocation among nations. The lack of certainty regarding access to a future fishery may give some nations pause to contribute now to a research program.

A second impediment to implementing a joint research program is the uncertain and variable environmental conditions that exist in the CAO. I've indicated above that summer sea ice is declining at a rate of about 13.2 percent per decade and that ice-free summers could be experienced by mid-century. These data might imply that conditions in the CAO are becoming benign, but I think that would be a misunderstanding of current conditions. Ship crews will inevitably encounter very challenging conditions when conducting surveys in the CAO. Ice conditions are highly variable with respect to the spatial distribution and overall extent of ice coverage in the region. This uncertainty with respect to ice conditions can limit any particular survey or preclude sampling in extreme conditions. Surveys involving trawlers are particularly susceptible to ice conditions compared to those using icebreakers. Consequently, any delays or postponements caused by the uncertain environmental conditions will increase costs and/or reduce the precision of the data collected.

A final challenge for the scientific research program will be for the parties to develop and sign a data-sharing agreement before the mapping and assessment exercise begins. The agreement is needed to ensure that the data are available to all of the parties while protecting the intellectual property rights of "primary investigators, organizations, institutions, and countries" (FiSCAO 2018). The parties have agreed to come to terms on the data-sharing protocol within two years and the FiSCAO group has drafted a framework for further discussion by the parties. The FiSCAO group used a number of national examples and ultimately based their proposed framework on the Distributed Biological Observatory (DBO) data policy and release guidelines. The framework addresses key issues such as access to database structure and archive, acknowledgement and citation as well as authorship issues. FiSCAO (2018) is proposing a series of next steps including a joint NOAA/ICES/PICES pilot study on data hosting and sharing protocols. What's lacking is a legal framework—to be negotiated by the parties—that will confirm the obligations to data sharing on fisheries research related to the CAO, and will ensure that scientists and institutions can freely share data and collaborate on research projects related to the CAO. My expectation is that an agreement on data sharing will enable rapid analysis of data, a collective understanding of the state of the fisheries in the CAO and the potential for commercial fisheries. However, the absence of a data-sharing agreement will encumber scientific understanding of the region and create uncertainty regarding the fishery potential in the region.

What Are the Canadian Plans to Contribute to the Needed Scientific and Monitoring Contribution Under the CAO Agreement?

Canadian government scientists have an ongoing commitment to the science and monitoring program mandated by the CAO fisheries agreement. We have participated in all five of the FiSCAO meetings, beginning with the 2011 meeting in Alaska, and hosted the fifth meeting in Ottawa in October 2017. Canadian scientists have contributed oceanographic and fisheries data to the program, as well as survey planning documents, suggestions for data sharing, and analysis. We will continue to contribute enthusiastically to the FISCAO meetings.

Fisheries and Oceans Canada conducts marine research and/or monitoring programs in at least three of the LMEs adjacent to the CAO including the Beaufort Sea, Canadian Archipelago, and Baffin Bay/Davis Strait. Most of these programs are ecosystem-based programs that capture a wide range of data from oceanographic data to abundance estimates of fishes and marine mammals. Occasionally, Canadian icebreakers use the opportunity to collect oceanographic data. These data are used to advise management sectors on resource management and conservation, marine protected areas, as well as assessments of new industrial activity and shipping in the Canadian Arctic. All of the Canadian data will be published in publicly available databases. In addition, all of the research and advisory documents are openly published (https://science-libraries.canada.ca/eng/fisheries-oceans/publications/). Consequently, the body of Arctic marine research conducted by Canada can contribute to the overall assessment of the CAO.

Of particular interest is the potential for contributions to the mapping and monitoring program for the CAO. The parties have not endorsed the recommendation from the science committee on its plan for and cost sharing agreement. Consequently, the Canadian government has not considered its contribution, if any, of operating funds, assets or field personnel for the program.

How Might Scientific Cooperation in the Arctic Be Further Enhanced?

The extent of Arctic scientific cooperation is quite strong. The latest

International Polar Year (IPY 2005-2009) provided a focus for Arctic research and collaboration. The IPY included three years of intensive research and observation periods in the Arctic and Antarctic, which officially concluded in 2010 and involved thousands of researchers from all regions of the globe. The legacy of IPY is not only the volume of data collected, but also the establishment of relationships that continue to generate scientific insights.

There are a number of intergovernmental agencies that bring scientists to gather to tackle important science issues in the Arctic. For example, the Arctic Council has an extensive array of working groups that foster scientific cooperation, including the Arctic Monitoring and Assessment Programme (AMAP), Protection of the Arctic Marine Environment (PAME) and Conservation of Arctic Flora and Fauna (CAFF). These working groups address issues related to contaminants, pollution and the conservation of biodiversity through monitoring, assessment and expert group activities. However, none of the Arctic Council working groups has a mandate to assess fisheries issues in the CAO nor have representation from all parties to the fisheries agreement. ICES and PICES are organizations with a strong focus on fisheries science, and each of these organizations has working groups that are focused on Arctic issues. Each of these organizations has participated in FiSCAO meetings and has been willing to actively participate in FISCAO tasks such as the data management protocol. However, neither organization is fully representative of all parties to the CAO fisheries agreement.

Many regional fisheries management organizations have scientific organizations or secretariats that provide the research support required by these organizations. These organizations provide excellent forums to develop scientific priorities and facilitate research, analysis and discussion related to regionally specific issues. While some of these organizations have an interest in Arctic fisheries, their focus is on fisheries management in sub-Arctic and temperate regions rather than specifically on the Arctic and CAO. The establishment of a similar organization focused on fisheries research and assessment in the CAO, supported by the parties to the fisheries agreement, would act as a catalyst for rapid assessment of current and future conditions in the region (Van Pelt 2017). This organization would be the nexus for marine fisheries science in the CAO and provide an excellent foundation for any future RFMO(s) in the region.

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Perspective from the Russian Federation

Andrei Zagorski

Introduction

It is the concept of subsidiarity[1] that appears helpful for the purpose of understanding and explaining Russian policies on a great variety of Arctic governance issues.[2] This concept implies that in the marine Arctic that includes maritime areas with differing legal status as defined by the Law of the Sea, Moscow would give priority to national laws and regulations as the principle means of governance within the area(s) under various coastal states' jurisdiction. Regional arrangements and agreements would have a subsidiary function whenever deemed necessary to complement national regulations. At the same time, particularly against the background of growing interest among extra-regional powers in Arctic affairs, this approach would serve the purpose of manifesting "Arctic exceptionalism," defining the region "as a *de facto* 'internal affair' of the community of Arctic Council states"[3] and emphasizing the exclusive rights and responsibilities of Arctic states as opposed to non-Arctic ones. Wider international solutions that engage non-Arctic actors would be only sought if a problem exceeds the jurisdictions of the Arctic states and thus cannot be fixed within a purely regional format. Such issues most obviously occur in the Central Arctic Ocean (CAO) beyond the exclusive economic zones (EEZs) of coastal states.

Between these three layers of governance in the marine Arctic—national, regional and global—there are a number of grey areas. Those occur whenever different views are expressed with regard to which level of governance is most appropriate to address a specific issue. Such differences may create tensions among the emphasis on national sovereignty, Arctic regional exceptionalism, and the need to engage extra-regional actors in order to close particular governance gaps.

This paper explores three Russian policies pertaining to: 1) preventing unregulated fisheries in the CAO; 2) further development of the Polar Code; and 3) the establishment of Marine Protected Areas (MPAs) in the Arctic. In all three cases, preferences can be traced reflecting the implicit subsidiarity approach, as it manifests itself in prioritizing national sovereignty and the need to shield Arctic governance, to the extent possible, from being affected by non-Arctic countries. However, in all three cases the final mix of measures to improve Arctic governance at the national, regional or broader international level is different.

CAO Fisheries

When confronted with a proposal to draft an agreement introducing a moratorium on commercial fisheries in the CAO beyond coastal states' jurisdictions, Russia first reacted hesitantly. However, Moscow recognized that the gradual opening of the Arctic Ocean and the observable expansion of some fish stocks, particularly from the Barents Sea further north and east,[4] would, sooner or later, require addressing the issue of unregulated fishing in the CAO.[5] The question was thus not whether a regional fisheries management regime was needed, but *what kind of* regime—and when and how it should be established.[6]

The evolution of Russian policy on the issue can be split into two main phases. In the first phase, between 2011 and 2014-2015,[7] it sought to identify common ground in consultations involving five coastal states (Canada, Denmark, Norway, Russia, and the U.S.) regarding the objectives of the agreement, and to sort out some principled issues, particularly involving identifying the proper stakeholders to be engaged and the best way to proceed. After having reached a general agreement on those issues, Moscow concentrated on details of the agreement itself. Then, after finalizing work on the agreement, which was signed in October 2018, a number of issues remained unresolved.

In the first phase, admitting that the gap in the regulation of international fisheries in the CAO was a looming problem, Moscow proceeded on the presumption that it was premature to consider establishing a CAO Regional Fisheries Management Organization (RFMO) or agreement.[8] There were no fish stocks yet to be managed, and commercial fishing was not expected to become economically viable any time soon. In this respect, Russian policy was not far from that of most other coastal states.[9]

Not seeing any urgency in establishing an RFMO in the CAO, Moscow proceeded on the basis that any fisheries agreement should be preceded by comprehensive research of aquatic biological resources in the area, bearing

Source: The PEW Environment Group

Figure II.5 *NEAFC Area of Competence in CAO* in mind the extremely limited available knowledge. This was supposed to enable all parties to formulate their interests and provide a more solid scientific basis for informed decisions concerning measures required to ensure sustainable use and preservation of aquatic biological resources of the Arctic Ocean without banning commercial fisheries altogether in the future.[10] Russian arguments pertaining to CAO fisheries followed the usual practices of establishing an RFMO, and Moscow's general approach that decisions to establish sectoral or comprehensive marine protected areas (MPA) limiting or prohibiting specific or any economic activities should be based on scientific data that proves the necessity of such measures, and not vice versa (see below the section on MPAs).

Apart from this, Russian international fisheries experts raised concerns that establishing an RFMO in the CAO could eventually adversely affect the North East Atlantic Fisheries Commission (NEAFC). The latter extends its competence to a small portion of the CAO (see Figure II.5) and is considered in Russia as both an efficient mechanism of maintaining sustainable fisheries in the "European" Arctic seas and also a fair arrangement in terms of setting total allowable catch quotas allocated to the Russian fisheries industry.[11]

From the Russian perspective, the issue of a proper institutional architecture for the management of biological resources in the CAO would thus require special consideration, to be informed by scientific research data collected before any decision on the issue would be made. It was clear from the very beginning that Russian experts would neither recommend the extension of the NEAFC area of competence further into the CAO, nor would they welcome any overlap of a new RFMO with NEAFC. Moscow would rather tend to delineate fisheries sectors in the CAO following the UN Food and Agriculture Organization (FAO) classification that treats the "European" and Eurasian and American Arctic seas as two distinct sectors, not least due to their different biological productivity.[12] That implied that Moscow would opt for the establishment, at a later stage, of a new RFMO in the Eurasian and American Arctic seas.

While the government remained hesitant, the Russian fisheries industry from the very beginning embraced a precautionary approach that urged against a delay in the development of a CAO fisheries agreement, despite the absence of sufficient research data.[13] Some experts originally considered the need to establish a proper RFMO in the CAO.[14] The main driver behind this approach was the fear that non-Arctic states engaged in expeditionary fishing could begin unregulated harvest in the area, and coastal states would be unable to prevent them from doing so.[15] Indeed, the basic interest of the Russian fisheries industry was not in seeking opportunities to harvest in the CAO in the future, since its main harvest grounds would be within the EEZ. Rather, it was in preventing unregulated fishing by non-Arctic states that could deplete the relevant fish stocks within the EEZs of coastal states.[16] The possibility that commercial fisheries in the CAO, albeit on a limited scale, could occur sooner than generally assumed made a compelling case not to delay precautionary measures in the CAO.

The discussion concerning the eventual access of third (non-Arctic) countries to the agreement and to fishing outside the EEZs of Arctic states proved difficult.[17] Moscow would prefer to limit the participation in the agreement to the five coastal states, thus emphasizing their unique responsibility for the Arctic Ocean and reinforcing the concept of "Arctic exceptionalism."[18] However, Russia was also aware that such an approach would be inconsistent with the 1995 Fish Stock Agreement, and no accord limited to five parties would be binding on third parties and thus limit or prohibit fishing by their ships beyond the EEZs.[19]

By 2014, most questions raised by Russia in consultations among the five coastal states had been sufficiently clarified. Moscow realized that no Arctic states considered the establishment of an RFMO in the CAO at this early stage, and the objective of the agreement would be to define interim measures in order to prevent unregulated fisheries in SAO by committing the parties not to issue licences for fishing in areas not covered by any RFMO (respectively, NEAFC and/or any new RFMO to be established in the CAO at a later date). The concept of preventing unregulated fishing replaced the initial proposal to introduce a moratorium on commercial fisheries. Since the agreement would not yet anticipate the establishment of an RFMO, the question of how to delineate responsibilities between the existing (NEAFC) and eventual new ones could be left open to the future. In order to properly inform any future decisions on that issue, solid scientific knowledge should be acquired. Therefore, the agreement would prioritize research cooperation among the parties in the agreement to be conducted regarding the CAO.[20]

There was a growing consensus that a balance of interest of Arctic and non-Arctic states had to be found,[21] based on the understanding that the longer the delay in adopting interim measures, the higher the costs could be in the absence of a regulatory regime.[22] These considerations (as well as the evolution of policies, particularly by Norway and Canada, which gradually embraced the idea of an agreement on interim measures) led Moscow to abandon its reluctance and accept the idea of a CAO fisheries agreement introducing precautionary interim measures without waiting for sufficient scientific knowledge to be accumulated. This led to Russia consenting to open the negotiation of the agreement to some non-Arctic actors while, at the same time, emphasizing the special responsibility of coastal states. These states endorsed the Oslo Declaration[23] in July 2015, which outlined the main building blocks of the future agreement and invited five more parties (China, the European Union, Iceland, Korea and Japan) to join in the negotiations later the same year.

In the second phase of negotiations in the extended format, Moscow concentrated on several details of the agreement. In particular, it sought to give expression to the priority of coastal states that reflected the Arctic exceptionalism approach, and preserved its freedom to harvest research catch while, at the same time, prevented unregulated commercial fisheries by third countries.[24] The related debate ultimately concentrated on three issues: the organization of scientific research cooperation of the parties, the decision-making rules, and the duration of the agreement.

With regard to research cooperation, Moscow was torn between two conflicting objectives. On the one hand it sought to limit, if not prevent, any fishing activities for research purposes by non-Arctic states, which could be obtained, among other ways, by institutionalizing such cooperation (including issuing quotas of catch for research purposes). On the other hand, the Russian fisheries industry was not prepared to accept any limitations of its own freedom of research catch. At the end, the industry made its choice in favor of preserving its freedom of fishing for research purposes, which automatically granted the same freedom to all other parties to the agreement.[25]

One consequence of this decision was that the agreement, while anticipating to "establish and operate a Joint Program of Scientific Research and Monitoring with the aim of improving the understanding of the ecosystem(s) of this area and, in particular, of determining whether fish stocks might exist in this area that could be harvested on a sustainable basis," has failed to spell out how this program would work.[26]

The cooperative management of research regarding aquatic biological resources in the CAO is one of the remaining issues in the agreement that has yet to be sorted out. China's recent indication that, within the framework of the CAO Fisheries Agreement, it "will strengthen survey on and research into the fishery resources in the high seas in the Arctic," and will "carry out appropriate exploratory fishing"[27] should urge Russia to finalize work on this aspect of the program in order to avoid "unregulated" fisheries research activities in the CAO.

There are different (though not necessarily divergent) views and questions about how cooperative management should be organized. These include an ongoing debate about the institutional architecture of future CAO biological research. For instance, should any of the existing organizations, such as the International Council for the Exploration of the Sea (ICES), inform NEAFC decisions and therefore extend their area of competence into the CAO? Should another institution or mechanism for cooperation be created? Should the Arctic Council play a role?[28]

Based on conversations with the Russian fisheries industry and other experts, it would be fair to assume that Moscow would give preference to organizing the exchange of individual countries' research findings in a way similar to how the 1994 Pollock agreement works now. It is most likely that participation in this exchange would be limited to the ten parties of the agreement. This logic would imply that, should those parties one day decide that a new RFMO should be established in order to manage any identifiable fish stock, this organization would be reduced to the parties of the current CAO fisheries agreement and thus, in its composition, remain distinct from NEAFC.

With regard to the rules of decision making (the most sensitive decision would be expected if and when regulated commercial fisheries could be allowed in the CAO, leading to the establishment of an RFMO), Russia clearly followed the logic of subsidiarity. Those rules should not allow decisions to bypass Moscow (thus granting it some sort of veto-power) and should give coastal states a clear priority in decision making. This explains the opposition of Russia to any options of (qualified) majority voting, including those requiring a double qualified majority of all parties to the agreement and of the five coastal states. Moscow's first choice would be a formula giving coastal states veto power by insisting that decisions should require the consensus of all coastal states, thus ensuring that no decision running against the interest of any of them could be passed. Should that formula not be acceptable, particularly to non-Arctic parties that initially suggested a simple majority mechanism, consensus decisions taken by all parties would meet that requirement on the Russian side. The predictable outcome of this debate was the ultimate agreement to make decisions by consensus of all parties.[29]

The requirement of consensus increased the importance of the issue of the duration of the agreement. The particular concern was that consensus rule could be abused by any or some parties in order to block a decision to open the CAO area for fishing and to create an RFMO once scientific data would prove the availability of fish stock(s) for sustainable use. These concerns could be met by limiting the duration of the agreement and thus to exert some pressure on the participating states to reach an agreement. Proposals to this effect varied significantly, from 10 to 30 years. A compromise, reportedly suggested by Russia, was reached by limiting the duration of the agreement to 16 years.[30] However, after the expiration of that period, the agreement can be renewed every five years until appropriate conservation and management measures are formulated and agreed upon by the parties.[31]

Polar Code

When the Polar Code (Code) was adopted in 2015, it left several gaps that were to be addressed at a later date. There remained two types of gaps:

First, the scope of ship categories encompassed by the Code. While its pollution prevention measures apply to all vessels (or most of them, depending on the annexes of the MARPOL Convention), except for warships or other ships in governmental service, the Code's safety measures apply only to larger cargo and passenger ships on international voyages. In a follow-up, negotiators were expected to elaborate specific requirements to cover more ship categories, in particular pleasure yachts and fishing vessels. However, the appropriate measures have yet to be elaborated.[32]

Second, several particular issues were left over for different reasons. One of them, regarding ballast water management, was exempted from the Code pending the entry into force of the 2004 International Convention for the Control and Management of Ship's Ballast Water and Sediments (BWM). Another, a ban on using heavy fuel in the Arctic, was controversial and was included into the Code as a recommendation without making it mandatory.[33] Both issues were supposed to be subsequently negotiated. Despite some remaining disagreements, since the entry of the Code into force some visible progress has been observed in addressing both ballast water management and heavy fuel use.

While the safety provisions of the Polar Code are largely seen as consistent with the rules of navigation established for the Northern Sea Route (NSR), the Code's environmental provisions were subject to criticism in Russia. The provisions were seen by many as particularly restrictive on Russian maritime operations in the NSR area.[34]

In September 2017, the *BWM Convention* ultimately entered into force. Most of the Arctic states (with the exception of Iceland and the U.S.) have ratified it.[35] Although the Convention does not include specific provisions for Arctic or Polar waters, its requirements now apply to ships flying the flag of any state and are subject to port state controls.

In 2015, the Russian Maritime Register of Shipping (RS)—the Russian classification society member of IACS—issued guidelines for the implementation of the BWM Convention requirements.[36] The RS is authorized to survey and certify Russian vessels, and vessels flying the flag of 42 other nations, for meeting those requirements.[37]

While the Convention's entry into force is seen as an important step forward, it is assumed that its provisions are not sufficient for protecting Arctic waters from risks related to potential ship-mediated bio-invasion.[38] As the BWM Convention explicitly encourages states parties to complement its requirements by region-specific measures, this is an option the Arctic states could pursue.

While, for economic reasons, the Russian government was not prepared to accept a mandatory ban on the use of heavy fuel oil (HFO) in Arctic waters during the negotiation of the Polar Code, its policy started changing from 2017. According to the Ministry for natural resources and environment, it is considering supporting "Green Shipping" projects in the Arctic by promoting the construction of new ships using liquefied natural gas fuel instead of heavy oil, as well as the respective modernization of the existing fleet. Russian gas companies in particular have shown support for this policy. Although no final decision to this effect was taken in 2017, Moscow supported a Canadian proposal on heavy fuel submitted to the International Maritime Organization (IMO) in 2017.[39]

This proposal was considered at the IMO Marine Environment Protection Committee (MEPC) 72nd session on 9-13 April 2018 that considered the development of measures to reduce risks associated with the use of heavy fuel oil by ships in Arctic waters. MEPC tasked the Subcommittee on Pollution Prevention and Response to develop a definition of heavy fuel oil and prepare a set of guidelines on mitigation measures to reduce risks of use and carriage of heavy fuel oil as fuel by ships in Arctic waters. On the basis of an assessment of the impacts, the Subcommittee was tasked to develop a ban on HFO for use and carriage as fuel by ships in Arctic waters, on an appropriate timescale. MEPC is scheduled to discuss the issue at its 6th session in February 2019.[40]

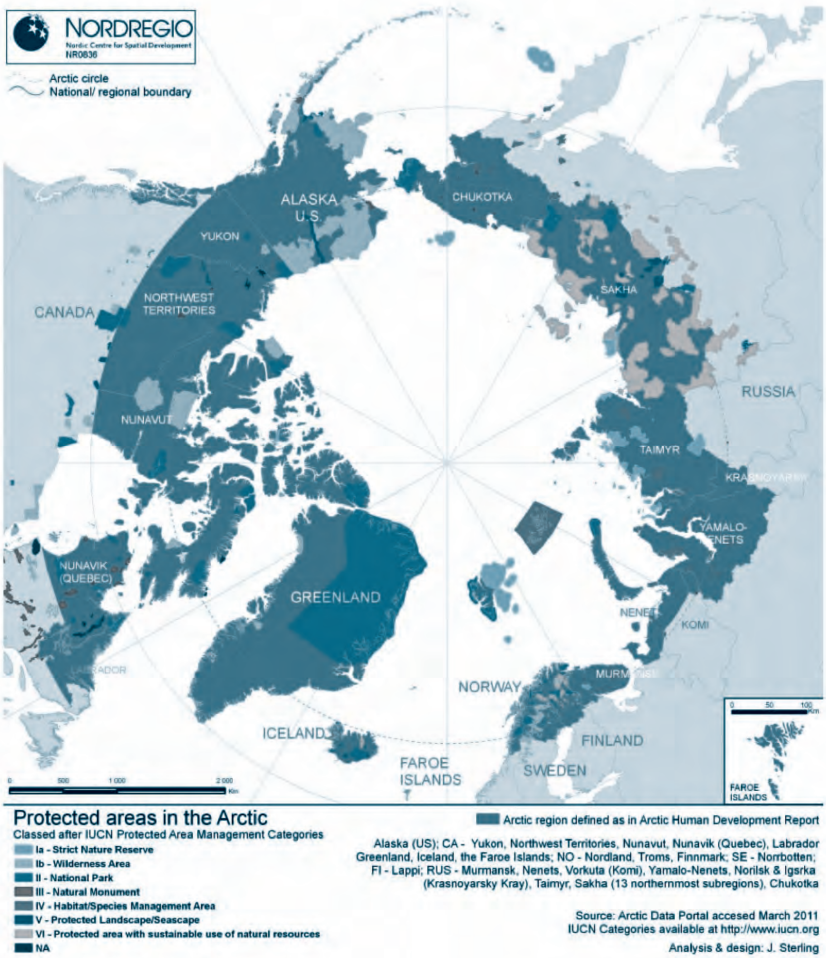
Marine Protected Areas

Context and International Practices

The concept of environmental (both terrestrial and marine) protected areas (PAs) is extremely broad. Most often, it is used as a generic concept covering a great variety of measures serving different purposes, including the conservation or management of use of various resources in defined areas. The concept of PAs encompasses specific types of human activity (sectoral PAs, particularly shipping and fisheries), and implies different kinds of regimes or levels of protection (for instance, strict natural reserves, wilderness areas, national parks, natural monuments, habitat/species management areas, protected landscapes and seascapes, and protected areas with sustainable use of natural resources, among others). In other words, PAs exist in a great variety of forms, are established and managed by different levels of government, and may differ significantly in the level and permanency of protections.[41] This concept also may imply measures that seek to "comprehensively protect and preserve rare or fragile ecosystems as well as the habitat of depleted or endangered species and other marine life in a particular region"[42] and, in doing so, follow a *holistic* ecosystem-based approach.[43]

Both the generic and the holistic approaches inform the establishment of different forms of Marine Protected Areas (MPAs). Although there is no common universal definition of what an MPA is, most often the concept follows the definition adopted by the International Union for Conservation of Nature (IUCN): "Any area of intertidal or subtidal terrain, together with its overlying water and associated flora, fauna, historical and cultural features, which has been reserved by law or other effective means to protect part or all of the enclosed environment."[44]

The generic concept encompasses various types of MPAs, such as



Source: NORDREGIO

Figure II.6 *Protected Areas in the Arctic*

sanctuaries, particularly sensitive sea areas, world cultural heritage protected areas, protected areas or areas requiring special measures for the conservation of biological diversity, sustainable management of marine biological resources, etc.[45] Historically, the establishment of relevant "sectoral" MPAs dominated international practices, thus giving a special role to particular sectoral international organizations, such as IMO, FAO, and regional fisheries management organizations, and the International Seabed Authority. It is clear, however, that "the identification of an area as an MPA does not necessarily mean that all human activities are prohibited."[46]

The establishment of MPAs is a more challenging task than that of establishing terrestrial protected areas, for several reasons. Firstly, scientific knowledge about the marine environment, including human impacts, is usually more limited than for terrestrial ecosystems.[47] This confronts states with a dilemma of science-based policy choices. Governments can either postpone the establishment of protective measures until sufficient knowledge has been accumulated, which necessitates constraining measures pending more complete scientific assessments. Or they may apply the precautionary approach and ban or limit specific (or all) human activities in a particular area until the scientific knowledge and/or technologies are available to prove the possibility of a sustainable use of respective resources in that area. The former approach is more often the case.

Second, and probably even more importantly, different legal regimes applicable to different maritime zones pose substantial challenges to establishing effective MPAs.[48] While terrestrial PAs are established within the territory of a state, coastal states' sovereignty does not extend beyond the 12 (or sometimes less) nautical miles-wide territorial seas. It is no surprise that the absolute majority of the roughly 6,000 operated MPAs of different types covering 1.31 percent of global oceans have been established in the territorial seas of coastal states.[49] Coastal states exercise some, albeit limited, jurisdiction over their EEZs and, over the past decades, there was a modest tendency toward gradual extension of MPAs into the EEZs.[50]

Establishing MPAs, particularly 'holistic' ones seeking to maximize conservation effects in high seas in Areas Beyond the National Jurisdiction (ABNJ), is a relatively new trend. No agreement by coastal states alone can prevent or limit the respective activities of third parties in such areas unless they accept the need to apply specific or comprehensive protective measures. In other words, any MPAs in ABNJ would require either some sort of universal agreement, or at least seek the participation of all states that may be relevant for the maintenance and the effectiveness of the respective regime. The elaboration of general criteria for establishing comprehensive protective measures, including the choices implicit in the science-based approach, is yet at the very early stage. So far, the experience with establishing MPAs in ABNJ is limited to a few mechanisms.[51] Two of them represent two different models to proceed.[52]

By the end of 2016, under the Oslo and Paris Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR), ten MPAs were established in areas beyond the national jurisdiction of its parties based on the precautionary approach.[53] Although the Convention explicitly encourages inviting third parties to participate in MPAs in ABNJ, so far the OSPAR Commission did not seek to extend its regulations to non-parties. Instead, it concentrated on developing coordination and cooperation in ABNJs with relevant sectoral international organizations, such as NEAFC (on fisheries), IMO (on shipping) or the International Seabed Authority (on the seabed beyond the continental shelf of the states-parties), seeking to increase the legitimacy of its own measures and to bind third parties by mandatory decisions of those organizations. By coordinating its measures with the relevant multilateral institutions, the OSPAR Commission seeks to achieve, to the extent possible, a synergy of different sectoral arrangements.

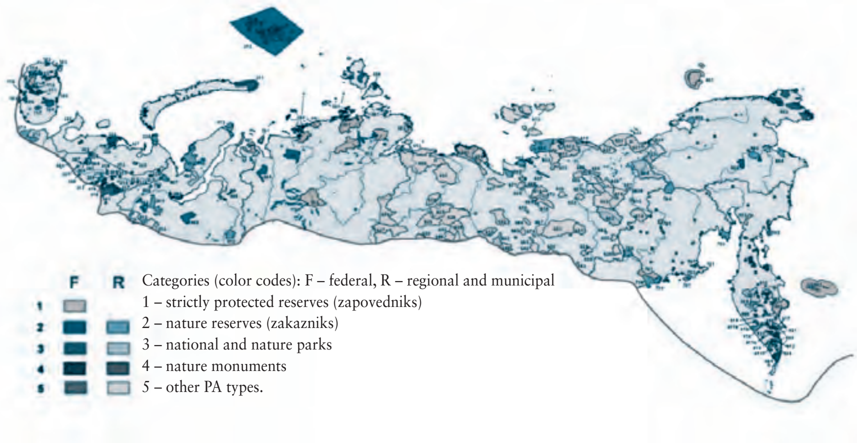
The other model is represented by the work of the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR). In 2009, CCAMLR established the very first MPA that included areas beyond national jurisdiction, pertaining to the protection of the South Orkney Islands southern shelf. In 2017, the CCAMLR decision to establish the Ross Sea region Marine Protected Area entered into force.[54] Both MPAs have a high level of protection. In applying a generally holistic approach by combining measures that encompass fisheries management as well as specific requirements for and constraints on vessel traffic, the CCAMLR largely benefits from being an integral part of the 1959 Antarctic Treaty system. There are several features that principally distinguish the ways in which the CCAMLR and the OSPAR Commission operate and highlight the difference between the Antarctic and the Arctic regions.

This distinction does not simply boil down to the fact that the Antarctic is a continent surrounded by an ocean while the Arctic is essentially an ocean surrounded by landmass. The essence of the Antarctic regime is the agreement by the party states that they would not claim sovereignty over any part of the continent. This has fundamental consequences for the legal regime of the waters surrounding the continent, most of which are regarded by default as maritime areas beyond any national jurisdiction. Any decisions on the conservation of biological resources are thus within the collective discretion of the party states to the Treaty, working together within the CCAMLR. However, the Antarctic Commission is also confronted with the challenge of ensuring compliance with its decisions by individual states and particularly by third parties.[55]

Russian Policies

Reflecting the different legal status of territories and maritime areas in the Arctic, Russian policies clearly follow the logic of subsidiarity. Laws and decisions regarding the establishment of protected terrestrial and marine areas within the territorial sea are created at the federal, regional and local (municipal) levels. Respective decisions concerning the establishment of MPAs within the Russian EEZ and beyond it are handled by federal authorities in cooperation with either regional states or within wider frameworks.

In the broadly defined Russian Arctic,[56] by the middle of this decade there were 450 terrestrial protected areas covering about 16.2 percent of the total area of the wider Russian Arctic (Figure II.7). Both in terms of the number of PAs and their area (75 percent of PAs and 60 percent of the total protected area) most have been established by regional authorities. There

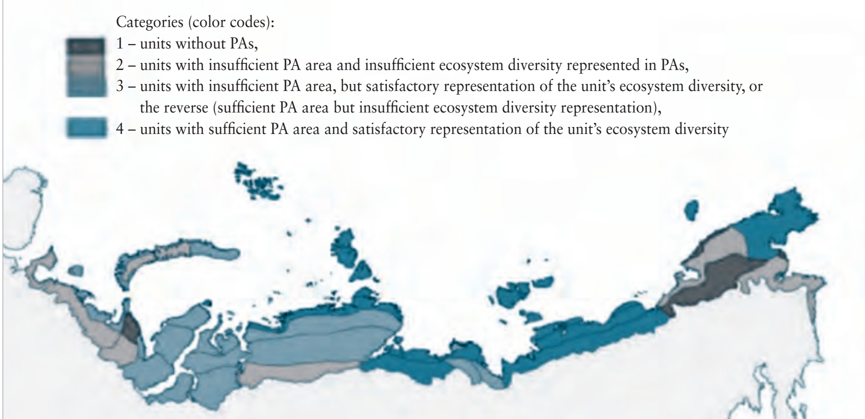


Source: Stishov M.S., Protected Areas in the Russian Arctic: Current State and Prospects for Development, [Moscow]: WWF Russia, 2013, p. 12.

Figure II.7 Protected Areas in the (wider) Russian Arctic are few federal PAs (eight percent), but usually federal PAs are larger than regional ones and extend to about 25 percent of the total area protected in the Russian Arctic. The share of PAs managed by local authorities reaches 15-17 percent in terms of their numbers and area.

Environmental experts assess the general characteristics of the network of protected areas in the Russian Arctic as satisfactory. The current area is close to meeting the target for terrestrial ecosystem protection (17 percent of Russia's area is slated to be protected by 2020). At the same time, these experts point out significant unevenness in the performance of different regions. The Sakha Republic (Yakutia) leads with one-third of its total Arctic area included in its PA network. Archangelsk region protects 25 percent of its Arctic area, which predominantly consists of archipelagos. More than 10 percent of the Arctic areas of the Komi Republic and Kamchatka are included in PAs. Other regions have included less than 10 percent of their Arctic areas into PAs, while the Nenets and Chukotka regions and the Magadan region have less than five percent PA coverage.[57]

The situation in the narrower zone of the Russian polar desert and tundra (except for the Kola Peninsula, which is included into the forest-tundra zone) is assessed in a similar way (Figure II.8). PAs with different



Source: Stishov M.S., Protected Areas in the Russian Arctic: Current State and Prospects for Development, [Moscow]: WWF Russia, 2013, p. 45.

Figure II.8 Adequacy of Area Protected and Ecosystem Diversity Representativeness in PAs in the Russian Polar Desert and Tundra Zone levels of protection extend to about 20 percent of that zone, which is considered satisfactory. However, the extremely unevenly distributed PA network is not sufficiently representative of the diversity of landscapes and ecosystems in the regions. The landscape and ecosystem diversity represented in PAs is the highest in the polar desert and the Middle Siberian and Eastern Siberian tundra. It is the lowest in the Eastern European and Chukotka tundra regions. The Western Siberian tundra, placed in the middle, is characterized by a relatively low proportion of protected area and a relatively low representation of landscape diversity. At the same time, it has a high level of ecosystems diversity represented.[58]

Proposals and plans for closing or narrowing gaps in how representative and complete the network of terrestrial PAs in the Russian Arctic exist at different stages of consideration, from awaiting approval to active implementation.[59]

Many terrestrial protected areas established along the Arctic coastline or on islands extend into the adjacent maritime areas within the Russian territorial sea. This is particularly true for the PAs established on the Franz-Josef-Land archipelago, Wrangel Island reserve, Beringiya National Park. This is also true for the Nenetzkiy and Gydan Reserves, the Russian Arctic National Park established on the northern part of the Northern Island of Novaya Zemlya, and the Grand Arctic Natural Reserve that includes, among other places, the Kara Sea islands and the Nordenskiöld Archipelago (see Figure II.7).

The projected intensification of human activities and particularly of natural resources exploration and extraction moving further north provided impetus for expanding the network of Marine Protected Areas within the Russian Arctic seas. A comprehensive study supported by the Ministry for Natural Resources and Environment was completed on this subject in 2016.[60] The study identified 47 marine areas to be included into the MPA network (Figure II.9). Those MPAs would extend to a total of 25 percent of the Russian marine Arctic. Respective proposals are considered for being included into the Ministry for Natural Resources and Environment's list of priorities for establishing protected areas in 2020-2030.[61]

There also are examples of sectoral or even holistic MPAs established or in progress in the Russian EEZ in the Arctic. The regulatory regime established for the Northern Sea Route for the purposes of minimizing the risks of pollution from ships is one such example. Building on Article 234 of the 1982 UN Convention on the Law of the Sea, Russia established

Source: Boris Solovyev et al., 'Сеть перспективных для охраны морских районов в российск ой Арктике' [Network of Prospective Marine Protected Areas in the Russian Arctic], Труды VI M еждународной научно-практической конференции 'Морские исследования и образовани е (MARESEDU-2017)' [Materials of the 6th International Applied Scientific Conference 'Maritime Research and Education (MARESEDU-2017)'], Tver', PoliPRESS, 2017, p. 583.

Figure II.9 Proposed Network of MPAs in the Russian Arctic

its rules by means of national legislation.[62] The United States-Russian 2017 joint proposal for establishing a vessel traffic management system for the Bering Strait approved by IMO in 2018 is another example.[63] The Bering Strait itself includes territorial seas of both Russia and the United States. This is why, at an earlier stage, Moscow considered the option of establishing the management system by means of a bilateral United States-Russian agreement. However, it took the two countries to submit the issue to the IMO in order to make respective measures mandatory, since vessels passing through the Strait enjoy transit passage rights.

After years of intensive scientific studies closely coordinated with the relevant Norwegian counterparts within the joint Russo-Norwegian environmental commission, a draft pilot plan for a comprehensive ecosystem-based management of the eastern ("Russian") part of the Barents

Sea was submitted to the Russian government for consideration at the end of 2015.[64] Since 2016, it has passed through the interagency coordination process that has revealed not only differences in the assessment of the proposal by different agencies and industries, but also significant gaps in the Russian legislation. The proposal is back to the slow machine of Russia's intra-governmental coordination process and, reportedly, focuses of developing relevant spatial planning in the Russian part of the Barents Sea.

Once approved, it could become the first holistic MPA in the Russian Arctic that would complement respective ecosystem-based management plans for the Norwegian part of the Barents Sea. However, since the maritime area where the potential measures would apply exceeds Russian territorial seas, most of the proposed measures would not be mandatory. Further holistic MPAs are being considered for the Eastern Siberian and Chukchi Seas.[65]

Establishing MPAs in areas beyond national jurisdiction is a relatively new development (see above), and not only in the Arctic Sea. However, there are already two sectoral MPAs in the CAO ABNJ. The Polar Code applies to ice-covered waters regardless of their legal status, including in the Central Arctic Ocean beyond the EEZs of the coastal states. It encompasses maritime safety and environmental protection measures. The CAO Fisheries Agreement (see above) pursues the objective of preventing unregulated commercial fishing beyond the EEZs and bears the potential to evolve in the future into a proper RFMO. Both sustainable use of biological resources and shipping are the sectors most often addressed by MPAs within and beyond the national jurisdiction. Appropriate avenues for developing further comprehensive measures encompassing the effective conservation of marine ecosystems are subject to discussions within the Arctic Council's Task Force on Arctic Marine Cooperation (TFMAC), although those discussions are yet inconclusive.

Russian basic policy on establishing MPAs in ABNJ was most explicitly articulated within the UN Preparatory Committee for the development of an international legally binding instrument on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction.[66] Those include the following:

1. The instrument on the conservation and sustainable use of marine biological diversity should exempt fisheries that, from the Russian

perspective, are sufficiently governed by the 1995 Fish Stock Agreement and the work of the relevant RFMOs. No universal instrument would compensate for the ineffectiveness of some RFMOs.
2. Neither the concept of the heritage of mankind nor the mandate of the International Seabed Authority should be extended to marine genetic resources.
3. The establishment of MPAs should be preceded by the collection of sufficient knowledge proving the need to constrain specific human activities in particular areas of the Global Ocean.
4. MPAs are not synonymous with the ban on any activities in a specific area. Any limitations established within an MPA should be subject to periodical review not excluding lifting those limitations.
5. Sovereign rights of coastal states, particularly with regard to the exploration and the exploitation of natural resources on the extended continental shelf beyond 200 nautical miles, should have priority as compared to the regulations established by an MPA.

Apart from these considerations, Moscow would give priority to regional arrangements rather than to a universal instrument.

The Russian position within the TFMAC was not definitive. Moscow does not have any clear vision with regard to a holistic management of the Arctic Ocean and pursues a rather reactive and thus hesitant policy. However, should one project the general elements of its approach to the establishment of MPAs in ABNJ to the Arctic Ocean, the following building blocs appear plausible:

1. Establishing a regional regime in the Arctic would be a preferred option as compared to the development of a universal instrument that would govern the establishment of MPAs in the Arctic.
2. A regional regime should exclude fisheries that are already governed by sectoral agreements, such as NEAFC or CAO fisheries agreement.
3. Any agreement(s) on the conservation and rational use of marine resources in the Arctic should respect sovereign rights of coastal states, including on the extended continental shelf.
4. The establishment of MPAs in ABNJ in the Arctic Ocean should be preceded by the accumulation of sufficient knowledge necessitating specific measures. These should not necessarily aim to prohibit

specific human activities but, rather should introduce reasonable management mechanisms for the purpose of rational and sustainable use of the resources of the Arctic Ocean.

5. Any decisions concerning the conservation of the marine Arctic ecosystems in ABNJ would be exposed to the challenge of engaging third parties in order to ensure compliance and enforcement of respective measures.

If compared to the two models described above (OSPAR and CCAMLR), it is reasonable to assume that any forthcoming work on establishing MPAs in the Arctic, particularly in the CAO, would most likely follow the OSPAR model, rather than that of CCAMLR. First, there are differences in the legal regimes of the Antarctic and the Arctic: human activities in the CAO are not currently governed, and are unlikely to be governed, by a universal treaty. Second, should the MPAs network in CAO be further developed on the platform of the Arctic Council, the latter would be confronted with the problem of ensuring compliance by third parties. The practical way to address the challenge would be to coordinate and cooperate with the relevant sectoral international organizations, particularly with IMO and regional fisheries management organizations and arrangements, including parties to the CAO fisheries agreement. At a later stage, after the process of establishing the outer limits of the continental shelf in CAO is completed, the Arctic Council might find it necessary to develop cooperation with the International Seabed Authority.[67]

At the same time, the Arctic Council could and should consolidate its role in accumulating and sharing scientific knowledge in a comprehensive manner that would inform proposals for establishing or improving holistic ecosystems-based MPAs in the Arctic Ocean, which the member states would jointly pursue in the relevant international organizations. In doing this, the Arctic Council could greatly benefit from the network of its observers who would be engaged in the discussion of necessary measures early in its negotiations, and, on that basis, could become an important resource when such proposals are taken to the relevant international organizations. The development of the Polar Code is a good example of exactly this kind of collaboration.

Conclusions

The review of these three case studies reveals basic elements of a common denominator of Russian policy with regard to the conservation and sustainable management if the Arctic. That common denominator follows the logic of subsidiarity.

First, Moscow prioritizes the respect for sovereignty, jurisdiction and sovereign (exclusive) rights of coastal states. Whenever an issue can be effectively addressed by national legislation and measures, it should be pursued in this way. This is one of the criteria in considering the establishment of MPAs. Although some recent decisions (most notably the adoption of the Polar Code that covers ice-covered maritime areas regardless of their legal status) may appear to be a deviation from that policy, in fact they are not. The bottom-line approach for the development of the Polar Code was, for Russia, that the Code should not replace Russia's national regulation of vessel traffic in the NSR.

Second, establishing MPAs, both within and beyond the national jurisdiction of coastal states, should not be reduced to considering banning human activities in particular areas as part of a holistic approach. It should rather serve the purpose of ensuring sustainable and rationale use of various types of maritime resources. This is why the consideration of MPAs should encompass a greater variety of options and measures including the establishment of primarily sectoral MPAs (the Polar Code and the CAO Fisheries Agreement are examples of such sectoral MPAs).

Third, Moscow's choice of the science-based policy follows the logic that any decisions that would constrain or prohibit any type of economic activities in any maritime area should be preceded by the accumulation of sufficient data and knowledge necessitating such measures, and not vice-versa, as would be suggested by a strictly interpreted precautionary approach. The ultimate decision by Moscow to embrace the idea of the early adoption of the CAO Fisheries Agreement without waiting for the availability of the relevant scientific data seems to be an exception from that rule. However, this exception was motivated by a different consideration, particularly by the acknowledgement of the need to bind the relevant non-Arctic states into the agreement.

Fourth, the concept of Arctic exceptionalism generally informs Russian policy in the sense that regional arrangements should be preferred to broader frameworks. However, Moscow is aware of the challenge of ensuring compliance of non-Arctic states with any regional decisions. In particular, whenever measures constraining the activities of non-Arctic third parties are considered necessary, Russia is open to turning the specific case to the relevant international organizations or a different appropriate framework. This is exemplified by the development of the Polar Code within the IMO, by addressing the vessel management in the Bering Strait, also through the IMO. This seems to have been one of the main arguments for Moscow to open the CAO Fisheries Agreement process to "third parties" without waiting for sufficient scientific data.

Fifth and finally, the Arctic Council seems to provide an appropriate platform for reconciling Arctic exceptionalism and the need to engage non-Arctic states in common decision making on regional issues. However, in order to make this platform more acceptable to non-Arctic states, the latter should be more actively engaged within the Council's framework.

Notes

1. Subsidiarity is usually defined in politics as "the principle that a central authority should have a subsidiary function, performing only those tasks, which cannot be performed at a more local level." See: 'Oxford Dictionaries' <http://www.oxforddictionaries.com/definition/english/subsidiarity?q=subsidiarity>.
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3. Juha Käpylä, Harri Mikkola, On Arctic Exceptionalism. Critical reflections in the light of the Arctic Sunrise case and the crisis in Ukraine: FIIA Working Paper 85, April 2015, p. 6.
4. Mikhail Glubokovsky, Alexander Glubokov, Sergey Melnikov, 'Prospects of Developing Aquatic Biological Resources of the Arctic,' *The Arctic Herald*, 2015, No 1, p. 67.
5. A. Glubokov, M. Glubokovsky, 'International Fisheries Governance', A.A. Dynkin and N.I. Ivanova (eds), *Russia in a Polycentric World*, Moscow: Ves Mir Publishers, 2012, p. 496.
6. See: A. Glubokov, M. Glubokovsky, 'International Fisheries Governance', p. 496; Vylegzhanin A.N. et al., Международное сотрудничество в област и охраны окружающей среды, сохранения и рационального управлен

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8. Mikhail Glubokovsky, Alexander Glubokov, Sergey Melnikov, Op. cit., p. 68.
9. Njord Wegge, 'The Emerging Politics of the Arctic Ocean: Future Management of the Living Marine Resources,' *Marine Policy*, Vol 51, 2015. The post print version, pp. 9-10. (https://www.fni.no/getfile.php/131445-1467365777/Filer/Publikasjoner/NW-MARPOL-2015.pdf)
10. A. Glubokov, M. Glubokovsky, 'International Fisheries Governance,' p. 497; Mikhail Glubokovsky, Alexander Glubokov, Sergey Melnikov, Op. cit., pp. 66, 68-69; Njord Wegge, Op. cit., p. 9.
11. A. Glubokov, M. Glubokovsky, 'International Fisheries Governance', p. 497; A.I. Glubokov, M.K. Glubokobsliy, 'Международно-правовое регулирование рыболовства в Арктических морях' [International Legal Regulation of Arctic Seas' Fisheries], A.V. Zagorski (ed.), Арктика: зона мира и сотрудничества [*The Arctic – A Zone of Peace and Cooperation*], Moscow: IMEMO RAS, 2011, p. 110, 119.
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14. See for instance: Bekyashev K.A., 'Международно-правовое управление ры боловством в Арктике' [International Regulation of Fisheries in the Arctic], Морские пространства Арктики: современный правовой аспект. Сборн ик научных статей [Arctic Marine Territories – Contemporary Legal Aspect. Collection of Academic Papers], Moscow: Magistral Publishers, 2013, pp.142-143.

15. A.I. Glubokov, M.K. Glubokobsliy, 'International Legal Regulation of Arctic Seas' Fisheries', p. 118; Alf Hakon Hoel, 'Potential Central Arctic Ocean Fisheries', *The Arctic Herald*, 2015, No 1, p. 72.

16. Anna Gorokhova, 'Рыбный промысел в Арктике: ловить нечего, но на вся кий случай запретят?' [Commercial Fisheries in the Arctic: Nothing to Catch but Prohibited, Just in Case?], REGNUM, December 2, 2017 (https://regnum.ru/news/2352623.html); 'Выступление координатора проекта ≪Морская пол итика≫ Центра стратегических оценок и прогнозов Анны Горновой на ≪круглом столе≫ ≪Современная Арктика: вопросы международного сот рудничества, политики, экономики и безопасности≫ 22 ноября 2017 г. в И нституте Европы РАН' [Statement by the Coordinator of the 'Maritime policy' Project of the Center for Strategic Assessments and Prognoses Anna Gornova at the 'Round Table' 'Contemporary Arctic: Issues of International Cooperation, Politics, Economy and Security', 22 November 2017, Institute of Europe of the Russian Academy of Sciences], Center for Strategic Assessments and Prognoses, November 22, 2017 (http://csef.ru/ru/articles/print/8140).

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56. The borders of the Russian Arctic defined in natural (physical-geographic, landscape, geo-botanical, etc.) terms don't coincide with either the administrative delineation of the Arctic Zone of the Russian Federation or other definitions, such as areas north of the Polar Circle. Based on the dominant characteristic of the absence of forest vegetation, relevant studies encompass a much larger area, although, at the same time, they differentiate various zones within it and, in particular, treat polar desert and tundra as separate natural sub-zones. This definition is closer to the conventional understanding of the extent of the Arctic (maps 3 and 4).

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Perspective from a Non-Arctic State

Sung-Jin Kim

Introduction

The melting of Arctic sea ice due to global warming is rapidly causing changes in the Arctic environment, affecting the global climate system, and consequently increasing the number and complexity of challenges facing humanity, akin to that of the Gordian Knot. A growing number of threats—and opportunities—brought on by climate change are present in the Arctic. Therefore, approaches being adopted to address the complex challenges emerging in this region must be pursued with dynamism and creativity.

First of all, in addressing Arctic issues there is an increasing effort to ensure legal stability through the use of the rule of law rather than political agreements. In particular, the adoption of legally binding agreements has been on the rise since 2010. Agreements such as the Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic (2011), the Agreement on Cooperation on Marine Oil Pollution Preparedness and Response in the Arctic (2013), the International Code for Ships Operating in Polar Waters (Polar Code; 2015), and the Agreement on Enhancing International Arctic Scientific Cooperation (2017) were adopted and have taken effect. Also, the draft of the Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean (CAO Fisheries Agreement) was agreed upon in November 2017. Agreements are being drawn in diverse areas, including search and rescue, environmental pollution, scientific cooperation, and fisheries management. This year, the IMO Marine Environmental Protection Committee (MEPC) began discussing the ban on the use of heavy fuel oil (HFO) by Arctic-going vessels with the eventual goal of adopting legal measures to prohibit its use.

Second, in light of the adoption of Sustainable Development Goals, the discussion of Arctic issues is moving away from a focus on environmental protection to one that emphasizes a balance between environmental protection and development. The changing agenda being discussed in and out of the Arctic Council is an example. Previously, the six working groups of the Arctic Council developed and implemented policy measures prioritizing the protection of the Arctic marine environment and its ecosystem. But in 2015, the Arctic Economic Council (AEC) was created by the Arctic Council to support responsible economic and infrastructure development, and to explore expanded business activities in the Arctic. The AEC is comprised of four working groups on 1) Maritime Transportation, 2) Telecommunications, 3) Resource Development, and 4) Arctic Stewardship. The creation of a new working group on Investment and Infrastructure was announced in May 2018.

Third, as Arctic problems are increasingly being perceived as global problems, the role of not only the Arctic States but those of non-Arctic States and Arctic Council Observer States is growing. International cooperation is expanding as the line that had once clearly divided Arctic and non-Arctic states is becoming blurred. For example, the CAO Fisheries Agreement was the first Arctic-related multilateral agreement in which states other than the eight Arctic Council member states participated. Non-Arctic States such as China, Japan, Korea, and the European Union actively participated in developing new international regulations on fisheries in the Central Arctic Ocean. This showed that non-Arctic States could also participate in certain areas of Arctic Ocean governance, such as fisheries, and take equal initiatives.

In light of the growing perception that Arctic problems are more than simple Arctic regional matters (due to global concerns that include climate change, environmental degradation, resource development, trade transportation networks, science and technology, and Indigenous Peoples' issues), there is an increasing emphasis on the role of non-Arctic states. This paper aims primarily to predict how current global trends will change society by 2030, and ultimately how they will affect challenges and opportunities in the Arctic. Through this lens, this paper will attempt to address the following three questions with a focus on the theme of the North Pacific Arctic Conference for 2018, which holds important meaning as a pathway to the future beyond 2030. First, what are the approaches and challenges for non-Arctic States in implementing the CAO fisheries agreement? Second, with regard to marine environmental cooperation, how can the role of non-Arctic States be strengthened in the IMO, Arctic Council, and other international forums? Third, what opportunities do non-Arctic states have for strengthening regional marine scientific cooperation?

Global Trends and the Arctic in 2030

Examining current global trends helps us to predict future changes and to foresee future challenges and opportunities that humanity may face, thus enabling common action and setting appropriate policy directions in response. Based on reports that project future socio-economic conditions, the Korean government has suggested four major global trends to be: 1) low economic growth and multi-polarization, 2) population growth in developing countries and an aging society, 3) climate changes and increasing energy insecurity, and 4) global standardization and a decreasing gap between economic classes.[1] Among these global trends, technological development and policy responses to ongoing climate changes and increasing energy security would be the most important global theme between now and 2030, and is set to become a central factor in imagining an Arctic future.

Climate change impacts on the Arctic are increasing and are expected to continue to increase as we approach 2030. Global warming in the Arctic is progressing two times faster than the global average, and is causing the extent and thickness of Arctic sea ice to decrease rapidly. Since satellite observations began in 1979, the lowest extent for Arctic sea ice was recorded in the summer of 2012 (3.4 million km^2), and the lowest Arctic sea ice extent for winter (14.28 million km^2) was recorded in 2017. Today, only 25 percent of the Arctic sea ice remains compared to 30 years ago, and many experts predict that the Arctic Ocean will be ice-free by the summer in 2030. As such, the loss of sea ice due to global warming could be a threat or an opportunity to the Arctic in 2030. Or both.

Threat Factors to Climate, Ecosystems, Indigenous Societies Will Grow by 2030

First, melting Arctic sea ice will worsen abnormal climate phenomena. The so-called “dark ice” caused by the acceleration of the melting of Arctic sea ice absorbs 90 percent of light, which in turn causes ice to melt even faster. Also, the diminishing ice cover in the Polar regions weakens the polar vortex, causing the cold air inside the vortex to leak to mid-latitude regions, where cold snaps will then be experienced. As a result of this, heat will be released from the sea, and the water vapor will increase in the Arctic, which could lead to heavy snowstorms in the Eurasian continent. In addition, as a result of global warming, large amounts of methane contained in the permafrost could be released, which could in turn accelerate global warming.

Second, the Arctic marine ecosystem and its food chain will be greatly affected. In the future as the ice melts, 30 percent of the fishery resources is expected to be gone, whereas 21 percent of mammals and 70 percent of flora will face extinction. According to a report by the International Union for Conservation of Nature (IUCN 2015), there is a high probability that the global polar bear population will decline by more than 30 percent over the next 35 to 40 years. In addition, due to an increase in the amount of atmospheric carbon dioxide that the ocean is projected to absorb, ocean acidification will accelerate. This will impair the growth of coral reefs and shellfish. Furthermore, crop yield is expected to decrease by 70 percent as salt water intrudes inland as a result of sea level rise caused by melting sea ice. As a result, it is predicted that international cooperation on monitoring and responding to global environmental change, including in the Arctic, will strengthen. Meanwhile, if the Arctic becomes ice-free during the summer by 2030 as projected, ship traffic and economic activity in the region are expected to rise, as will environmental pollution.

Third, the number of threats will increase that affect Arctic Indigenous Peoples' livelihoods and habitat. In response to climate changes, migration patterns of sea lions, polar bears, and other traditional sources of food hunted by Indigenous People will change, threatening their food security. Nenets people of the Arctic region, for example, are facing threats to their reindeer herds, an important source of their livelihood, as tundra moss disappears and resource development increases due to climate change effects. Furthermore, if the habitat of Indigenous populations alters due to climate change (i.e. reducing food sources or flooding coastal villages), the Arctic could potentially see a number of climate refugees.

Fourth, competition among coastal states for Arctic Ocean resources is expected to become tense. An acceleration of sea ice melting due to global warming will enable greater access to resources in the Arctic Ocean. As ship traffic along Arctic sea routes increases, Arctic coastal states are likely to establish a new framework for securing resources and establishing a security strategy. As a result, competition among coastal states in order to secure resources in the Arctic high seas, seabed and continental shelf will become fierce. Currently, such competition exists among Russia, Denmark, Canada, and the United States, as these countries try to extend their continental shelves beyond 200 nautical miles. Also, as participation in Arctic issues expands to include also non-Arctic states and their companies, the likelihood of Arctic governance evolving into a much more complex system is high. This could either be towards a more open governance system where new cooperation between Arctic and non-Arctic states is easily established, or towards a governance system that solidifies an Arctic state central governance system.

By 2030, Opportunities for Arctic Development Will Grow in Resource Development, Infrastructure, Industry, and Technology

First, new economic opportunities will become available as possibilities for resource development (minerals and hydrocarbons, etc.) expand with increasing accessibility due to melting sea ice. According to a 2008 U.S. Geological Survey report, the Arctic may hold as much as 90 billion barrels of undiscovered oil reserves, 1,669 trillion cubic feet of natural gas, and 44 billion barrels of natural gas liquids, which would amount to 22 percent of the world's undiscovered fossil fuel resources. More large-scale resource development projects such as the Russian Yamal LNG and Arctic LNG-2 projects are expected, as well as other investments in the Arctic. According to Guggenheim Partners, current and future investments for Arctic development by the eight Arctic countries will reach $1 trillion. Production technology research is expected to increase for Arctic oil and gas resources such as methane hydrate and shale oil that require high levels of technology and costs, if oil prices rise to make production economically feasible in the future.

Second, infrastructure development along Arctic sea routes will increase. With advantages in terms of distance and time over the current sea route connecting the Asian and European continents, the Arctic sea route is gaining attention as a new sea route. In the future, with accelerated melting of the Arctic sea ice, various types of sea transportation are expected to occur along the sea route, including an increase in the current, sporadic LNG and resource-centered transportation as well as container shipping and regular liner services. Along with such developments, industrial activities and infrastructure development that connects the Arctic sea route with inland transportation and logistics is expected to grow. In particular, demand for port infrastructure development in the Russian Arctic is expected to be high.

Third, fisheries management in the Central Arctic Ocean will be strengthened and international participation will grow. Global annual fish consumption per capita is expected to rise by 5.8 percent in 20 years from 17.2 kg in 2010 to 18.2 kg in 2030. In 2030, global fish production is expected to reach 186.8 million tons, and about 50 percent of that fish production is expected to come from aquaculture farms. In the case of the Arctic, about 37 percent of world's fish production comes from nearby seas such as the Barents Sea, Bering Sea, and the northern coast of Alaska—and fish species are already migrating north due to climate change. A viable fishing environment in the Central Arctic Ocean is also projected to emerge in the future, and thus the growth of marine bio-industries that use marine living resources is also expected. As such, changes to the location of Arctic fish species and new fishing conditions in the Central Arctic Ocean due to this migration is likely to lead to strengthened international cooperation and management.

Fourth, utilization of the Fourth Industrial Revolution (4IR) technologies will increase. The 4IR technologies are likely to act as a catalyst for lowering future threats to the Arctic, while broadening opportunities. First of all, they are applicable to creating smart cities and providing better access to goods and medical care, which is likely to improve living standards among Arctic Indigenous Peoples. In addition, in order to minimize vulnerability to marine pollution and accidents and to overcome limitations posed by the extreme conditions in the Arctic, there will be a growing demand for convergent technologies such as drone and big data collection for managing Arctic biodiversity, technology for mitigating Arctic marine litter pollution, autonomous underwater drones for marine environment surveys, and data monitoring technology for predicting and effectively responding to climate change. In addition, automation and unmanned technologies are likely to have high use for search and rescue, as well as in the ports and logistics sector in support of Arctic sea routes.

Roles and Responsibilities of Non-Arctic States in Implementing the CAO Agreement

As a result of the Central Arctic Ocean Fisheries Agreement agreed upon in November 2017, the possibility of unregulated fishing in the Central Arctic

Ocean was eliminated in advance, and negotiations laid the groundwork for joint research for fisheries resource management. As the acceleration of melting ice due to global warming raises the risk of overfishing of fishery resources and other living resources in the Arctic Ocean, Arctic states and non-Arctic states agreed to active countermeasures that produced a meaningful outcome. After adopting the "Declaration Concerning the Prevention of Unregulated High Seas Fishing in the Central Arctic Ocean" (Oslo Declaration) in July 2015, various meetings were held to negotiate the binding agreement. The five Arctic coastal states (United States, Russia, Canada, Denmark, and Norway) and the five major fishing powers (Korea, China, Japan, Iceland, and the European Union) participated in these meetings to negotiate on the Agreement text.

This Agreement has been highly praised for having applied the precautionary principle and for having been negotiated before any actual fishing took place. It enables Arctic and non-Arctic States to cooperate in fisheries resource monitoring and surveys through a joint scientific research and monitoring program.

Furthermore, it is noted this CAO Agreement broke from the traditional Arctic Council-centered establishment of Arctic regulations and involved three Arctic Council Observer States (China, Japan and Korea) that actively participated in the development of a new Arctic regulation. Apart from participating in the six inter-governmental meetings for the development of the Agreement, the three non-Arctic States (China, Japan, and Korea) also hosted three roundtable meetings (Shanghai 2015, Incheon 2016, and Hokkaido 2017), which were attended by experts from both Arctic and non-Arctic States, thereby contributing to the development of consensus towards the agreement on the draft text. This was meaningful in that non-Arctic States, including the Arctic Council Observer States, participated in a two-track process for achieving consensus on the Agreement text, at both the expert level and at the inter-government level.

This indicates a possible expanding role for non-Arctic states in the specific implementation stage of the Agreement in the future. In particular, the CAO Fisheries Agreement is provisionary in character, and it is expected that it will be implemented as a comprehensive fisheries agreement in the future. Therefore, discussions are likely to proceed regarding the establishment of a regional fisheries organization for managing the Central Arctic Ocean. In this case, China, Japan, and Korea would be able to contribute their opinions and expertise in subsequent discussions and have the right to join the organization as an initial party to the Agreement.

Also, the role of non-Arctic States in carrying out joint scientific research activities as defined by the Agreement is expected to grow. China, Japan and Korea already have advanced capabilities and infrastructure for Arctic scientific research and a strong mechanism for cooperating with Arctic States. The three nations could lead the scientific survey on fisheries in the Central Arctic Ocean with their research icebreakers. It is increasingly becoming necessary for the initial parties to the Agreement to establish joint scientific activities, which are central to the CAO Agreement, and to prepare and establish cooperation mechanisms for joint international surveys in the future.

Korea is making various preparations to implement the CAO agreement. In anticipation that there could be sustainable commercial fisheries in the Central Arctic Ocean in the future, Korea is taking part in making various efforts to establish a fisheries management organization, conduct scientific research, and increase international cooperation. Korea plans to actively participate in the international discussion regarding the follow-up work of the CAO Agreement, development of joint research programs at the "Meeting of Scientific Experts on Fish Stocks in the Central Arctic Ocean (FisCAO)," as well as the comprehensive evaluation and implementation of joint research programs on the Arctic Central Ocean ecosystem. In addition, Korea is planning to propose a discussion of Arctic-related agendas at regional fisheries management organizations that have relevance to fisheries resource management in the Arctic Ocean, such as the North Pacific Fisheries Commission (NFPC). Furthermore, Korea will focus on creating opportunities to pursue scientific research in order to better facilitate active participation in ecosystem conservation and entry into the fisheries industry in the Arctic. By utilizing its icebreaker *Araon*, Korea plans to strengthen research activities to preserve the marine resources and ecosystems of the Central Arctic Ocean. Particularly, the National Fisheries Research and Development Institute, Korea Polar Research Institute (KOPRI), and the National Oceanic and Atmospheric Administration (NOAA) will jointly participate in developing fisheries resource surveying equipment for icebreakers, and promote joint research on studying the changes in the climate and fisheries resources in the U.S. Arctic.

However, many internal and external challenges remain in order to fully implement the Agreement. Internally, in implementing the CAO Agreement, the interests of Korea's domestic fishing industry need to be taken into account, in particular the ones that conflict with the Agreement. In the short-term, big problems will not occur since commercial fishing in the Central Arctic Ocean is currently impossible, and scientific research to develop a framework for sustainable fisheries in the CAO is lacking. In the long term however, if commercial fishing is deemed possible and the allocation of fishing quotas for fish species of high commercial value is discussed, there would be a need to secure a Korean quota, a key issue for the domestic fishing industry. In this case, the basic principle of maintaining a balance between allowing an adequate level of commercial fishing while preserving the fishery resources and its ecosystem should be followed.

Externally, noting that the CAO Agreement is the first multilateral agreement on the Arctic that includes parties that are not part of the Arctic Council member states, it remains to be seen whether this example will remain an exception or lead to the continuation of a practice of involving non-Arctic States on certain Arctic issues.

For the CAO Agreement to serve its fundamental purpose and be effectively implemented, the following additional points need to be noted:

First, similar fisheries management-related international agreements should be examined. The CAO agreement is significant, in that it contains some important concepts such as the "precautionary principle" and the "harmonious balance between development and conservation," which are also found in the Convention on the Conservation and Management of Pollock Resources in the Central Bering Sea (CBSPC), International Whaling Commission (IWRC), and the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR).

Second, Arctic and non-Arctic stakeholders need to be made aware of the importance of the exchange of scientific materials and information. At the same time, efforts should be made to build a platform for cooperation among governments, research institutions, and NGOs through various channels in the science sector.

Third, cooperative relations need to be fostered among international and regional fisheries organizations, including the FAO, with the Regional Fisheries management Organization (RFMO) that will be established.

Fourth, if commercial fishing in the Central Arctic Ocean becomes possible, its impact on trade in the fisheries sector for non-Arctic states (including Asian states) will be significant. Therefore, a sufficient socioeconomic impact study should be conducted even before the CAO Agreement comes into effect.

Fifth, although the CAO Agreement is limited in geographical range to the Central Arctic Ocean, adjacent and migratory stocks should be taken into account. Nearby waters that affect the CAO should also be considered.

Finally, the voice of Indigenous Peoples should be respected and considered as much as possible. Their rights, traditions, culture and economic activities should be protected, and fishing regulations should be in harmony with Indigenous Peoples' traditional and current practices.

Along with these considerations, in the spirit of the CAO Agreement, high expectations of broad cooperation towards the achievement of sustainable development goals and building trust between Arctic and non-Arctic states is also an aspiration. In this regard, NPAC could possibly contribute in developing measures for creating exemplary international collaboration between Arctic and non-Arctic States, based on its years of accumulated knowledge, trust and international network. In particular, NPAC could examine and discuss the possible need to establish a taskforce for creating the preparatory groundwork for the expected establishment of a regional fisheries management organization and scientific research programs.

Multilateral Governance for Arctic Environmental Cooperation and the Role of Non-Arctic States

The Arctic Council is the central body for discussing issues and policies about the Arctic, including the Arctic environment, climate, biodiversity, and Indigenous Peoples. In particular, among issues currently being discussed about the Arctic, marine environmental issues regarding the Arctic Ocean are considered a top-priority issue. Against the context of Sustainable Development Goals (SDGs), discussions about Arctic development that also consider environmental protection are shaping the Arctic paradigm. Current activities of the Arctic Council working groups also indicate the importance of preserving the marine environment in the Arctic. Strengthening marine environmental protection and international cooperation are common objectives shared among all six working groups: ACAP, AMAP, CAFF, EPPR, PAME, and SDWG. While the issue of the Arctic marine environment is discussed within broad global frameworks and regimes such as the Agreement on Cooperation on Marine Oil Pollution Preparedness and Response in the Arctic, United Nations Environmental Programme (UNEP), International Maritime Organization

(IMO), etc., the unique situation of the Arctic becomes an important factor when deciding the rights and duties of any agreements. Also, the establishment of Marine Protection Area (MPAs) in the Artic can be one of effective instruments to protect marine environment.

The latest topic regarding the Arctic Ocean environment is a discussion within IMO on the ban of the use of heavy fuel oil (HFO) in the Arctic Ocean. The discussion for the restriction on the use and transportation of HFO first began at the IMO's 72^{nd} Marine Environmental Protection Committee (MEPC) held in April 2018. In addition, since the resolution to address marine waste and fine plastic issues was adopted at the 3rd United National Environment Assembly held in December 2017, the Protection of the Arctic Marine Environment (PAME) working group of the Arctic Council began to actively discuss the issue of Arctic marine waste. The Arctic Marine Waste Workshop was hosted in Iceland in June 2018 for 5-6 days, reports from which will be submitted to the Artic Council's biannual Ministerial Meeting in May 2019.

While multinational governance activities are being strengthened to address Arctic marine environmental problems, it's important to highlight three aspects regarding approaches for enhancing the role of non-Arctic States. First, there needs to be a growing perception of the view that Arctic marine environment problems are also global marine environmental problems. This would help eliminate the Arctic/non-Arctic state dichotomy and widen the scope for participation in addressing Arctic environmental problems by non-Arctic states. A prime example is the issue of Arctic marine waste. Marine waste accumulated in the Arctic mostly originates from the non-Arctic region, but the problem ends up staying in the Arctic Ocean. Thus, the Arctic marine waste problem cannot be resolved without active participation by non-Arctic States.

Also, non-Arctic states should move away from the "agenda-taking" role and find ways to take on a more active "agenda-setting" role in addressing Arctic issues. Environmental issues are generally categorized as belonging to the area of "low politics" rather than to the politically sensitive "high politics." Thus, non-Arctic states may also play a more active role in the matter of the Arctic marine environment, with a perspective of the common interest of humanity. For this, it is necessary to actively participate in the setting of marine environmental regimes within international organizations such as the IMO, the UN, and UNEP, and to increase participation in the expert groups within the Arctic Council working groups by expanding the role of Observer States. Although some non-Arctic states are limited in their role as Observer States to the Arctic Council, they are at the same time a party to some global marine environmental agreements, where they are not limited from active participation.

Perhaps the most important thing to consider is to find ways to expand practical contributions to the implementation process. There is a need to actively participate in the implementation process of Arctic Ocean marine environment-related regulations or policies promoted by the IMO, the UNEP, the Arctic Council, etc., by providing financial or technical support, sharing knowledge and experiences (best practices), jointly preparing pre- or post- prevention and response methods, etc. Using the role of Korea in the implementation process of the Polar Code as an example, Korea can do the following: first, transfer eco-friendly ship construction technology; second, share experiences of operating advanced ship operation systems as a preliminary prevention method, study various scenarios for Arctic navigation, and estimate the appropriate operational fleet size to maintain sustainable routes; and third, establish national cooperation manuals and joint response systems for expediting responses to oil spill accidents and marine rescues.

Currently, Korea is actively participating in the effort to protect the Arctic environment. For example, Korea is establishing and operating an integrated observation network on Arctic environmental change and is working on securing basic data through observations of atmosphere, ocean dynamics, melting sea ice, and the ecosystem to predict a three-dimensional picture of how climate change will affect melting of the Arctic sea ice and other, related impacts. In addition, Korea participated in the Pacific Arctic Climate Ecosystem Observatory (PACEO), an international joint project investigating Arctic sea ice melting, and is conducting field observations using the icebreaker *Araon*. Korea is also establishing a collaboration mechanism for international research on Arctic climate change. It is actively participating in the research on Arctic climate change and the exchange of knowledge and information based on the Dasan Research Station, and is developing projects to predict abnormal climate events and potential disasters by quantifying the characteristics of abnormal climate events in mid-latitude Arctic regions.

By establishing KPOPS-Climate and KPOPS-Weather, Korea is contributing towards improving predictions of the rate of melting of polar sea ice and weather trends.

Opportunities and Tasks to Enhance Arctic Regional Marine Scientific Cooperation

In recent years, dramatic changes in the Arctic natural environment due to global warming and climate changes have made accurate weather and climate predictions more difficult. On the other hand, as the potential for the use of the Arctic increases, the demand for information about melting Arctic sea ice is increasing rapidly. So is the need for predictable information gathering and the exchange of information for various scientific, economic, and social endeavors. Thus, countries advanced in Arctic research are establishing long-term, large-scale projects and investment plans to respond to the effects that climate change has on the natural environment, the status of human activities, and opportunities in this dynamic region. Centered in Svalbard, Norway, where many Arctic research stations are located, international Arctic environmental information exchange systems such as the Svalbard Integrated Observation System (SIOS) and the Ny-Alesund Science Managers Committee (NySMAC) have been established, and information is actively being exchanged.

As of May 23, 2018, the Agreement on Enhancing International Arctic Scientific Cooperation took effect. The Agreement, which is legally binding on eight Arctic Council member states, was signed at the Arctic Council Ministerial Meeting in Fairbanks, Alaska in May 2017. With the adoption of the Agreement, concrete measures are expected to be implemented for scientific activities in the Arctic, such as improved accessibility for data collection in the Arctic, sharing of scientific data, and support for scientific education.

The most notable part of the Agreement is Article 17. This provision stipulates that parties to the agreement should strengthen cooperation with non-party states, i.e., non-Arctic states. Also, it provides that the Agreement does not affect the rights and obligations under the Agreement that Arctic states have signed with non-Arctic states and does not exclude ongoing cooperation. It shows that the solution to the environmental issues surrounding the Arctic Ocean must be based on accurate and objective scientific research and that working with non-Arctic states is a prerequisite. In fact, Korea Polar Research Institute (KOPRI) has signed 37 MOUs with various research institutes related to Arctic science to conduct various studies.

Due to the complicated environmental characteristics of the Arctic, the challenges to conduct scientific research are extensive, even though it is the region with the highest demand for research related to climate change —and poses a global challenge. Accordingly, the need for cooperation in conducting scientific research by the international community is expected to increase. Particular research infrastructure is needed for the Arctic environment, which cannot be built with the capacity of a single country. The key infrastructure for Arctic scientific cooperation could be said to be icebreakers. Seventeen countries worldwide possess a total of 92 icebreakers, but there are far too few research icebreakers dedicated to scientific research. For example, Russia has a total of 46 icebreakers as of 2017, but only 10 are research icebreakers and only two are routinely used. As a result, the demand for joint scientific research using icebreakers owned by non-Arctic states such as China, Japan, and Korea is increasing. At the moment, China is building a second icebreaker, and Japan is also building a second one exclusively for Arctic science. Korea is also looking to build a 10,000-ton research icebreaker. If additional icebreakers are built and operated by China, Japan, and Korea, the momentum for scientific cooperation in the Arctic would be greater, and the call for Arctic policies that seek stronger scientific cooperation with non-Arctic states would be louder. Furthermore, if Korea, China, and Japan strengthen their cooperation in the Arctic science sector and this leads to increased cooperation with Arctic states, the role of East Asian Observer States in the Arctic could further increase.

Against this backdrop, the Trilateral High Level Dialogue on the Arctic held among China, Japan and Korea every year since 2016 holds great promise. Trilateral High Level Dialogue on the Arctic was proposed by Korea during the Sixth Trilateral Summit Meeting of the Korea, Japan, and the People's Republic of China in November 2015. At the Trilateral Dialogue on the Arctic every year, the three nations inform each other of the progress and achievements made in Arctic scientific cooperation, as well as their future plans. At the 2018 Dialogue held in Shanghai, China, the three countries agreed to strengthen Arctic scientific cooperation in light of the recent entry into force of the Arctic Council Agreement on Enhancing International Arctic Scientific Cooperation. In particular, Korea proposed sharing satellite data related to the Arctic among China, Japan and Korea in the future as a project for strengthening the potential for Arctic scientific cooperation among the three nations. With China and Japan showing positive response to the proposal, the chances that the project will be realized as a major cooperation project for the three nations have increased.

Separate from the abovementioned cooperation at the government level, the North Pacific Arctic Research Community (NPARC) was initiated by the KMI to enhance trilateral cooperation at the expert level. About 20 research institutes and universities from the three countries are voluntarily participating in NPARC to discuss research and areas of common interest. In particular, it is worth noting that the host for NPARC meetings rotates every year among the three countries and is becoming a new exemplar of cooperation within the region.

In addition, there are currently many international joint research programs, conferences, and intergovernmental organizations related to Arctic science. However, in order for these bodies to operate more efficiently and a more advanced international cooperation to take form, new momentum is needed. Furthermore, international cooperation programs should include capacity-building programs for young scientists.

In conclusion, from a mid- to long-term perspective and from the perspective I have presented on these three issues, I believe NPAC can and should take more initiative to promote cooperation in the Arctic. Building on its many years of progress and experience, NPAC could make a more proactive contribution towards building consensus and motivation for a new kind of international cooperation in this important region that affects the entire planet.

Notes

1. Ministry of Strategy and Finance: Medium and Long term Policy Agenda of the Republic of Korea , 2013

Indigenous and NGO Perspectives

Jim Gamble

The recent past has been a time of profound change in the Arctic. Rising temperatures, rapid decline in the thickness, duration, and extent of sea ice, increases in unusual and extreme weather, shifting species habitats, accelerating coastal erosion, permafrost melt and the deterioration of infrastructure built on permafrost are just some examples of observed meteorological and ecological processes that are in rapid flux. The Arctic is also home to nearly four million people, a great many of whom live on the littoral zone bordering the Arctic Ocean and its marginal seas. Many of the people of the Arctic are indigenous to the region and have thrived in a very challenging environment for millennia, developing complex social systems, a rich cultural heritage, and a profound knowledge about their environment, which is tightly woven into their languages and cultures.

The decline in sea ice in the Arctic, coupled with development pressures and a rise in other human uses, has facilitated an increase in vessel traffic in the region. Despite the challenges presented by Arctic conditions, this trend is expected to continue.[1] Such traffic in remote Arctic waters, can pose substantial safety and environmental risks, including possible impacts on cultural practices and food security of the Indigenous Peoples of the Arctic. Key threats include oil spills (in an area with few or no resources to respond), introduction of invasive species, air emissions, the adverse impacts of underwater noise, ship strikes on marine mammals, and interference with fishing and marine mammal hunting. With the implementation of the International Maritime Organization's (IMO) Polar Code, key steps have been taken to protect ecological integrity and promote safety in the region while also ensuring that essential goods and economic opportunities reach the people of the north. However, substantial regulatory and governance gaps still remain that could be closed with additional consideration and consultation. In addition to the Polar Code, another mechanism through which Arctic people and the environment might be protected is the establishment of Marine Protected Areas (MPAs). There are a variety of potential types of MPAs that may be instituted within the territorial seas of the Arctic coastal states through national programs. Through the IMO, protected areas could also be established in international waters, including in Exclusive Economic Zones (EEZs) and in territorial waters, for international vessel traffic in innocent passage.

In this paper I will examine the mechanisms through which Indigenous Peoples (IPs) and environmental nongovernmental organizations (eNGOs) participate in Arctic Ocean cooperation. I will discuss how this participation is likely to increase in the future, particularly with regard to the preeminent Arctic forum, the Arctic Council (AC), and the specialized United Nations agency responsible for regulating shipping, the IMO. In addition, I will discuss how the Traditional Knowledge of Indigenous Peoples will increasingly contribute to research, assessment, and policy making. Finally, I will look at the establishment of MPAs in the U.S. maritime Arctic through the lens of Indigenous Peoples and NGOs involvement, including current challenges and future opportunities.

Representation and Participation in Arctic Maritime Cooperation

The Arctic Council

The Arctic Council is an intergovernmental forum founded in 1996 to address protection of the Arctic environment and promote sustainable development of the region. It is often cited as an example of robust inclusion and participation of Indigenous Peoples.[2] Supported by a secretariat located in Tromsø, Norway, the AC is comprised of representatives of the eight Arctic countries. The work of the AC is conducted through six working groups: the Arctic Contaminants Action Program (ACAP); the Arctic Monitoring and Assessment Program (AMAP); the Conservation of Arctic Flora and Fauna working group (CAFF); the Emergency Prevention Preparedness and Response working group (EPPR); the Protection of the Arctic Marine Environment working group (PAME); and the Sustainable Development Working Group (SDWG), all of whose mandates are roughly divided along thematic lines. The Arctic Council is responsible for numerous important and influential reports and assessments, three legally binding instruments, and, at least indirectly, the development of international agreements such as the Stockholm Convention on Persistent Organic Pollutants and the Polar Code dealing with safety and environmental protection issues arising from shipping practices in the circumpolar regions.

The foundational history of the AC included participation from three organizations representing the Indigenous Peoples of the Arctic. Since that time, additional Indigenous organizations have joined the Arctic Council as Permanent Participants (PPs). Today the six PPs are: the Aleut International Association; the Arctic Athabaskan Council; the Gwich'in Council International; the Inuit Circumpolar Council; the Russian Association of the Indigenous Peoples of the North; and the Saami Council. The Terms of Reference of the Arctic Council endowed the PPs with full consultive powers and a seat at the table in all AC matters. Because the AC makes decisions based on the principle of consensus, there is no voting. However, unless consensus is achieved an initiative cannot move forward. Herein lies a difference between the Arctic states and PPs. The PPs cannot block consensus, which is sometimes described as "having a seat at the table, but not a vote." However, in my eight years working at every level of the Arctic Council, I found that if a PP organization had serious issues with an initiative under discussion, there was almost always a good faith effort by the Arctic states to understand and address that issue. Because of this high level of participation, the PPs have made major contributions to many of the AC's most important projects, including the Arctic Climate Impact Assessment (ACIA 2004), the Arctic Marine Shipping Assessment (AMSA 2009), and the Arctic Biodiversity Assessment (ABA 2013). In addition, the PPs have had at least some involvement in the development of the three legally binding agreements negotiated under the auspices of the Arctic Council. For example, the Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic (2011) and the Agreement on Cooperation on Marine Oil Pollution Preparedness and Response (2013) were both recommendations contained in the AMSA report. In the Agreement on Enhancing International Arctic Scientific Cooperation (2017) there is a section on the inclusion of Traditional Knowledge in scientific cooperation that undoubtedly would not have been included without the active participation of the PPs.[3]

Like the Permanent Participants, observers were also involved with the AC from its inception and are divided into three categories: non-Arctic states, intergovernmental organizations (IGOs), and non-governmental organizations (NGOs), all of whom enjoy more or less equal footing within the council. Observers have an extensive set of criteria against which their applications are examined. There is a requirement that observers report on their activities within the Council every two years and that their observer status be reviewed by the Senior Arctic Officials every four years. The Arctic Council Rules of Procedure state the role of Observers in the Council as follows:[4]

> *The primary role of Observers is to observe the work of the Arctic Council. Observers contribute through their engagement in the Arctic Council primarily at the level of working groups. In meetings of the Arctic Council's subsidiary bodies to which Observers have been invited to participate, Observers may, at the discretion of the Chair, make statements after Arctic States and Permanent Participants, present written statements, submit relevant documents and provide views on the issues under discussion. Observers may also submit written statements at Ministerial meetings. Observers may propose projects through an Arctic State or a Permanent Participant but the total financial contributions from all Observers to any given project may not exceed the financing from Arctic States, unless otherwise decided by the SAOs.*

This passage also points out that unlike the PPs, observers are primarily expected to engage with the AC at the working group level. The PAME group is the primary venue where activities on ocean issues take place. The work of PAME is divided among expert groups whose topics include shipping, the ecosystem approach to marine management, marine protected areas, marine litter, and resource exploration and development in the Arctic marine environment. Projects are developed in the working groups in a number of ways and many PAME projects and activities have originated with the AMSA recommendations. Who brings a particular project idea to the working groups can vary. A majority of the projects are brought forward by the Arctic states, but some come from the PPs. Projects also originate from Observers in collaboration with an Arctic State or PP. In many cases, projects are not fully formed when they are initially introduced to the Working Group, and they may need additional input to determine scope or deliverables. Also, they often need resources in the form of funding or expertise, and all of these areas are opportunities for substantive Observer and/or PP involvement. As the work of the AC increases and more demands are placed on it, the active involvement of the PPs and Observers will likely increase in importance and scope.

Currently in the AC there is a subsidiary group that focuses directly on how the Council can improve cooperation on marine issues. The Task

Force on Arctic Marine Cooperation (TFAMC) began during the U.S. Chairmanship of the AC (2015-2017) and has been continued into the current Chairmanship (Finland 2017-2019). The TFAMC's mandate is to consider future needs for strengthened cooperation on Arctic marine areas, as well as to consider mechanisms to meet these needs and to make recommendations on the nature and scope of any such mechanisms.[5] There has been keen PP and observer interest (primarily among non-Arctic States and NGOs) in the TFAMC, as it provides a chance to observe discussions among the Arctic States not only on how they will cooperate in the management of their own territorial waters, but also in their approach to the high seas areas of the Arctic Ocean. The focus of discussions in the task force has evolved from thinking about a legally binding instrument on Arctic marine cooperation among the Arctic states (probably in the form of a regional seas agreement) to more of a discussion about the structure of the Arctic Council itself, and how the current arrangement of SAOs and subsidiary bodies might be altered or augmented to improve cooperation on marine issues.[6]

The International Maritime Organization (IMO)

The IMO is a specialized agency of the United Nations whose mandate comprises the development and maintenance of a regulatory framework for shipping, including issues such as safety, environmental protection, and technical cooperation. Headquartered in London, the IMO met for the first time in 1959 and now includes 174 member states, 81 international NGOs with consultive status, and 64 intergovernmental organizations who have signed agreements of cooperation with the IMO.[7] Similar to the Arctic Council, the IMO works through five committees, which are divided along thematic lines and supported by technical subcommittees. The IMO has been responsible for numerous agreements, such as the current version of the International Convention for the Safety of Life at Sea (SOLAS), the International Convention for the Prevention of Pollution from Ships (MARPOL), (which includes annexes on oil, sewage, garbage, air emissions, and noxious/harmful substances carried as cargo), and recently, the International Code for Ships Operating or Polar Waters (Polar Code). The Polar Code's safety provisions were adopted in 2014, its environmental provisions were added in 2015, and it entered into force on January 1, 2017.

Unlike on the Arctic Council, Indigenous Peoples have not played an active role in IMO activities and the organization currently does not include any Indigenous organizations with consultive status. Indigenous representatives do sometimes attend as part of either State or NGO delegations. Canada in particular has supported Indigenous attendees, but shifting political priorities among different governments has resulted in inconsistent Indigenous representation in this forum. Recently there has been an effort among environmental NGOs to bring Indigenous representatives from the Arctic to attend meetings of the Marine Environmental Protection Committee (MEPC). These representatives have been included in order to be provided the opportunity to say for themselves how shipping issues affect their communities. They have spoken out on a number of subjects, including the use of heavy fuel oil in the Arctic, greenhouse gas emissions from shipping, and issues effecting marine mammals including avoidance and underwater noise from shipping. At the MEPC meeting in April of 2018, Shelia Watt-Cloutier, a noted Inuit leader, activist, and Nobel Peace Prize nominee, addressed a well-attended side event in the IMO plenary hall and said, "In the Arctic, the constant state of emergency has become the norm, leaving a huge psychological impact on our communities."[8]

Of the 81 NGOs with consultive status at the IMO, seven are environmental/conservation organizations, and most of the rest are industry, trade, or special interest entities. Against the backdrop of more than 170 flag states seated at the IMO table, one might think that stakeholders have little sway in such a large organization with so many political complexities. However, Indigenous representatives and NGOs have had good success organizing and working together with like-minded governments. At the MEPC meeting in April of 2018, the IMO made its first effort to set timelines and targets for the reduction of greenhouse gas emissions from shipping. It should be noted that shipping currently represents around 2.6 percent of total global GHG emissions, but this share could more than triple by 2050.[9] The agreement reached at the IMO would reduce GHG emissions from shipping by at least 50 percent compared to 2008 levels by 2050. These reductions are probably inadequate to meet the Paris Climate Agreement goals of no more than a 2°C rise in global average temperature, and certainly will not achieve a 1.5°C rise scenario.[10] However, the language provides a means to work on shorter timelines and more aggressive reduction targets and certainly represents a victory for the Indigenous organizations, NGOs, and governments (including a majority of the Arctic states) who worked together to achieve it. At the same meeting, a decision was made to move forward with a ban on the use and carriage as fuel of heavy fuel oil (HFO) in the Arctic.[11] Though HFO is banned in Antarctica, the Polar Code only discourages the use of HFO in the Arctic. The move toward an Arctic ban was the result of good cooperation among most Arctic flags states, NGOs and Indigenous Peoples. Another good example of collaboration at the IMO came at the Marine Safety Committee (MSC) meeting in May of 2018 when the IMO established routing measures and areas to be avoided (ATBAs) for the Bering Strait region between the Russian Federation and the United States.[12] This initially represented a collaborative effort between the two countries in order to establish safety measures for a choke point in the route between the North Pacific and the Arctic Ocean through the Bering Sea. While the amount of shipping that travels this route currently is small, as sea ice recedes it is expected that this route between Asia and Europe will become more economically attractive and traffic will increase.[13] In addition, the process of developing the recommendations for the IMO proposal was the result of an extensive stakeholder consultation process by the U.S. Coast Guard that involved numerous groups including Indigenous organizations and NGOs. Finally, the review and discussion of the proposal at IMO was greatly facilitated by the presence of Indigenous and NGO representatives who could speak firsthand about how the consultation process worked.[14]

The above are merely a few examples of how collaboration with Indigenous Peoples and NGOs has benefited the work of the Arctic Council and IMO, and I feel that these benefits are being recognized to a greater and greater extent by both organizations. It should be noted that to a great extent the AC and IMO interact closely on Arctic issues, with the work of the AC informing IMO decision making. This collaboration has become important enough that in July 2018, the IMO Council decided to move forward with an IMO application for Observer status at the AC.

It is likely that similar collaboration will continue on the Polar Code to enhance implementation (by employing PAME's Arctic Shipping Best Practices Information Forum), provide further guidance (for example on marine mammal avoidance), and extend the Polar Code protections to non-SOLAS vessels (such as fishing boats, large yachts, and smaller cargo vessels). So work on Arctic issues by each organization, and enhanced collaboration between the two organizations, is likely to increase moving towards 2030.

Indigenous Knowledge in Arctic Maritime Cooperation

During the second Canadian Chairmanship of the Arctic Council (2013 to 2015), the six PPs came together in two meetings to discuss Indigenous Knowledge (IK), and how it should best be included in the work of the AC. At the second meeting in Ottawa, Canada they finalized a working definition of IK that reads as follows (please note that for the purposes of the Arctic Council the term "Traditional Knowledge" is used for consistency with previous documents):

> *Traditional Knowledge is a systematic way of thinking and knowing that is elaborated and applied to phenomena across biological, physical, cultural and linguistic systems. Traditional Knowledge is owned by the holders of that knowledge, often collectively, and is uniquely expressed and transmitted through Indigenous languages. It is a body of knowledge generated through cultural practices, lived experiences including extensive and multi-generational observations, lessons and skills. It has been developed and verified over millennia and is still developing in a living process, including knowledge acquired today and in the future, and it is passed on from generation to generation.*

The PPs also adopted 13 fundamental principles for the use of Indigenous Knowledge in strengthening the work of the AC.[15] The Arctic Council member states would not consider endorsing the 13 principles without extensive edits, but the PPs felt that the principles were their own and they should not have to be negotiated and edited to satisfy the AC Member States. However, from those principles (to some extent), as well as and from discussions that followed in the Sustainable Development Working Group, the AC approved and adopted seven recommendations for the integration of Traditional and Local Knowledge into the work of the AC.[16]

What is implied but not explicitly stated in the definition is that IK is person- and place-based. It requires talking to people, spending time with them, earning their trust, and including them as full partners. This requires resources of both time and funding, which means that the inclusion of IK must be planned for at the very beginning of the project and Indigenous partners should be included when a project is first conceptualized. This concept of early inclusion is one that is reflected in the AC recommendations described above, and also in a report that I have had the honor of working on which will be released by the PAME working group in the spring of 2019 on the Meaningful Engagement of Indigenous Peoples and Local Communities in Marine Activities (MEMA). This report accumulates guidance on meaningful engagement from a large number of sources among the Arctic states, including governments, academic institutions, business and industry, as well as Indigenous organizations themselves. A common thread that runs through a vast majority of the guidance that has been documented is early and consistent inclusion through all phases of a project, and recognition that what is really being sought through collaboration and cooperation is a co-production of knowledge.

Finally, it is not just time, funding, and early inclusion that are needed to strengthen the inclusion of IK in Arctic marine cooperation. Other elements that are more complex must also be taken into consideration. These include the use of Indigenous languages whenever possible, as IK is fundamentally linked to language. It also includes the use and support of existing Indigenous knowledge institutions and networks and the development of new Indigenous educational institutions where the melding of science and IK can be taken forward from an Indigenous perspective. The support and development of these institutions will be important factors in enhancing Arctic maritime cooperation in the future.

Marine Protected Areas in the U.S. Maritime Arctic

Alaska is by far the largest state in the United States, with land area equal to about a third of the lower 48 states. Alaska also has more coastline than the rest of the U.S. combined, and Alaska's offshore area represents more than a third of the U.S. Exclusive Economic Zone. Alaska is also home to diverse and sensitive ecosystems, multiple levels of government, and an economy based primarily on the oil and gas industry. It is also reliant on fishing and tourism, and many Indigenous groups have depended on Alaska's natural resources for millennia. All of these factors make maritime cooperation complex, and the establishment and management of MPAs particularly so. Recognizing that there are many types of MPAs with a variety of goals and management structures, Alaska currently has nearly 70 state and/or federal MPAs, the majority of which are related to sustainable production of key marine species and have the authority to restrict commercial and/or recreational fishing in order to allow species to recover. Most of the existing MPAs are located in southern Alaska where the bulk of commercial fishing takes place. MPAs that are located in Arctic Alaska, such as those offshore from the Arctic Natural Wildlife Refuge, have a primary conservation focus on natural heritage protection as they exist in areas where there are no current commercial fisheries.

Establishing new MPAs in Alaska is challenging for a variety of reasons, not the least of which is that protected areas are often viewed as potentially jeopardizing economic activities within their boundaries. Even when this is not the case, it is hard to overcome the stigma associated with words such as "sanctuary" and "protected area." Any process that draws lines on a map and delineates "acceptable" activity inside those boundaries may be perceived as suspect by various stakeholders, since they are often perceived as being arbitrary or insufficiently flexible and developed without sufficient stakeholder consultation. However, these issues can be addressed through the processes discussed previously in this paper, including early consultation and collaboration on design, implementation, and management of protected areas. A good example of this can be seen in two recent applications to the National Oceanic and Atmospheric Administration (NOAA) to establish National Marine Sanctuaries, a type of MPA that does not as yet exist in Alaska. The first, brought forward by a Washington, D.C.-based conservation group, Public Employees for Environmental Responsibility (PEER), sought to establish an Aleutian Island National Marine Sanctuary. Community members in the Aleutian Islands received this nomination poorly, because it was perceived to have potential negative impacts on the commercial fishing industry—even though the sanctuary was designed to protect key habitats for commercial species. Because of expected opposition from communities, there was no public consultation process and the application was not supported by regional organizations or Alaska's congressional delegation. NOAA rejected the application in early 2015.[17] By contrast, a second application was made to NOAA in 2016 to establish a NMS around St. George, one of the Pribilof Islands in the Bering Sea. This application originated from a resolution passed by the St. George Community Council in an effort to provide additional protections for fur seal and sea bird populations, and the proposal received a mixture of support and opposition from regional entities. Lisa Murkowski, Alaska's senior senator, made a statement saying that she supported St. George undertaking a process that it believes is in its best interest. The mayor of

St. George, Pat Pletnikoff, stated that he appreciated that the creation of a sanctuary is an inclusive public process, and that the establishment of a sanctuary would not necessarily curtail any type of commercial activity.[18] The St. George application was entered into the inventory of successful nominations in January of 2017,[19] where it will wait for NOAA to move it forward for congressional approval, a process that will include a period of public comment and is likely to take years.

Another avenue for the establishment of MPAs in Arctic waters is through the IMO, typically through actions such as routing measures, areas to be avoided (ATBAs), or speed or seasonal restrictions. In certain cases a suite of such measures can be established through a Particularly Sensitive Sea Area (PSSA) designation. The impetus for instituting such measures can come from a variety of sources. For example, in 2004 the cargo vessel *Selendang Ayu* lost engine power in heavy weather and, despite the best efforts of the U.S. Coast Guard, broke up on the rocks of Unalaska Island and resulted in the deaths of six crewman and the second-largest oil spill in Alaska history, after the *Exxon Valdez* accident in 1989.[20] From the monetary settlement after the *Selendang Ayu* spill, a commission was established to conduct an Aleutian Islands Risk Assessment[21] whose recommendations included the establishment of five ATBAs in the Aleutians. It should be noted that these islands lie on the North Pacific Great Circle Route and experience a large amount of ship traffic in innocent passage between North America and Asia. The Coast Guard took the proposal forward to the IMO, and the five Aleutian Island ATBAs came into effect on January 1, 2016.[22] This process used the impetus from a disaster to develop a very inclusive, stakeholder-driven process that resulted in tangible protections for the region. By contrast, the establishment of routing measures in the Bering Strait between Alaska and the Russian Federation that was outlined previously in this paper is an example of cooperation that seeks to prevent future mishaps in an area with increasing traffic. These measures were brought about by consultation between Russia and the United States, a good stakeholder input process, and a proposal from the two countries was submitted jointly to the IMO. It resulted in steps to improve safety (routing measures) and environmental protection (ATBAs around three islands along the route in the Bering Sea).[23] This process will likely be repeated for the area around the Big and Little Diomede Islands, and also with the inclusion of Canada for routing measures for vessel traffic in the Beaufort and Chukchi Seas.

Establishment of MPAs in the U.S. Maritime Arctic is a process complicated by politics, economics, and misperception. So it is important that the best possible information, good outreach, and an inclusive process that involves all possible stakeholders accompany these initiatives.

Conclusion

As sea ice continues to recede in the Arctic, increased activity from a number of sources is all but inevitable. In order to prevent negative outcomes and manage for sustainability, it is imperative that good cooperation takes place among all stakeholders. It is particularly important that the Indigenous Peoples of the Arctic are well represented and are able to speak with their own voice. This has the further benefit of including Indigenous Knowledge in research, assessment, and policy making. There are good examples of fruitful international collaboration to be drawn on from the Arctic Council and International Maritime Organization, and opportunities to further enhance these mechanisms should be sought and supported. If this happens, the importance of robust involvement of Indigenous Peoples and NGOs in Arctic maritime cooperation will increase through 2030 and beyond.

Notes

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Perspectives from an Early Career Scientist

Yekaterina Y. Kontar

Introduction

Due to rapid biophysical changes and rising levels of human activities in the Arctic, Russia and the United States face rapid increases in the frequency and severity of natural and technological hazards in the Arctic Ocean (IPCC 2014; NAS 2016). Decreasing Arctic sea ice is assumed to provide both countries with more opportunities to enable the exploitation of hydrocarbons and minerals and to gain greater access for commercial shipping and fishing. The United States Geological Survey (USGS) estimates that the Arctic may hold as much as 13 percent of the world's undiscovered oil and 30 percent of the word's undiscovered natural gas (Gautier et al. 2009). Most of these reserves are located in increasingly accessible offshore Arctic waters. Increased resource extraction poses an amplified risk of oil spills and other environmental contamination. Currently, neither Russia nor the United States is adequately equipped to deal with a large oil spill or another significant ecological disaster in Arctic waters (Sharp 2011).

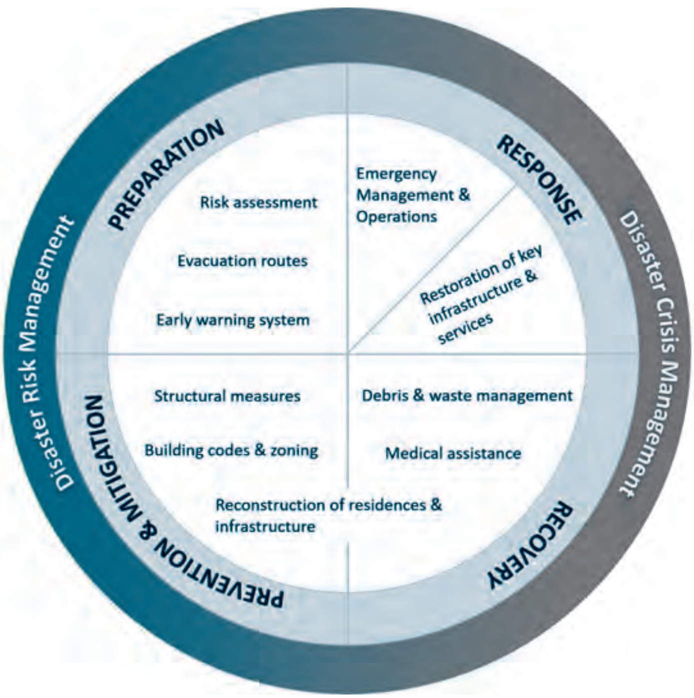
The depletion of Arctic sea ice is also assumed to facilitate increases in cruise-ship tourism and greater access to maritime shipping. As ice-bound Arctic waters open up more and remain ice-free for longer periods each year, the Arctic routes—the Northwest Passage and Northern Sea Route—are likely to become viable alternatives to existing routes (Sharp 2011). Although increases in maritime tourism and shipping would provide great financial opportunities, they also raise concerns about the ability of both countries to coordinate search-and-rescue operations in a timely and efficient manner should a large ship have an emergency.

The primary goal of this paper is to illustrate the role of disaster-related science diplomacy (hereinafter disaster diplomacy) in reducing disaster risks in the Arctic Ocean, while simultaneously fostering peace between Russia and the United States through cooperation among disaster-relevant experts from both countries. The paper elaborates on the importance and challenges of disaster risk reduction in the Arctic Ocean, introduces key concepts of disaster diplomacy, provides examples of the existing United States-Russian disaster diplomacy efforts in the Arctic Ocean, and suggests strategies to foster these opportunities and create new ones.

Disaster Risk Reduction in the Arctic Ocean: Challenges and Opportunities for Cooperation

Disaster risk reduction entails the development and application of policies and practices to reduce, or ideally eliminate, vulnerability of a region (state, community, or individual people) to disasters (UNISDR 2015). It incorporates disaster preparedness, mitigation, and prevention within the broad context of a region's sustainable development (Figure II.10).

In the context of this paper, *risk* is defined as the likelihood of



In practice, disaster management phases are not discrete but represent mutually inclusive units, with many activities overlapping among the phases. The concepts of resilience and sustainable development are woven throughout each phase. Modified from Kontar et al. 2018a.

Figure II.10 Disaster Management Phases and Activities fatalities, injuries or destruction and damage from a disaster (UNISDR 2015). Although often used interchangeably, hazards and disasters are not synonyms. *Disasters* often follow *hazards—physical* phenomena (e.g. storms, flooding, and coastal erosion) or technological incidents (e.g. oil spills or shipwrecks). Hazards turn into disasters only when they cause severe threats to humans and/or damage to infrastructure (UNISDR 2015). Thus, disaster risk is a consequence of complex interactions among hazards and the characteristics that make people and places vulnerable. *Vulnerability* comprises a set of physical, social, economic and environmental factors or processes that increase the susceptibility of a region to the adverse impacts of hazards (Wisner et al. 2012).

The underlying idea behind disaster risk reduction is to proactively manage disaster risk to minimize and ideally prevent its adverse impacts, as opposed to reacting to the disaster crisis (Figure II.10) (UNISDR 2015). The benefits of a more proactive disaster management approach are especially evident in the Arctic Ocean, where the region's geographical and climatological features pose immense challenges for disaster response. Prolonged brutal weather and widespread presence of ice, vast distances, limited physical and communication infrastructure, and seasonal lack of daylight pose significant obstacles to emergency response in the Arctic Ocean (Kontar et al. 2018a).

Inadequate risk assessment and emergency training further complicate disaster response in the Arctic Ocean. Disaster practitioners' reports from Alaska, for instance, have repeatedly indicated many complications and delays during disaster relief operations (McCarthy 2014). In most cases, federal assistance is crucial, but rarely timely (Kontar et al. 2018a). Major emergency responses (i.e. national disaster responses) in both the U.S. and Russia are typically launched from more southerly hubs in lower latitudes, which are relatively long distances away from the impacted communities. Responders from outside the affected region are often unfamiliar with the geographic area and the unique logistical and cultural features of the north. For these reasons, the necessary help might arrive faster from neighboring Arctic countries rather than from each nation's capitals.

Furthermore, future climate projections suggest a rapid increase in the frequency and intensity of climatological and hydrological disasters in the Arctic, such as coastal flooding and extreme weather events (IPCC 2014; NAS 2016). Considering everything mentioned above, not investing in disaster risk reduction in the Arctic Ocean and continuing to rely predominantly on disaster response and crisis management strategies will ultimately put many northern peoples and communities in both Russia and the United States at risk.

As stated above, disaster risk results from the complex interactions among a series of physical processes and human activities that generate conditions of hazard and vulnerability. Thus, reducing disaster risk requires accurate identification and assessment of hazard and vulnerability. This approach is possible only through cooperative interdisciplinary research, which includes both natural and social sciences, as well as Indigenous and local knowledge and practitioners' expertise (Kontar et al 2018a). Interagency cooperation also needs to be established and fostered to ensure the allocation of the necessary resources and appointment of the appropriate institutions to develop, implement, and analyze disaster risk reduction policies (Kontar et al. 2018a).

Drivers and impacts of disasters often cross geopolitical borders, requiring international cooperation in prevention, monitoring, and response (Kontar et al. 2018a). Disaster risk reduction efforts in the U.S. and Russian Arctic would benefit critically from drawing on experiences and identifying best practices among bilateral experts. Through bilateral peer-to-peer cooperation, disaster diplomacy provides opportunities to improve disaster risk reduction in the Arctic Ocean, while simultaneously fostering peace between Russia and the United States by 2030 and beyond.

Disaster-related Science Diplomacy: Enhancing Resilience and Fostering United States-Russia Cooperation in the Arctic Ocean

Summarizing common definitions, *disaster diplomacy* is the use of collaborations among disaster experts from relevant disciplines and practices to address mutual challenges in disaster management, while simultaneously building and fostering cooperation and peace between states where relations could otherwise be strained (Kelman 2012; Kontar et al. 2018a).

Examples of disaster diplomacy in academic literature, practitioners' reports, and media are plentiful, with prominent case studies featured on www.disasterdiplomacy.org. The case studies reveal a series of potential benefits disaster diplomacy could bring to American and Russian disaster experts and diplomats alike.

For example, bilateral disaster-related expert collaborations can help reduce research costs and provide access to valuable additional expertise, thus helping to avoid duplication of efforts. Peer-to-peer efforts also have a potential to result in more thorough and coherent disaster risk assessments in the Arctic Ocean that would lead to better-informed decision making regarding infrastructure development and resource exploitation.

Disaster diplomacy endeavors are also beneficial to United States-Russian diplomacy, as they provide a positive rationale for maintaining cooperation in the Arctic Ocean—even in the face of disagreements on other issues in the lower latitudes. The increased peer-to-peer dialogue regarding disaster risk reduction in the Arctic waters could help foster greater contacts and improve understanding and trust between the U.S. and Russian northern populations.

Despite bilateral friction over the U.S. 2016 presidential election and conflicts in Ukraine and Syria, the Arctic remains a region of peace. Many political scholars and analysts, however, worry that the political tensions in the lower latitudes might spill into the Arctic (Legvold 2014; McFarland and Lide 2017). Enhancing disaster resilience in the warming Arctic region is a strong incentive for Russia and the United States to cooperate. Via their active involvement with the Arctic Council—an intergovernmental forum for promoting cooperation, coordination, and interaction among the eight Arctic countries—Russia and the United States are cooperating on enhancing joint research efforts and improving search-and-rescue and oil spill response coordination (Arctic Council n.d.; Arctic Council 2011; Arctic Council 2013a).

In 2011, under the auspices of the Arctic Council, the Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic (SAR Agreement) was adopted (Arctic Council 2011). Russia and the United States signed the agreement along with the other Arctic states, compelling the two countries to pursue increased cooperation in establishing search-and-rescue interoperability in Arctic waters. For seven years, the cooperation has been taking place predominantly in the form of joint tabletop and live full-scale exercises to build contacts between both states' maritime forces (e.g. the US and Russian coastguard) and reduce risk in future emergency situations (Sydnes et al. 2017). Tabletop search-and-rescue exercises (e.g, SAREX Greenland Sea 2012 and 2013 Arctic Zephyr 2015 and Arctic Chinook 2016) are perfect examples of disaster diplomacy, as they help build trust and reciprocal relationships between U.S. and Russian disaster experts, identify challenges in the existing national, bi- and multi-lateral risk reduction strategies, and advance disaster preparedness and response.

For example, the SAREX Greenland Sea 2012—the first full-scale live search-and-rescue exercise conducted under the Arctic Council SAR Agreement, revealed that the Arctic SAR regime as an emergency response system needed to improve its procedures for cooperation and communication and establish a common understanding on how to apply them (Arctic Council 2013b). The exercise also revealed other challenges, such as the lack of adequate planning and trained personnel for evacuation operations, coordination problems among emergency medical units, and malfunctions of crisis communication at various levels. The joint exercise report provided a series of detailed recommendations for the different phases of the search-and-rescue operations (Arctic Council 2013b).

The SAREX Greenland Sea 2013 was conducted only a year later to address the challenges identified by its predecessor. The exercise resulted in a series of joint recommendations on search-and-rescue operations, including enhancement of communication, use of common log systems, and strengthening the manning of the Joint Arctic Command (SAREX Greenland Sea Report 2013).

The Arctic Zephyr 2015 was a tabletop exercise conducted to test command and control and coordination among the Arctic nations' relevant stakeholders at various levels during a mass rescue operation (Coast Gard News 2015). The exercise revealed challenges with communication channels, targeted messages, and media, as well as situational awareness, resources, logistical support, and coordination and planning (Sydnes et al. 2017).

Although the exercises mentioned above have been conducted with participants from all Arctic states, rather than solely among U.S. and Russian counterparts, currently they provide the only opportunity to foster United States-Russian cooperation in the Arctic waters. Bilateral search-and-rescue exercises and other disaster-related cooperation have been stalled in the last four years as a result of U.S. sanctions and restrictions on bilateral contacts after the Russian involvement in the 2014 Ukrainian Revolution.

Another example of the United States-Russian disaster diplomacy efforts in the Arctic Ocean is the countries' cooperation on oil-spill prevention and response. In 2013, Russia and the United States signed the Arctic Council's Agreement on Cooperation on Marine Oil Pollution Preparedness and Response in the Arctic (OSR Agreement), which binds the two countries to "promote cooperation and coordination by endeavoring to carry out joint exercises and training, including alerting or call-out exercises, table-top exercises, equipment deployment exercises, and other relevant activities" (Arctic Council 2013). The agreement also encourages U.S. and Russian disaster response groups to build trust by exchanging best practices and technologies in oil spill prevention and response.

Unlike the SAR Agreement, the OSR Agreement was built on the existing bilateral and multilateral agreements between Arctic states (Arctic Council 2013). For example, the Agreement between and among the government of the Union of Soviet Socialist Republics (USSR) and the government of the United States concerning Cooperation in Combating Pollution in the Bering and Chukchi Seas in Emergency Situations was signed at the very end of the Cold War in May 1989, eight years before the establishment of the Arctic Council. According to the Agreement, both states agree to provide assistance to each other in combatting pollution incidents that may affect the areas of responsibility of the parties, regardless of where such incidents may occur (USCG n.d.).

The Joint Contingency Plan against Pollution in the Bering and Chukchi Seas (1997) was originally created with the agreement and was updated in 1997 to change USSR to the Russian Federation and include the proper competent national authorities after the fall of the Soviet Union. The contingency plan is based in three aspects: planning, coordination of joint responses, and communication, and calls for tabletop exercises to be conducted every two years and meetings of the joint response team to be held at least every 18 months (USCG n.d.). No bilateral exercises have been conducted since 2014 due to the restrictions of bilateral contacts (Sydnes et al. 2017).

Disaster diplomacy opportunities also arise from joint education ventures, facilitated through individual universities and through the University of the Arctic (UArctic), which is an international cooperative network based in the Circumpolar Arctic region consisting of more than 170 higher education and research institutions with an interest in promoting education and research in the Arctic region (UArctic n.d.). The Fulbright Arctic Initiative also provides opportunities for bilateral and interdisciplinary disaster-related research, as the program encourages unique science, policy, and diplomatic collaboration (Fulbright n.d.).

U.S. and Russian disaster experts can also further advance disaster diplomacy through the opportunities provided by the International Arctic Science Committee (IASC) and other international scientific and/or intergovernmental unions, which help bridge research gaps and encourage interdisciplinary scientific collaborations by facilitating interaction among scientists across disciplines and national boundaries. Examples include the International Union of Geodesy and Geophysics (IUGG) and the Union's Commission on Geophysical Risk and Sustainability (GeoRisk Commission), United Nations Office for Disaster Risk Reduction (UNISDR), and Integrated Research on Disaster Risk (IRDR) program (these examples are not comprehensive, only illustrative).

Despite its potential benefits, disaster diplomacy faces significant barriers. Case studies reveal politics as a key barrier to effective disaster diplomacy (e.g. Kelman 2012; Kontar et al 2018b). Examples of political incentives to disregard and scuttle disaster diplomacy opportunities include leadership changes, long-existing prejudices and distrust, and belief that historical conflicts trump advances in disaster risk reduction. A nation's foreign policies can significantly hinder disaster diplomacy efforts. U.S. and Russian scientists have reported travel and financial restrictions hindering their bilateral collaborations in the Arctic (Kintisch 2015).

Looking Forward: United States-Russia Cooperation in the Arctic Ocean in 2030 and Beyond

Bilateral cooperation between U.S. and Russian disaster experts is crucial in advancing scientific knowledge and practices in disaster risk reduction in the Arctic Ocean. Disaster diplomacy provides myriad opportunities for the United States and Russia to advance their disaster-related research and management, and foster peace in the Arctic waters. Scientific objectives of disaster diplomacy include generating new knowledge through both short-term and long-term collaborative research, gaining access to knowledge, materials, and techniques not otherwise available, and making progress in fields in which the other country has superior standing. Diplomatic objectives of disaster diplomacy include using scientific and technological interchange as a way of reducing political tensions and contributing to détente.

Overall, there are multiple entry points for U.S. and Russian disaster researchers and practitioners to engage in disaster diplomacy through established international and Pan-Arctic consortiums and collaborations. To advance disaster diplomacy in the Arctic Ocean, it is vital for U.S. and Russian scientists to make active efforts to develop policy-relevant research programs in their Arctic studies, with research questions informed by pressing disaster-related issues and promulgated by interdisciplinary teams. Scientists should not develop research programs in isolation, but should instead consult with a diversity of Arctic stakeholders beyond academia, potentially including Indigenous leaders, government leaders, NGOs, and industry.

Russia and the United States are already engaged in disaster diplomacy efforts through Arctic Council agreements on search and rescue and cooperation on maritime oil pollution. Examples above demonstrate that these agreements are necessary but not sufficient to foster United States-Russia cooperation in the Arctic. Additional bilateral agreements are necessary to foster resilience and peace in the region. To be effective, the agreements must address specific disaster cooperation efforts, list all key stakeholder groups from each state along with their responsibilities, and other relevant operational measures. A key goal of the bilateral agreements is to foster continuous communication between disaster experts in the United States and Russia along with data and information sharing as these elements are critical to research and operational cost effectiveness.

Before additional disaster diplomacy efforts can be initiated, it is important to identify elements that constitute effective disaster diplomacy. To begin this process, a diverse group of experts—consisting of disaster and diplomacy scholars and practitioners—should be assembled to develop the conceptual framework for disaster diplomacy in the Arctic Ocean. The main goal of this framework would be to provide a unified terminology, a set of guiding principles, and standardized metrics of success for the evaluation of disaster diplomacy projects and case studies.

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PART III

CLIMATE CHANGE IN THE ARCTIC: FUTURE DIRECTIONS FOR ADAPTAION

Threats to Arctic Ecosystems and Human Societies

Lars-Otto Reiersen

Introduction

The reduction in Arctic sea ice extent and volume, melting of glaciers and ice caps, and thawing of the permafrost have provided headlines in international newspapers over the past two decades. Climate change is affecting the Arctic faster than many other places in the world, but climate change is not the only threat for Arctic ecosystems and the people living there. Several types of chemical pollutants are also threatening the Arctic. The most significant sources for pollutants and greenhouse gases that have impacts on the Arctic and the globe come from southern latitudes, where the majority of humans live and work. Winds, rivers, and ocean currents are the key mechanisms that provide the Long-Range Transport (LRT) of these chemicals and gases. There are some military and industrial sources that have been and still are significant point sources of pollution affecting parts of the Arctic, including mining and smelters mainly in northern Russia at places such as Norilsk and on the Kola Peninsula (AMAP 1998). This paper provides a short overview of the knowledge we have today about these pollutants, and the scenarios for their spread and impacts until 2100.

Contaminants

Long-Range Transported contaminants include two groups of chemicals: Persistent Organic Pollutants (POPs) and heavy metals. POPs are a group of chemicals partly composed of industrial products such as PCBs (Polychlorinated Biphenyls), brominated and per-fluorinated-products, and pesticides such as DDT and lindane. These products do not break down easily in nature, and are transported over long distances with ocean, river, and atmospheric currents. These chemicals then bio-accumulate in the food chain to levels that cause adverse biological effects on humans living in the Arctic, especially those that consume large amounts of marine mammals.

Mercury, for example, is a very toxic heavy metal of greatest concern in the Arctic environment, since it is a LRT contaminant that bio-accumulates in the food chain and has reached levels that have caused documented negative effects in humans that consume marine mammals, such as seals and walrus, as part of their traditional food supply. The main source for mercury accumulating in the Arctic is from the burning of coal at power plants in lower latitudes, due to inadequate systems to capture the gas-phase of mercury that is released during incineration. The increase in the use of coal to produce electricity in Southeast Asia is today the largest source for this mercury pollution. Several assessments from AMAP over the past 20 years (AMAP 1998, 2002, 2009 and 2017) have provided detailed documentation about the LRT of POPs and mercury, including their bioaccumulation and adverse biological effects on the cardiovascular, neurological and immune systems in humans. Based on this documentation, actions have been taken both at local and international levels to reduce the exposure of humans to these harmful chemicals. Education programs have targeted Arctic residents, especially young women of childbearing age, to reduce their exposure to these chemicals for themselves and their children. In addition to these local actions, information about chemical exposures

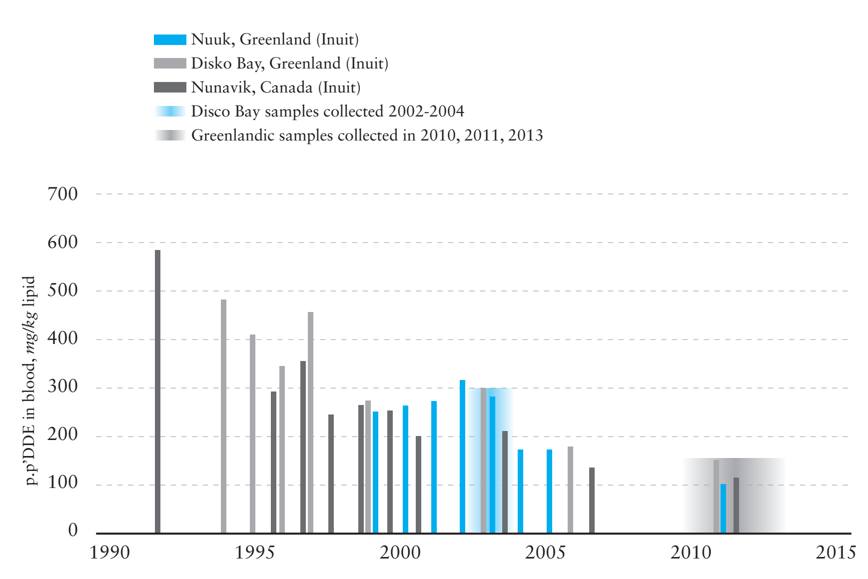


Figure III.1 Decrease in DDE Levels in Human Blood from Greenland and Northern Canada in the Arctic has been shared at international forums such as UNEP and UNECE to provide data that will help to forge international agreements that reduce or ban the production and use of the most problematic chemicals. International protocols like the Aarhus protocol and the Stockholm convention to reduce production and use of POPs and the Minamata convention to reduce the emissions and discharges of mercury are examples of such agreements. Figure III.1 shows the reduction of DDE (a breakdown product of the pesticide DDT) in some populations in Greenland and Northern Canada. This reduction, which has been observed over the last 10-15 years in humans, is very positive, and reflects not only lower levels in the environment (for example, in various Arctic animals), but also the effectiveness of local educational programs.

A significant challenge in reducing exposures to these harmful chemicals has been to develop effective ways to inform local inhabitants about the pollutants—and how best to avoid ingesting them. The consumption of traditional food has over millennia provided the most important source of nutrients, vitamins and energy, and the consumption of traditional food is deeply ingrained in the culture of Arctic Indigenous Peoples. It has not been easy to argue for a change in diet to reduce their exposures. The "store-bought food" available from shops at remote Arctic places is often very expensive, yet does not contain the same amount of important nutrients as are found in traditional subsistence diets.

Radionuclides are also contaminants that have had, and still have, sources in the Artic, mainly military installations, ships, and nuclear power plants. The exposure to ecosystems and humans to radionuclides was very high in the early 1960s due to nuclear weapons tests in the atmosphere both within the Arctic (Novaya Zemlya) and farther south (in Nevada and the South Pacific). The radionuclides released from these and other test sites spread all over the world with the wind. The human group with the highest exposure to radionuclides in the Arctic was reindeer herders who consumed reindeer meat every day. After the ban on atmospheric nuclear weapons testing in 1964, the exposure and doses to humans and the environment reduced significantly (see Figure III.2, AMAP 1997 & 1998). Wind direction and precipitation are important factors influencing local fallout and bioaccumulation in the food chain. (One important chain was lichens—reindeer—humans.)

For Arctic marine waters, the main source of Cesium-137 in the 1970s was the nuclear fuel reprocessing plant at Sellafield in the United Kingdom.

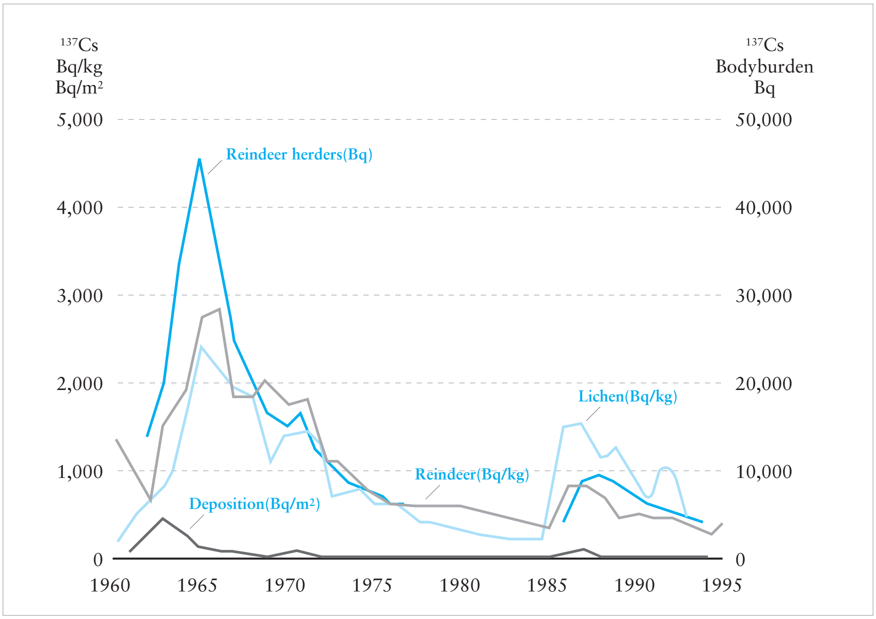


Figure III.2 Dose of Radioactive Cesium to Humans (Reindeer Herders) and Environment in Northern Norway due to Fallout after the Testing of Nuclear Weapons in the Atmosphere and the Chernobyl Accident.

After political pressure from Norway and Denmark, Sellafield changed its process. But instead of discharging cesium to the Irish Sea, they discharged technetium-99, which a few years later was detected in seaweed in the Barents Sea.

In the spring of 2018, a floating nuclear power plant was towed from St. Petersburg to Murmansk, where the final installments were made to produce energy at a remote location in Siberia. The plan is to produce several such floating nuclear power plants and deploy them near remote settlements in the north and for potential export to other countries. This new potential "hot spot" requires proper monitoring of operations and any discharges.

Mining is an activity that normally has created localized pollution, often into rivers, lake systems, or fjords, where the tailings were discharged. Among the observed effects have been increased levels of some metals in local species, and occasionally oil and lubricants spilled from mining machinery.

Oil pollution can easily create headlines in newspapers because this "black" pollution is much more visible to the human eye than the contaminants mentioned above, which require sophisticated instruments to detect. The biological effects of an oil spill are normally observed much more locally than the widely distributed LRT contaminants.

Still, oil spills kill animals and disturb ecosystems. The most important environmental security action of an oil-related operation is to avoid accidents and spills, and this is best achieved by implementing strict standards for the equipment, operations, and staff operating the oil drilling, production, and transport, which includes shipping and pipelines. To achieve this level of oversight and strict monitoring procedures under Arctic conditions, operators must follow international standards for the operation of ships and platforms, as well as specialized national legislation for operations under challenging Arctic conditions that include remoteness, low temperatures, icing, fog, darkness, and extreme weather events.

The degree of biological effects of Arctic oil spills depends on the co-occurrence of oil on water/ice and animals and plants such as birds, plankton and fish eggs/larvae. If a spill occurs in an area and at a time of the year with low biological activity, one may not see significant effects. However, in a biologically active period, spring and summer, the impacts will be more damaging. In Arctic areas, birds and marine mammals that regulate their body heat by fur and feather are very sensitive to oil spills; birds that get an oil spot of a few centimeters on their feathers may not survive due to the resulting loss of temperature regulation (AMAP 2007).

For local fishing communities, an oil spill may contaminate their catch and fishing gear, and consequently they may not find buyers for their fish or shellfish products. Clean-up of an oil spill under Arctic conditions is not an easy task due to several factors, such as the cold, wind, ice, fog, and darkness during winter months. Equipment does exist that can contain and collect oil on water, but no equipment is deployed around the Arctic coasts that can clean up oil in icy water. Some Arctic areas are very vulnerable to oil spills and should have permanent protection. The sea ice edge is such an area; it is a very important and productive area for Arctic marine wildlife (AMAP 2007).

The most costly cleanup operation of an oil-spill in a sub-Arctic area has been after the *Exxon Valdez* oil spill that happened in 1989 on the south coast of Alaska. The price tag for cleanup operation and damages is uncertain, but figures from \$2 billion-\$4.5 billion have been presented (1990 value).

Have We Solved the Arctic Pollution Problem?

Despite the actions described above that have reduced the levels and exposure to several toxic compounds both within the Arctic and for the rest of the globe, the environment is subject to hundreds of new chemical products every year. Testing and approval regimes for new chemical products that are in operation today vary from country to country. There are serious gaps in regulations to effectively document the long-term behavior of these chemicals in the environment. The report "Emerging Chemicals of Arctic Concerns" (AMAP 2017a) documents part of the problem we are facing today regarding all the old chemicals that are still in use, as well as new chemicals that will be there tomorrow. The rate of new products being introduced into the global market often outpaces the ability of existing testing systems to assure their safety, and/or they are being produced in countries with few controls. To improve the protection of the Arctic, the global environment, there is a need to strengthen international regulations for the approval of new products, and to strengthen research and monitoring of chemicals in the environment and human exposures.

One of the emerging concerns today is microplastic. Plastic bags, bottles and larger plastic products such as fishing gear and hard plastic boxes that are dumped or "lost" into rivers and oceans, break down and are transported in ocean currents all over the world. Some of it ends up in the Arctic. As a result, microplastics can be found in the stomachs of fish, birds, and sea mammals, which in turn causes a threat for some species: when animals consume plastics instead of real food, they can be exposed to toxic chemicals that either is glued to or is part of the plastic and can cause mortality. It is a huge challenge to get people and business all over the world to stop improperly disposing plastic bottles and bags instead of taking them to a recycling or landfill facility—and for governments to ban the use of such products.

Climate Change

The most dramatic human impacts today on Arctic ecosystems and societies are due to climate change. The first assessment documenting that climate change was affecting the Arctic was made in the 1990s (AMAP 1998) but the eye-opener came with the release of the Arctic Climate Impact

Assessment (ACIA 2004 & 2005). The results presented then brought the Arctic Council out of the valley of shadows and into the global spotlight. However, it was not only the negative effects due to the melting of Arctic snow and ice that attracted attention, but also new opportunities that were highlighted, including access to new resources (oil, gas and minerals), potential new shipping lanes between East and West, and the tourism potential around the Arctic. As a consequence, several countries in Asia and Europe wanted to become observers on the Arctic Council. They wanted to be at the table where Arctic governance was discussed, and where the scientific assessments were planned and executed.

The climate assessments delivered over the years since the ACIA, including "Snow, Water, Ice and Permafrost in the Arctic" (SWIPA) (AMAP 2011, 2017b), and the Arctic Ocean Acidification report (AOA) (AMAP 2013, 2018) have presented updated information regarding ongoing scientific monitoring data and projections for the years until 2100 and beyond, using the same models as the Intergovernmental Panel on Climate Change (IPCC) in their 2013 report. The focus in the mainstream media has been, for the most part, on the reduced extent of the Arctic Ocean summer sea ice. What has been under-communicated is the paradigm shift observed regarding the thickness and volume of sea ice in the Arctic Ocean. This has changed from a situation with stable, thick, sea ice covering most of the Arctic seas to seas mostly covered by sea ice of 1.5-2 meters. The increased heat in the ocean is a key factor here. Continued temperature increases will have effects on the marine ecosystems, and especially on animals depending on sea ice for reproduction and feeding, such as polar bears, walrus, seals, and birds.

From the business point of view, this "new Arctic" is opening up new shipping lanes faster than expected some years ago, and may open possibilities for harvesting species and minerals from the newly opened ocean. There are, however, many questions related to the possibilities of starting these types of activities, and they should be properly analyzed before permission to start exploitation is given.

The Arctic tundra is a significant source of carbon, mostly stored as methane—a greenhouse gas 30 times stronger than CO_2 as a climate-forcing mechanism. If released in large quantities into the atmosphere because of the thawing of permafrost, it could have huge effects on global warming. For now, analyses indicate that the release of methane from the tundra will correlate with the increase of thawing permafrost, and do not project a huge and sudden release of a large amount of methane over a short time (AMAP 2015).

The Paris agreement is intended to stabilize the average global temperature at 2°C (and hopefully 1.5°C) by 2100. However, according to modelling work performed using the same models as the IPCC, temperature increases in the Arctic will be much higher, especially in the winter months (see Figure III.3). The scenario RCP (Representative Concentration Pathways) 8.5 represents a "business as usual" emissions curve, and this is the curve we are following today. RCP 4.5 is close to the Paris agreement. As can be seen from this figure, the global average temperature will pass the 1.5°C threshold within a decade or two, largely due to all the carbon dioxide and other greenhouse gases already released into the system. The increase in the winter months for areas north of 60N is much more than 2°C under any scenario, especially during the winter month November-March (N2M) and this will trigger huge snow and ice melt, as well as the thawing of permafrost due to shorter and warmer winters, which will in turn have significant effects on the physical, chemical and biological environment—and notably to us, on human societies.

The melting of ice caps and ice sheets in the Arctic is also contributing to global sea level rise (GSLR). Today, Greenland is the main contributor to GSLR (Figure III.4) from ice melt, combined with the effects of thermal

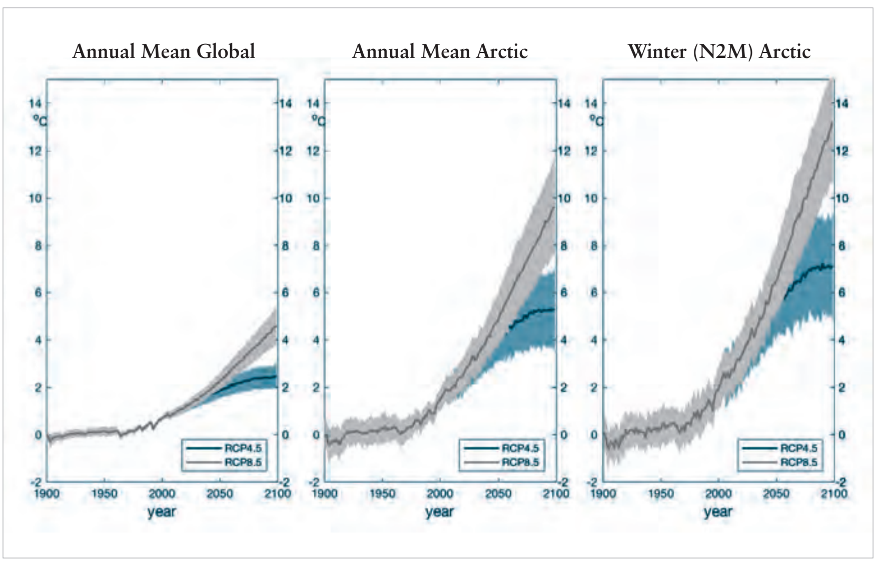
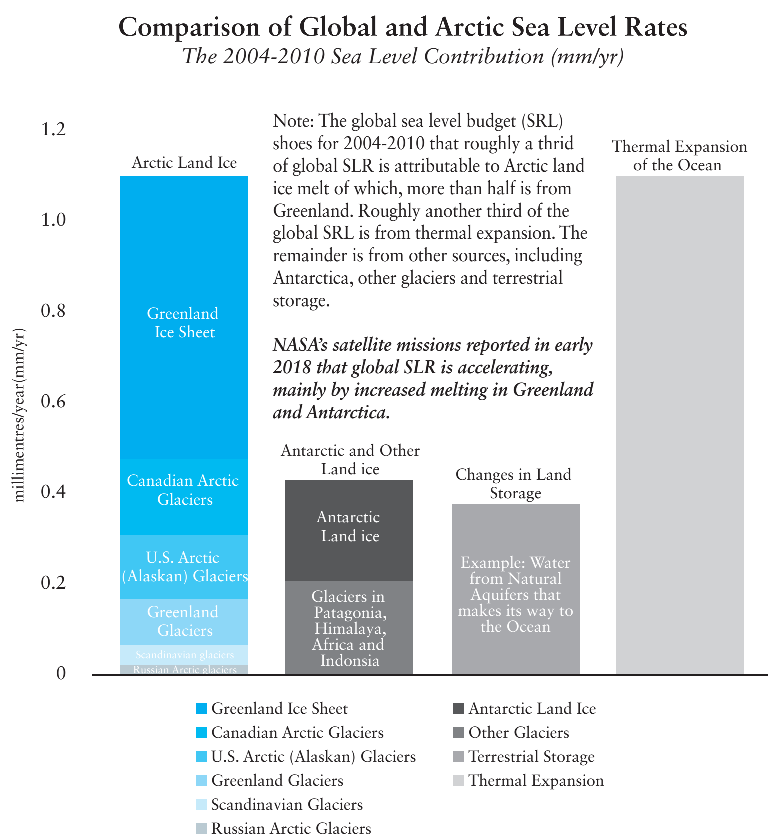


Figure III.3 *Projected Future Annual Air Temperatures* expansion, which increases the volume of water as temperature rises. A minimum GSLR by 2100, even if the Paris agreement (2°C) is successfully implemented, will be an average of at least 0.5 m. However, some areas of the globe will be flooded much more than others, and realistic scenarios indicate up to 2 m GSLR will occur in some areas. As a consequence, huge low-lying areas with large populations and important agriculture areas will be flooded, and thereby trigger human migration, lack of food production and clean drinking water, threatening the stability of the world. (At the same time, Greenland will rise up from the sea when the ice melts on top of



Source: Adapted from Fig. 9.3, AMAP, 2017. Snow, Water, Ice and Permafrost in the Arctic (SWIPA) 2017.

Figure III.4 *Sources of Global Sea Level Rise* the land.)

Some key observations;

- The warming of the tundra area has led to increased growth of bushes and shrubs, thereby leading to a "greening" of part of the terrestrial area. However, in part of the northern areas the thawing of the permafrost has led to drainage of surface water so the land is "browning."
- The thawing of the permafrost (Figure III.5) will not only affect terrestrial ecosystems on the tundra, but also human-made infrastructure, houses, roads and airports.
- The reduced time when rivers and ground are frozen has reduced the period available to use ice-roads for transportation of heavy good to remote places in the North.
- The warming of the tundra has affected the traditional way of storing food (such as fish, berries and meat from hunts) in traditional subterranean "earth freezers." The long-term storage of frozen food is less assured.
- New species, both marine and terrestrial, are migrating north, as are

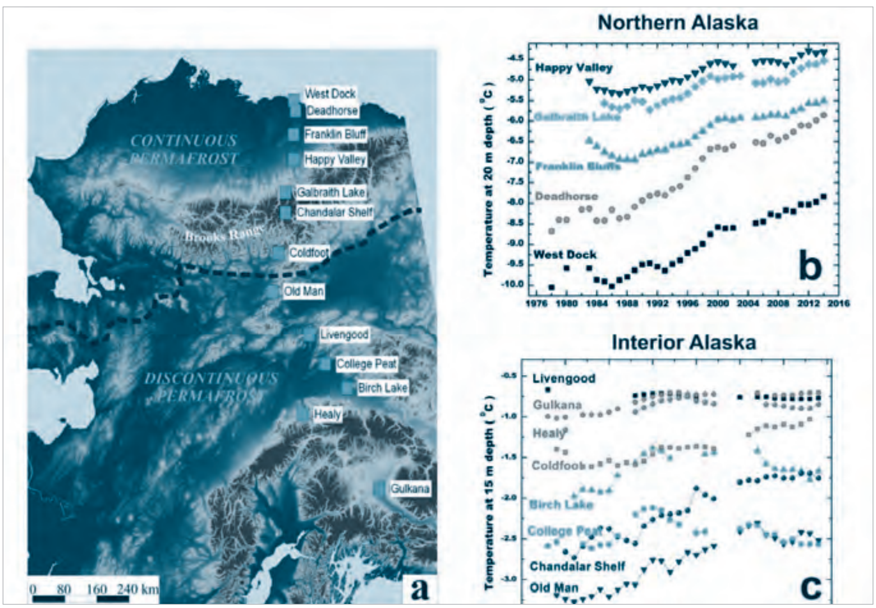


Figure III.5 *Permafrost Temperature at 15 and 20 meters depth over the Last 35 Years in Alaska* parasites and viruses, thereby transporting new diseases that may affect Arctic humans and animals.

Global emissions of CO_2 do not only act as a greenhouse gas that traps heat and increases the global temperature of air and oceans. These emissions also increase the amount of CO_2 absorbed in the world oceans, which in turn makes ocean water more acidic—observed as a reduced pH. The effects of increased acidification of Arctic Ocean and northern coastal waters have only partly been analyzed, and we still lack significant information from research and monitoring that would clarify basic mechanisms and interactions between and among marine species—e.g. the link from phytoplankton growth up the food chain to fish and sea mammals. What may happen if one species in today's food chain, such as phytoplankton, disappears and another takes over the space? Will the food chain remain as it is today, or change? Can we continue to harvest the same species (e.g. fish, sea mammals and shellfish) and in the same quantities as we do today, such as herring, cod, and capelin?

It has been documented that in part of the Arctic Ocean, especially in some coastal areas, the change in pH is occurring faster than in most marine areas of the world, and these areas are becoming more acidic. This is due to several factors. First, cold water can absorb and store more atmospheric CO_2 than warm water. In addition, the layer of freshwater on the surface of the Arctic Ocean is growing, caused by more runoff from Arctic rivers and the melting of snow and ice. Freshwater has a lower buffering capacity than salt water. The huge input of organic carbons from the rivers is a third important component in this changing system (AMAP 2013). The question then becomes: What do all these changes in the physical and chemical composition of these Arctic waters mean for the biological systems that have evolved there? These organisms are not only affected by the growing acidification, but also by the change in water temperature and other stress factors such as contaminants and harvesting by humans. In analyzing the effects of increased ocean acidification, one has to take into account these other stressors—especially the change in temperature. This complex situation is still to be properly analyzed. In the new AMAP assessment (AMAP 2018) five case studies have analyzed different scenarios in an attempt to get a better idea on how some of the biological and physical/chemical processes in northern waters may interact and trigger changes in species composition—and thereby alter the potential harvest by humans for local consumption and export.

Since a lot of data and information is lacking, it is rather difficult today to present a good prediction of what is in the pipeline and what may happen in the next decades and beyond. Analyses indicate that in some geographical areas along the coastal shelf of Alaska and Siberia, acidification may become critical and will corrode the carbon shells of mollusks and crustaceans, disrupting the marine food chain and subsequently having a deleterious effect on some species that are important food sources for humans and other creatures.

The Paris Agreement—2030 and Beyond

The pledges presented by the countries that have signed the Paris Agreement will have a minor positive contribution towards reducing climate change. But even if the Paris Agreement is fully implemented and may slow or halt some of the processes described above, it will not stop them all. The Arctic will continue to melt and affect global sea level rise, weather patterns, extreme weather events, animal and plant distribution, and ecosystem functions, among other impacts.

Can Engineering Save the World?

Engineering covers a wide range of possibilities. One of the most important engineering initiatives under way is the sequestration, or "harvesting" of carbon from the atmosphere and biological systems. According to modelling work and current trends, we will have no chance to reach the Paris Agreement simply by reducing global emissions of CO_2 to zero. Therefore this type of engineering should be supported.

Not all ideas for engineering should be encouraged, however. For example, so-called "geo-engineering" plans to reduce incoming energy from the sun by pumping sulfur or other chemical compounds into the atmosphere are fraught with uncertainty and possible dangers. Atmospheric sulfur pollution occurred some decades ago due to the burning of oil and coal with high sulfur content, and this reduced the atmospheric temperature due to reflection of the sun energy. However, this sulfur emission had significant effects on terrestrial and freshwater species. The proposed use of a sulfur “pumping method” or similar techniques, will not reduce human CO_2 emissions and thereby will not reduce or reverse the acidification of the Arctic and other global oceans. The solutions we need to implement today and tomorrow must not create new problems in the long-term.

Adaptation Challenges

AMAP has published three case studies to clarify actions needed today to be prepared for the near- and long-term future, and face the consequences of several stressors affecting Arctic ecosystems, societies and human health (AMAP 2017c, 2017d & 2017e). The three regions assessed are shown in Figure III.6.

One of the main challenges to perform these three case studies is how to involve both local governments and the business community. For many local businesses and people living in the north, the main threat viewed by them today—for themselves and their businesses—was not climate change: It was to have a job and to make it possible for their business to survive a year or two. The effects of climate change and other external stress factors

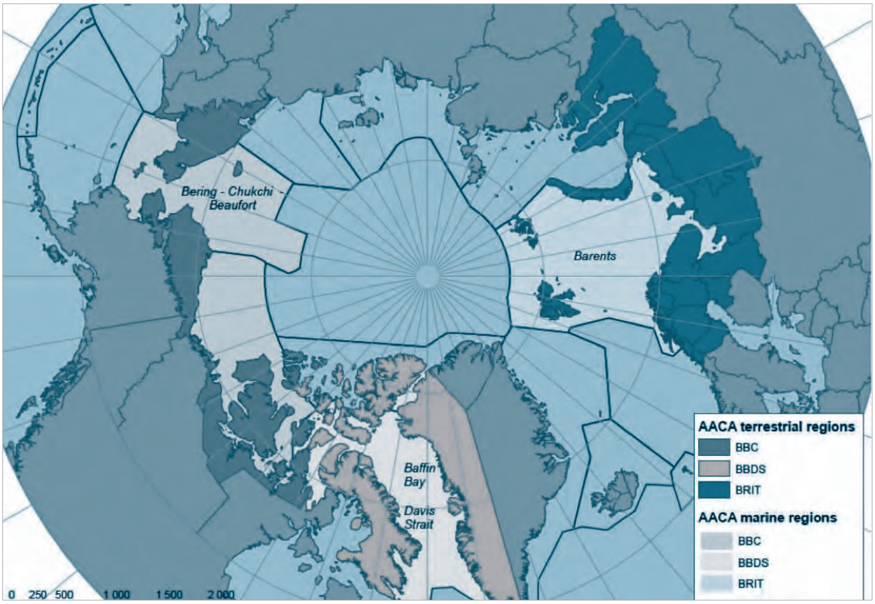


Figure III.6 The Three Regions Analyzed in the Assessment Reports “Adaptation Actions for a Changing Arctic” were viewed as a future problem that did not take precedence over their short-term challenges.

A key challenge is therefore to find a way that Arctic residents can focus on both short-term problems related to securing "my job" and economy today, as well as retaining a long-term focus on actions to prepare for and adapt to long-term effects of climate change and other stress factors.

People in the Arctic have been highly adaptive and resilient for millennia, but now the pace of change is faster than ever and is amplified by a series of increasingly complex, globalized, socio-economic structures. As a result, it is necessary to make substantial adjustments to how societies plan and organize the work necessary to keep up with rapidly changing conditions (AMAP 2017c, 2017d, 2017e).

To secure a good process, there is a need for close cooperation among scientists, the business community, Indigenous Peoples, and governmental institutions. Communication will be essential to ensure that everyone understands what is at stake from both short- and long-term perspectives. One topic cannot be ignored because another topic appears to be more important at any given moment.

The time is past due for international societies—governments and businesses—to initiate significant mitigation actions to reduce the emissions of greenhouse gases and to "harvest" carbon out of the biological system, and for concrete actions at the national and local levels to prepare for long-term adaptation strategies and actions. In this important process to address climate change and all its implications, it is important not to forget the issue of chemical pollution, and to secure implementation of significant actions for a cleaner world. The Arctic Council and its working groups have over the last 15 years provided world-class reports documenting the situation and calling for actions, and it has been stated in several Arctic Council Ministerial declaration texts that, "We—the ministers—will take the lead" to instigate action. However, neither the Arctic Council nor its member states have yet succeeded in doing enough.

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Climate and Health Perspective

Chris M. Furgal

Introduction

According to the World Health Organization, health is a "state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (WHO 2006). As such, human health status is influenced by a complex interaction of a variety of factors.

Environmental, social, genetic and behavioural variables all influence a person's health, regardless of their place of residence.

One particular environmental factor, climate change, has been identified as the largest threat to human health status in the 21st Century (Costello et al. 2009). This is not because of one particular threat to a specific aspect of health, such as the direct impacts of exposure to extreme weather events and severe risk of injury or death, but rather the ubiquitous nature of climate and weather pressures on health status on a daily basis the world over. Arctic regions of the world, experiencing some of the most dramatic and rapid environmental changes and impacts as a result of shifts and variability in climatic conditions, are home to some of the most vulnerable populations to climate-related health impacts in the world; those populations or segments of populations relying on these environments as their place of residence and source of livelihood and well-being are among the groups most at risk.

Indigenous Peoples of the circumpolar north have always been inextricably linked to their local environments for aspects of their health and well-being. Historically, whether they are nomadic reindeer herders of Finno-Scandinavia, coastal whaling and sealing peoples of the Canadian Arctic, Alaska, or Greenland, or more inland traveling peoples of the barren ground tundra in Russian Siberia, their health, well-being, and basic survival has always been directly and indirectly influenced by local environmental conditions. In response, to thrive or simply survive, they have learned to adapt.

Despite the significant periods of time that have passed since these forms of livelihood and survival in the Arctic were the norm, this is still very much the case today. While Indigenous residents make up a small proportion of the majority of circumpolar countries' total populations, it is these groups in the northern regions of these countries that are disproportionately and most negatively influenced by the variability and rapid changes taking place in climatic conditions today.

While significant change and related impacts to aspects of health and well-being have been observed and reported by northern communities and researchers for more than 30 years, the evolution in understanding of these relationships in the Arctic have grown significantly over the past 15 years.

At the time of the release of the Arctic Climate Impact Assessment (2005), the relationships between climate and health in the Arctic were speculated, projected and hypothesized. By the time of the release of the Fourth IPCC Assessment (2007), growing evidence was available to illustrate the relationships and realities. These were not simply projected impacts but were in fact already taking place in association with the rapidly changing environmental conditions of the northern latitudes. Successive assessments in the circumpolar north have only served to accumulate more evidence supporting the claims that a changing climate is having impacts on Arctic residents' health. At the same time, when compared to our research and understanding in other regions of the world, our understanding of climate and health impacts in the Arctic is still relatively new.

Basic Health Status and Living Conditions

Many Indigenous Peoples in the North today face increased exposure to changing climatic conditions. Where they live and the forms of livelihood they pursue remain increasingly important influences on their health status today. However, we must also be aware of many disparities in basic health status between Indigenous and non-Indigenous Peoples at the national and even regional scales in many countries that persist. Significant differences in life expectancy, the prevalence levels of many chronic diseases, access to basic and emergency health services, and equitable access to important components of public health infrastructure (such as affordable, nutritious food, clean and safe drinking water, and adequate housing) put many of these populations at greater health risk than other segments of their countries' regional or national population. In some instances, these factors also significantly dampen the capacity of individuals and communities to adapt.

Climate Change Impacts on Arctic Health

Climate-related health impacts among Arctic populations can be organized into direct and indirect impacts. The direct impacts are "those health consequences resulting from direct interactions with aspects of the environment that have changed or are changing with local climate (i.e. resulting from direct interactions with physical characteristics of the environment: air, water, ice, land; and for example exposure to thermal extremes)" (Berner et al. 2005, 869). Table III.1 presents a summary of identified direct health impacts associated with climate change among northern populations. Of these, perhaps most commonly observed and reported in Arctic communities today are the physical and mental health impacts associated with decreased hunting and travel safety as a result of changes in storm systems and seasonality.

Table III.1 Direct Impacts of Climate Change on Health in Arctic Populations (from Furgal et al. 2008)

Identified climate-related change	Direct health impact
Increased (magnitude and frequency) temperature extremes	Increased health and cold-related morbidity and mortality
Increase in frequency and intensity of extreme weather events (e.g. storms, etc) Increase in uncharacteristic weather patterns	Increased frequency and severity of accidents while hunting and traveling resulting in injuries, death and psychosocial stress
Increased ultraviolet radiation exposure	Increased risks of skin cancers, burns, infectious diseases, eye damage (cataracts), immunosuppression

The indirect impacts are "those health consequences resulting from indirect interactions mediated via human behavior and components of the environment that have changed or are changing with local climate" (Berner et al 2005, 878). Table III.2 presents a summary of observed and potential indirect impacts of climate on Arctic health. Based on research to date, some of the most commonly reported and documented impacts of an indirect nature include those associated with accidents in the local environment while pursuing components of traditional livelihoods, as well as decreased ground and ice stability and melting permafrost and the associated impacts to housing and public health infrastructure in communities, as well as impacts to food and water security.

Table III.2 Indirect Impacts of Climate Change on Health in Arctic Populations (from Furgal et al. 2008)

Identified climate-related change	Indirect health impact
Increased (magnitude and frequency) temperature extremes	Increase in infectious disease incidence and transmission, psychosocial disruption
Decrease in ice distribution, stability and duration of coverage	Increased frequency and severity of accidents while hunting and travelling resulting in injuries, death, psychosocial stress Decreased access to country food items, decreased food security, erosion of social and cultural values associated with country foods preparation, sharing and consumption
Change in snow composition (decrease in quality of snow for igloo construction with increased humidity)	Challenges to building shelters (igloos) for safety while on the land
Increase in range and activity of existing and new infectious agents (e.g. biting flies)	Increased exposure to existing and new vector-borne diseases
Change in local ecology of water-borne and food-borne infectious agents	Increase in incidence of diarrheal and other infectious diseases Emergence of new diseases
Increased permafrost melting, decreased stability	Negative impacts to stability of public health, housing and transportation infrastructure Psychosocial disruption associated with community relocation (partial or complete)
Sea level rise	Psychosocial disruption associated with infrastructure damage and community relocation (partial or complete)
Changes in air pollution (contaminants, pollens and spores)	Increased incidence of respiratory and cardiovascular diseases, increased exposure to environmental contaminants and subsequent impacts

Adaptations to Climate to Avoid Serious Impacts to Health in the North

It is important to note that effective short-term (coping) or long-term (adaptation) change in response to changes in environmental conditions has been a foundational pillar of northern cultures and societies for millennia. What is unique today about adaptation to climate change is the significantly more complex context within which this adaptation or response has to occur. The most recent adaptation assessments in the north, Adaptation Actions for a Changing Arctic (AMAP 2018) illustrate this in Figure III.7. It emphasizes the fact that today, climate is not the only driver of change in northern regions and therefore short-term coping or long-term adaptation may take many forms and must consider these multiple driving forces in the landscape.

As a result, adaptations may be more related to the changing patterns in climatic conditions over the short term, or more aimed at enhancing aspects of adaptive capacity and reducing the vulnerability of the individual, community or society over the longer term (Figure III.8).

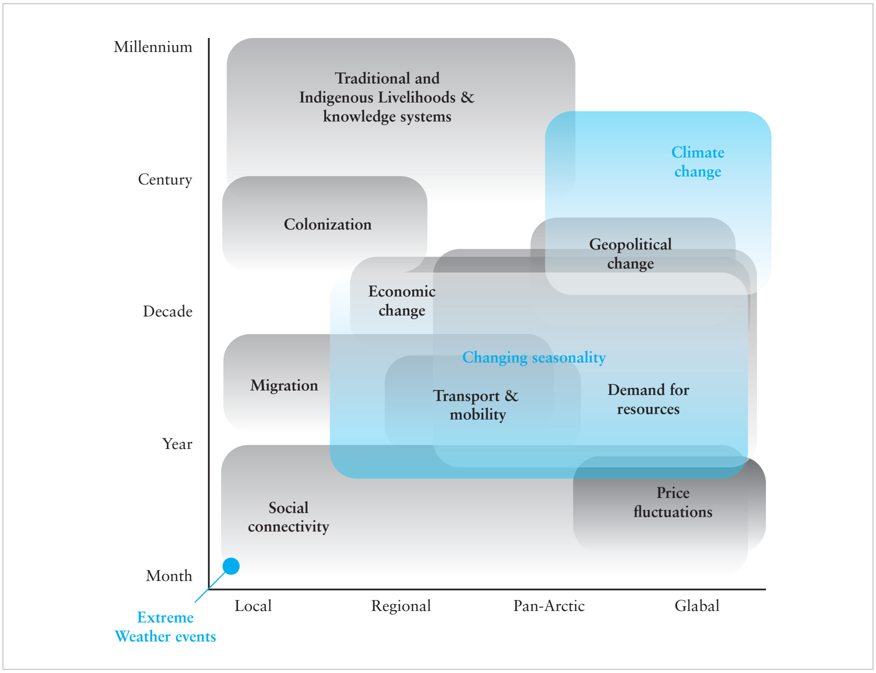

Figure III.7 Multiple Forces and Timescales Acting on Any One Example of a Perceived Climate Change Related Impact on Human Health in an Arctic Community Context (from AMAP 2018)

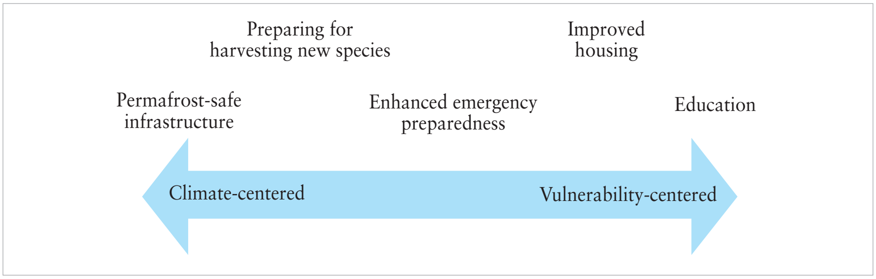

Figure III.8 Examples of Climate-centered vs. Vulnerability-centered Adaptations to Climate Impacts on Individual Well-being in the Arctic (from AMAP 2018)

Table III.3 Selected Adaptations already enacted in Arctic Communities in Response to Climate Related Impacts and Threats to Health (from Furgal et al. 2008)

Identified environmental change and health impact	Adaptation
Precipitation extremes and natural disasters	
• Property damage, injuries and death, increased travel risks	• Relocation of buildings in avalanche hazard zones • Increased needs for enhanced local search and rescue capacity
Increasing variability in weather systems and storms	
• Limitations on hunting and travelling • Increased travel risks and injuries • Increased damage to equipment • Decreased access to traditional foods	• Increased use and dependence on built (shelters) and natural (protected bays) refuges from storms • Increased communication among hunters • Increased preparations for travel and hunting • Decreasing outings during variable times • Use of technology (e.g. GPS)
Temperature-extremes	
• Changes in incidence of cold-related injuries • Increased heat stress	• Reduce physical activity • Increasing house ventilation and access to cool areas
Warming temperatures and changing ice conditions	
• Increased travel risks • Increased injuries and deaths (e.g. drowning) • associated with uncharacteristic and dangerous ice conditions • Impacts to equipment and household economies • Decreased access to traditional food • Disruption of traditional cycles and impacts • on social cohesion and mental well-being	• Shifting hunting patterns (e.g. times) • Using multiple means of transportation for same trip • Increasing community monitoring and communication of ice conditions • Use of new or alternate routes of travel • Use of technology (GPS, satellite imagery)
New and emerging diseases	
• Increased incidence and exposure to zoonotic diseases • Increased exposure to new vectors	• Increased use of insect repellents and bug nets • Increased selectivity of animal meat consumed (to screen for parasites and other abnormalities)
Environmental changes and habitat or ecological community structure shifts	
• Decreases in traditional food availability (wildlife health and numbers), accessibility (changes in ice and snow conditions impacting routes to hunting grounds) and quality (safety of meat for consumption) • Appearance of new species • Increased potential for local-scale northern agriculture	• Changes in times of hunting (to match shifts in availability) • Shifting species hunted (to match changes in availability) • Purchase of new transportation equipment to access animals harder to reach • Return to community in summer more often from hunting trips to store fresh meat
Permafrost, coastal erosion and destabilization of community infrastructure	
• Loss of land along shorelines near buildings • Destabilization of foundations and threats to buildings and other public health structures	• Reinforcing shorelines • Relocate buildings away from shorelines

What is certain is that adaptations in a variety of forms (climate centered and/or vulnerability centered) are already taking place in many northern communities (Table III.3).

Such things as altering travel routes, enhancing safety measures, and increased preparation for land-, sea-, or sea-ice based livelihood activities, adopting and integrating modern technologies such as satellite imagery in detecting safe and unsafe environmental conditions prior to hunting trips are already happening. In some cases, the formalization of previously socially supported networks for accessing important health resources, like harvested foods, is occurring in communities in the form of community freezers and other kinds of sharing hubs or networks to compensate for climate impacts on food security. Over the longer term, and taking a more vulnerability centered approach, many communities are developing climate adaptation plans, mainstreaming climate in regional government policies and decisions, and improving land-based skills of young people in the community to better prepare them for a more dynamic future (Fawcett et al. 2018; Furgal et al. 2008).

Sustainability Issues Facing Human Health and Well-being in the Arctic

Despite these positive changes taking place over the short- and long-term in response to climatic changes and threats to human health, many Arctic communities face multiple challenges to their sustainability over the long term. As stated earlier, the disparities in aspects of health status between Indigenous and non-Indigenous members of the same region or nation state are significant. As is the case in many developing economy countries, northern communities in many areas of the Arctic are still challenged with having access to basic services, public health support, and resources that others in more southern regions of their country enjoy. As a result, they continue to be challenged by basic things that threaten the achievement of the foundational UN Sustainable Development Goals of eliminating poverty, reducing hunger, providing access to basic education, providing clean water and sanitation, as well as affordable and clean energy. In consideration of the immediate need for climate centered adaptations as well as the realization of the need to enhance long-term adaptive capacity in Arctic communities for the future, it can be argued that there will be a trends towards more vulnerability focused approaches to health adaptation to climate change over time. Significant work is needed to improve these foundational aspects of living conditions in the Arctic. However, any effort in this regard will also begin to enhance adaptive capacity to the ongoing impacts of climate change on health, a much needed undertaking.

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Perspective from a Non-Arctic State

Fengshi Wu

Introduction

This chapter reviews how non-Arctic states, especially the Arctic Council (AC) Observer states in northeast Asia (China, Japan, and Korea) are responding to climate change in the Arctic region and associated impacts. Compared with other AC observers (e.g. India and Singapore), these three countries face more direct challenges resulting from climate change in the Arctic due to their geographic location, economic/trade patterns, and strategic relations with some Arctic states. Therefore, China, Japan, and Korea are making an increasing effort to both engage with international activities and adjust domestic institutions to cope with such challenges. The chapter mostly draws on observations from China, and also uses references from Korea and Japan when relevant.

Responses to Climate Change in the Arctic

The potential impacts of climate change in the Arctic are a major concern and motivation for all three northeast Asian AC observer countries to significantly boost their Arctic-related activities, both at home and abroad. This trend has been evident since the 1990s, and accelerated in the past decade. The Korean government identified the Arctic as a policy priority even before the AC welcomed its application for observer status in May 2013. The Korean Arctic Master Plan released in 2013 called for "an overhaul of the domestic law and the establishment of a national department exclusively responsible for the polar regions."[1] Japan named its first Arctic Ambassador in 2013 and released its first official National Arctic Policy on 16 October 2015. After some delay, China, breaking from its normal diplomatic patterns on multilateral issues, published its Arctic White Paper[2] in January 2018.

These three countries share some concerns related to climate change in the Arctic, such as sea level rise, environmental changes along their Pacific coasts, and the potential increase of extreme weather events and natural disasters. However, each country also faces distinctive challenges. For example, China worries most about climate impacts on its agriculture and food production sectors in its inland territories. Global climate change in general and in the Arctic region can affect the patterns of rainfall, temperature, water supply and weather in China's grain production regions.[3]

What's worth underscoring is that *all non-Arctic countries discussed in this paper recognize that the consequences of climate change in the Arctic go beyond geo-physical or climatological realms. Hence, their proposals for climate adaptation are highly proactive and comprehensive* (and even visionary), rather than passive preventive measures or narrowly defined community/local resilience building (even though the latter part is also critical). First, each country recognizes potential impacts on global shipping routes, trade and macro-economic dynamics due to the melting of Arctic ice during summer seasons. Located in the northeast Pacific region, these three countries all have transformed into global trade and economic hubs over the past 40-60 years, and they all perceive great potential and even benefits of the Northern Sea Route (NSR) in the future. Moreover, they are equally confident about getting a lead in the race and eventually taking advantage of shipping and trade via the NSR. In its Arctic Master Plan, Korea calls itself "the leading nation opening up a sustainable future of the Arctic." More specifically, Korea has promoted the grand idea of developing "Arctic industries" by highlighting its own strength in shipbuilding, safety technology for Arctic vessels, and offshore plant technologies for deep-sea mining in the polar region.[4] Similarly, Japan's Arctic Policy specifically identifies its strength in "construction of a system to predict sea ice distribution and other systems to support maritime navigation."[5]

In this aspect, China's proposal in its Arctic White Paper seems to be even more ambitious, as it gives a new name to the NSR—the "Silk Road on Ice"—and incorporates NSR into the Belt and Road Initiative, the flagship global strategy under the leadership of Xi Jinping.[6] This signals China's willingness to take the lead in Arctic transportation and connectivity infrastructure building, including providing funds and financial tools. The idea of "an Arctic railway" has been revived in recent years and has drawn "substantial business interests" in Europe and beyond.[7] The policy concept of this "Silk Road on Ice" provides new opportunities and political legitimacy for China to invest in these railway projects.[8]

In terms of how to respond to the potential economic challenges caused by the changing climate in the Arctic, China, Japan and Korea may differ in their emphasis on particular industries, technologies or business proposals, but they obviously converge around the optimism and confidence in turning these massive changes into something that could possibly generate tremendous economic gain. They all have become brave experimenters and innovators to explore the NSR in order to promote future development in the region, including but not limited to shipping and ports, tourism, bio-sustainable energy, underwater pipelines, and deep-water natural gas extraction.

Secondly, and probably more importantly, the three non-Arctic countries are fully aware of the security and strategic dimensions of climate change in the Arctic. Given their special bilateral relationship with the United States, Japan and Korea are inevitably sensitive to the great power dynamics played out in the meeting rooms related to Arctic governance. How to respond to the changing security environment due to potential climate changes in the Arctic is among the top rationales for formulating a national-level Arctic Policy in Japan, stated in its National Arctic Policy.

Despite many efforts to clarify (or even downplay) its intentions in the Arctic region, China is viewed as a potentially strategic player in the Arctic and therefore needs to be watched by AC member states. In turn, Chinese policy experts and policy makers are aware of this tendency and have gradually come to terms with it. One of the main justifications for more engagement in Arctic governance provided by the Chinese state is that China is a Permanent Member of the UN Security Council. Since Xi Jinping took office in 2012, China's official rhetoric has become more willing to accept its "great power" status than previously, and to speak of the strategic implications of its activities abroad—including the polar regions.

Some policy experts in China now advocate the idea that the Arctic is a key case to experiment and launch China's "new territorial diplomacy" (*xin jiangyu waijiao*)[9] and "great power strategy" (*qiangguo zhanlue*).[10] "New Territorial Diplomacy" is a policy phrase recently crafted by Chinese policy pundits to conceptualize China's future in global governance, and such "new territories" include the deep-sea, polar region, outer space, and cyber-space. In a sense, China is not dealing with Arctic politics as an isolated issue, but as an integral part of its new engagement with the overall global governance. This partially explains why China's Arctic White Paper highlights the fact that China is one of the five permanent members of the UN Security Council and, without challenging the sovereign rights of the eight Arctic countries, would use this status to justify China's participation in some Arctic affairs that have global implications (particularly peace and stability).

Adaptation Now and Beyond 2030

Although not strong, there is evidence of "an Arctic dimension" in China's national-level overall climate strategy and policy.[11] It is important to note that China's climate research in the Arctic has transformed "from the previous stage of ad-hoc observation and data collection to formalized systematic knowledge production to provide better understanding of domestic climate changes." In comparison, both Japan and Korea pay most attention to the impact of climate change in the Arctic on fisheries and fishing industries.

Despite publishing the first State Policy Paper on Climate Change in 2007, China's climate adaptation policy only gradually came into shape around 2013. The central guiding idea for official documents on climate change prior to 2013 was "to control greenhouse gas emissions and enhance sustainable development capacity," and "to ensure economic development is the core of all climate change-related state actions."[12] Two important state-level policy papers—the first National Climate Change Adaptation Plan and a new State Policy Paper (or National Plan) on Climate Change—were released by the central government in 2013 and 2014, respectively. They finally dropped the statement that "climate change is ultimately a developmental issue," elevated the importance of adaptation, and greatly expanded the scope of climate-related policy-making. The 2015 Annual Report on Climate Change Policies and Actions provided more detailed explanations of climate-related vulnerabilities, potential harms, and relevant preventive measures in the country.[13]

However, up until recently, China's adaptation policy has remained weak "with an incomplete administrative structure and few documented examples of implementation and mainstreaming."[14] Even though multiple groups of key pilot cities have been named to implement climate change-related policies (including adaptation) at the municipal level, there is strong evidence to argue that either local governments lack the incentive or capacity to implement such policies, or some of them tend to incorporate climate goals into their old development-oriented policy agenda without losing the fiscal funds attached to pilot climate programs.[15]

In the most recent Annual Report on Response to Climate Change Policies and Actions (2017), the adaptation section has been expanded to nine pages (out of 60 in total) and identified priority areas, including agriculture, water, forestry and eco-systems, coasts and oceans, urbanized regions, meteorology, and disaster preparation and reduction.[16] One new highlight in this aspect included in the 2017 Annual Report is the establishment of 260 ocean conservation zones (that total more than 120,000 km^2) at all administrative levels and the strengthening of regulations related to coastal land, bay areas and coastal wetlands. In addition, the Annual Report identified three main mechanisms to enhance adaptation capacity: enhancement of basic infrastructure, establishment of monitoring and warning systems, and improvement of climate-related technologies.

Having made some progress in setting up overall policy frameworks, goals and priorities, China's adaptation policy remains at the top level and is mostly implemented through sectoral channels, similar to the pattern of China's overall responses to climate change mentioned above. There is, however a very recent administrative development that may cast some uncertainty over how China's Arctic activities will be linked with climate change policy-making at the top levels. After the 19th Plenary of People's Congress in March 2018, the State Oceanic Administration (SOA) was practically dissolved (with the only exception being the Department of International Affairs) and mainly absorbed into two other ministries: the newly created Ministry of Environment and Ecology, and the Ministry of Natural Resources.[17] Also, the People's Armed Police has taken over coast guard duties, and the Ministry of Civil Affairs is now in charge of disaster relief and preparation. SOA used to be a regular member of China's National Coordination Committee on Climate Change—the central coordinating mechanism for climate change policy-making in China. At the time this chapter was written, there was no confirmed information about the new administrative home of the Arctic and Antarctic Administration. Nor is it clear where all state polar research institutions will be placed and through which new bureaucratic agency oceanic and polar affairs can be brought into national-level climate policy-making.

The Role of Non-Arctic States in Future Arctic Governance

The phrase "faithful observer" used in Korea's Arctic Master Plan is a good way to start summarizing the role to be played by the non-Arctic AC observer states in the years to come. To be more precise, this report would add "actively engaged" in addition to the above phrase to describe the future roles of the three northeast Asian AC observer states in Arctic governance. All of them, including China, have expressly stated their respect for the sovereign rights of the eight Arctic states, and each vowed to participate in Arctic affairs according to international laws and the governing structure centered around the AC.

Both China and Korea have used proactive narratives in their national Arctic policy document to describe their future roles in Arctic governance. Korea, as mentioned before, refers to itself as the "leading nation" in the Arctic's sustainable development. But, the document is also very clear about the mechanisms through which Korea will reach such an ambitious goal: 1) bilateral cooperation with Arctic countries; 2) multilateral channels, particularly the institutional frameworks centered on the AC and AC's working groups; and 3) industrial relations and networks.

What the Korean government has outlined in terms of mechanisms for a non-Arctic state to play a role in Arctic governance can also be applied to and has been applied by both China and Japan. In addition, the Chinese government has identified some extra mechanisms for China to explore and influence Arctic affairs. By emphasizing the role of the United Nations in all fields of global public goods, the Chinese government believes there is definitely an important role for it to play with regard to the part of Arctic affairs that has direct global implications for peace and stability, climate change, biodiversity conservation, and environmental protection.

Here it is necessary to mention Yang Jian, one of the most prominent experts on the Arctic and polar politics in China, and his scholarship and argumentation on why China should elevate the political relevance of participating in the Arctic and polar governance at the global level. According to him, it is not the commercial benefit, climate adaptation, or even geopolitical consideration that makes the Arctic relevant for the top leadership in Beijing. He argues that the Arctic situation offers the Chinese leadership an opportunity to experiment and exercise the knowledge and skill of global leadership to match China's great power status in the international system.[18] As Beijing increasingly aspires for a great power status on the global stage, its actual experiences and knowledge of leading other nations to strive for greater global public goods, nevertheless, is extremely limited, if not completely lacking. In many issue areas, the door to global institutional leadership is still closed to China, and China's attempt to "lean in" has met with a less than lukewarm welcome.[19] Therefore, there is "strategic value" in participating in Arctic governance. It is a rare and valuable platform for China to acquire an advanced understanding of global governance and experiment with its particular style of global leadership.

For all these three non-Arctic countries, the most promising role in future Arctic governance is in the fields of technological innovation and industrial development. Given the slowing down of the economy in both Europe and America, it is very reasonable to expect China, Korea, and Japan to become active advocates, investors, and operators of future Arctic industries. However, an irony emerges: there has been relatively slower development of market regulatory mechanisms (including corporate self-regulatory mechanisms) at the global level for Arctic-specific businesses and industries.

Governance Challenges

As there is little room for non-Arctic states to bargain within the AC institutional framework, the biggest practical governance challenges come from outside the AC. Because states like China or Korea are so keen on taking the lead in the future Arctic economy, the more urgent question is whether and how these countries can affect future market regulatory bodies in the Arctic region. (Table III.4)

Table III.4 Mechanisms for Non-Arctic States to Participate in Arctic Governance

Institutional channels	Direct participation	Indirect participation
The Arctic Council	Observation	Convene opinions and interests via bilateral channels with AC member states
AC working groups and other functional agencies	Participation by both officials and experts	Informal expert networks
Other Arctic related international meetings and organizations	Participation by both officials and experts; potentially more prominent roles	Influence via global governance structures, e.g., the UN system
Market instruments and regulatory bodies (?)	State backed economic cooperation and initiatives	Multi-national corporate partnerships

The AC, as well the UN system, has produced various agreements to regulate navigation, shipping, fishing, environmental pollution, resource exploration, biodiversity, and climate change. However, market instruments and regulatory bodies are different. The direct targets of market-based regulatory instruments are commercial corporate entities and individual consumers instead of states, and they help to shape the market environment of Arctic industries such as polar shipbuilding, polar cruises and tourism, fishing, and others. After the successful voyage of the 13-deck, 1,000-passenger *Crystal Serenity*—the pioneering cruise liner that sailed the Arctic's fabled Northwest Passage in 2016—there emerged a real need for more effort to formulate commercial standards and quality control in the field of Arctic tourism.[20]

In China's Arctic White Paper, tourism is one of the highlighted fields of commercial interests, and the number of Chinese tourists visiting the Arctic has increased significantly in recent years and will continue to grow in the future. It is only reasonable to expect that Chinese companies, backed by the government, will actively explore ways to influence the establishment of a sustainable tourism market in the Arctic. Estimates suggest that Chinese tourists represent as much as 50 percent of annual global tourist visits to the Arctic region. In Russia's Arctic territories, most tourists are already from China.[21] Even though various companies and environmental NGOs have issued voluntary principles for sustainable tourism (or eco-tourism) in the Arctic, such as the "Ten Principles for Arctic Tourism" outlined by the World Wide Fund for Nature (WWF),[22] there is no consolidated market-based regulatory framework or international body designated to regulate Arctic tourism.

Besides tourism, these three non-Arctic states have targeted many other industries in the coming decades, and each aspires to be the champion of the sector (Table III.5). For each of these industrial sectors, various actors can drive market-based regulatory frameworks (including voluntary-based ones)—governmental agencies, international organizations, flagship companies, and NGOs. For example, WWF may be one of the most active advocates in promoting a code of conduct in the field of Arctic tourism. The picture of a commercial regulatory framework for offshore oil and gas development in the Arctic region is also messy and multi-layered, in spite of a long history of development and more direct involvement of governments.[23]

For China, Korea, or Japan to directly affect the formation of market-

Table III.5 Economic and Industrial Interests of Non-Arctic States in Northeast Asia

Industries/economic sectors	Most interested states*
NSR shipping	China, Korea, Japan
Shipbuilding and shipyards	Korea
NSR ports and connectivity infrastructure	China
Tourism	China
Oil, gas, and resource development	China, Korea, Japan
Renewables and bio-energy	Japan
Fishing	Japan, Korea
Arctic safety technology	Korea
Deep sea communication cable and technologies	China

*Note: Based on each country's main official Arctic document and policy priority.

based regulatory mechanisms in various Arctic industrial sectors, it depends on not only the historical development of each sector and the existing main players but also the nature of the sector and each non-Arctic state's competitive edge. In some fields, such as seabed drilling and conservation, there has been a governance stalemate at the global level, reflected in the weakness of specialized international agencies (e.g. International Seabed Authority). For technology-intensive fields (e.g. renewables and bio-energy), Japan may have accumulated more competitive advantage than the others. For those sectors that require a large amount of capital investment in advance (e.g. ports and connectivity infrastructure), maybe at this moment of history, China possesses some advantage compared with traditional investors. All these factors will modify what non Arctic states can achieve in the development of better market-based regulatory mechanisms in the future.

Conclusion

For all three non-Arctic countries that this chapter focuses on, and particularly China, state and public awareness of climate impacts in the Arctic is rising and there is evidence of an Arctic link in these countries' domestic climate adaptation plans. However, what is unique for these states is that they also recognize the strategic and economic consequences of an evolving Arctic region, which are not only conceived as risks or harm. For them, the future of the Arctic is not only about the melting ice, warmer summers to come, and changing biodiversity and climate patterns, but also the opening up of new global shipping route(s), new opportunities for trade and economic development, and new dynamics in regional peace and security. On the one hand, there is much to be improved in terms of implementing and mainstreaming climate adaptation at home; on the other, these non-Arctic states are proactive in exploring possible channels to innovate technologies, market relations, business models, and governing mechanisms to be able to get a lead in the future of Arctic affairs.

Notes

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Communities and Adaptation Perspective

Kevin Harun

The Big Picture

Definition of Arctic Sustainability and Importance

What is sustainability? For years, it was defined as the ability of biological systems and ecosystems to persist with diversity and resilience. However, today, as humanity consumes natural resources exponentially with enormous ecological impacts, any definition must be broadened to include integration within the environment of human society and economics.

In 1983 the United Nations established the *World Commission on Environment and Development*, a.k.a. the "Brundtland Commission" to find ways to harmonize social and economic decision making with the environment. The Commission produced a blueprint for sustainability (in 1987) titled *"Our Common Future: Report of the World Commission on Environment and Development"*[1] and defined sustainability as:

> *Sustainability is the process of living within the available physical, natural and social resources in ways that allow the living systems on which humans are embedded to thrive in perpetuity.*

Nowhere is sustainability more critical than in the Arctic where indigenous peoples have lived in harmony with their environment for tens of thousands of years[2]—and where some of the fastest and most consequential impacts of climate change are being felt. The Arctic is in fact the proverbial "canary in the coal mine," and how this region addresses sustainability also has worldwide implications.

It is hoped that in the Arctic (in accordance with the U.N. definition) that "living systems on which humans are embedded…(will) thrive in perpetuity." But hope is not a plan and a rapid response is urgently needed, especially in light of climate change.

Arctic Sustainability Is Not Possible Without Addressing Climate Change

Why did the dinosaurs disappear? Some paleontologists attribute it to volcanic action, while others impute meteoric impacts. In any event, the climate changed so rapidly that most species were unable to adapt and survive.[3] However, in an even more eerie parallel to modern times, the greatest mass extinction recorded (earlier than the dinosaur extinction) killed 90 percent of ocean life and 75 percent on land, as volcanic fires burned through fossil fuel reserves rapidly elevating carbon dioxide levels.[4] At the macro level, the opposite of sustainability is mass extinction.

Slowing the rate of change is critical to sustainability. The primary reason for mass extinctions was inability to adapt to rapid change. To slow the rate of change it is imperative that not only should the United States and other nations remain committed to the Paris Agreement[5] (which seeks to limit the increase in the global average temperature to well below 2°C above pre-industrial levels)—but Arctic and world nations need to take aggressive action to adopt model measures within the Arctic.

Toward a Fossil-Fuel-Free Arctic

Unless the rate of climate change is slowed dramatically, the Arctic environment as we know it is doomed to unprecedented and unadaptable change. A report by Oil Change (August 2015) calculated that developing Arctic fossil-fuel reserves would unlock new carbon that would result in the world exceeding the 2°C increase presented as a manageable by the Paris Agreement.[6] In addition, rising temperature causes Arctic sea ice to melt, decreasing the Earth's albedo. According to NASA, "this decrease in albedo means more energy is absorbed, which causes further warming and in turn causes more melting."[7] The release of black carbon through fossil-fuel development and use also has a disproportionate impact on albedo and temperature.[8]

The Arctic itself should be a model for developing standards to address climate change. One big step would be a vision of a fossil-fuel free Arctic.

While a fossil-fuel free Arctic may currently seems like a fantasy, climate-change impacts are accelerating so fast that it is only a matter of time before decision makers will be pressured to catch-up. Already, for example, in a startling recent move the United Kingdom decided to ban the sale of all diesel or gasoline powered automobiles starting in 2040.[9] France announced it was prohibiting all new oil and gas exploration licenses in a bid to spur renewables and reduce greenhouse gases.[10] Anecdotally, this author, through his organization's permanent consultative status at the United Nations' International Maritime Organization (IMO) has seen just in the past year a rapidly increased international interest in more substantively addressing climate-induced topics such as heavy fuel oil (HFO); energy efficiency and design standards as well as ship greenhouse gas emissions.

Arctic Sustainability at the Local Level

Energy Issues: Helping Arctic Communities to Make Transitions

Any movement toward a fossil-fuel Arctic must address the fundamental question of how to assist communities in making transitions. Most Arctic communities are heavily dependent on fossil-fuels for heating, power generation and subsistence activities. While some communities with identifiable renewable resources are making energy changes, it will take innovation, careful planning and time to ensure this transformation occurs in ways that are not harmful to local residents.

Complicating matters, many Arctic communities look to oil and gas development and other energy-intensive, non-renewable resource extraction projects for both jobs and the local cash economy. In many places, economic alternatives are not readily apparent. For Arctic sustainability to truly be supported, it is essential to identify viable economic activities as well as alternative energy sources.

Reducing Major Threats: Shipping and Heavy Fuel Oil

The Arctic Ocean is one of the most pristine places on earth because it has been largely inaccessible to the outside world—until now. With climate change rapidly accelerating in the Arctic, sea ice is disappearing fast. Current estimates suggest that the Arctic Ocean will be completely ice-free in the summer within 10 to 30 years. Sea ice reductions throughout the year will lengthen the navigation season, open new sea routes, and dramatically increase ship traffic. Arctic nations, along with other economic powerhouses like China, are eager to exploit the newly "open" seas.

Increased ship traffic threatens marine biodiversity and Indigenous food security through potentially devastating oil spill disasters, routine oil discharges, chemical pollution, underwater noise, collisions with whales and other marine wildlife, introduction of invasive species, and destruction of ecosystems. Ships also emit the greenhouse gas carbon dioxide, and they are a significant source of other air pollutants, including black carbon.

In addition to its direct impacts on marine ecosystems and wildlife, increased shipping will accelerate land-based resource extraction. New shipping lanes will provide access to previously remote regions containing a wealth of fossil fuel and mineral resources, while deep-water ports and related industrial infrastructure will facilitate the export of extracted resources to industrial centers around the world.

The International Maritime Organization's (IMO) new Polar Code contains several important environmental provisions that protect the Arctic marine environment: a ban on discharges of oil and oily waters, sharp restrictions for garbage discharges, and a provision that requires mariners to avoid marine mammal concentrations in voyage planning. However, several critical issues were left out of the Code, including black carbon, disposal of ballast and grey water, and the use and carriage of heavy fuel oil (HFO). The Arctic Council has stated that an oil spill, and especially an HFO spill, is the biggest threat to the Arctic marine environment.

Despite shipping's impacts on Indigenous Peoples, there is still no indigenous representation at the IMO. Pacific Environment and allies have started collaborating with indigenous leaders in Canada, Russia, and Alaska to chart a path toward indigenous participation in IMO decision making.

One hopeful new process at the U.S. domestic level is the Coast Guard-led "Port Study" for the Bering Strait region. The Coast Guard has included routing measures and several Areas to be Avoided (ATBAs) in its draft Port Study. New domestic rules will hopefully be enacted..

Over the past few years, conservation groups have created extremely effective domestic and international coalitions to address changing Arctic marine conditions. 1) to reduce the risk of an ecologically devastating oil spill in the Arctic Ocean, achieve a phase-out of the use of HFO and lay the groundwork to phase out the carriage of HFO in Arctic water; 2) to protect sensitive habitats and species, subsistence resources and secure marine protection measures in the Bering Strait region; and, 3) to closely collaborate with Arctic indigenous leaders to facilitate their participation in IMO decision-making through attaining permanent consultative status.

Foundational Blocks of Arctic Sustainability: Culture, Language, Economy

While actions taken nationally and internationally on climate change are critical to Arctic sustainability, local Arctic communities should be the leaders in creating their own sustainable futures. Key foundational blocks of local sustainability are culture, language, governance, and the economy. Arctic communities must be supported in their efforts to support subsistence hunting and fishing and other activities which are central for cultural and physical survival. Many decision makers outside of the Arctic have little understanding at how dependent Arctic residents are on local renewable resources.

Language is important to preserve cultural information for current and future generations; as a construct and vehicle to see the world; as a key component of identity; and, as a validation of all knowledge that has come before us. While some Arctic indigenous communities have lost their language, efforts to restore language and place names are a key component of sustainability. Recognizing the importance of language, in Alaska last year the Inupiaq community of “Barrow” changed its name to “Utquigvik,” meaning “place to gather roots.”[11] Similarly, community governance is a critical piece toward self-directed community sustainability.

A New Arctic Economy

Economic development should be one of the pillars of sustainable communities. One place to start is to provide support for and strengthen traditional economic activities such as subsistence. Ways to promote subsistence, for example, should include utilizing local traditional knowledge and community leaders in the governance of fish and game policies.

Traditional subsistence is in many ways what economists call “import substitution.” Besides subsistence hunting and fishing, other potential import substitutions may exist, such as horticulture in greenhouses to substitute for costly food imports. Of course, all these activities are highly dependent on energy costs. One important way to reduce energy costs is to focus on energy efficiency projects.

For years, the most powerful paradigm for economic development has been characterized by: 1) large non-renewal resource extraction projects; 2) dependence on one industry; 3) bricks-and-mortar infrastructure, such as roads, ports and other projects designed to facilitate resource extraction.

A new Arctic economic paradigm should capitalize on: 1) renewable resources such as eco-tourism and environmental education; 2) potential value-added processing; 3) multiple smaller economic ventures with smaller footprints; 4) knowledge-based services provided via internet; and, 5) a wider vision for infrastructure to include education and broad-band connectivity.

Here are some specific examples of how economic adaptation might take place in harmony with culture, environment and community needs:

Environmental Education. In all parts of the world, there is a growing need for ecologists and environmental educators to develop a knowledge base, teaching skills and a keen understanding of ecosystems, environmental issues and potential solutions to how climate change is affecting a growing range of human activities. One way to advance these goals is to develop environmental education facilities and programs in Arctic regional communities to identify indigenous residents with Traditional Knowledge to develop and teach curricula to outside educators and students. Such local-based Arctic traditional knowledge would not only provide a counter-balance to science-based curricula, it would also assist teachers and students in making connections with Arctic communities necessary for future cross-fertilization of ideas and interdisciplinary decision making. Such regional education centers could be developed in partnership with universities and provide local employment for indigenous educators—as well as provide a means to assist local residents in filling local government jobs relating to science and ecology, i.e., fish and wildlife as well as environmental protection agency positions.

Eco-Tourism Projects. The world yearns to see and learn about all things Arctic firsthand. To fulfill these needs, there is an opportunity for Arctic communities to develop regional strategies to bring tourists in small groups to a network of communities. For example, in Alaska, several villages along the Yukon River could band together to provide a seasonal ferry boat linking villages to provide high-paying tourists the opportunity to observe “the subsistence way of life,” including traditional food-gathering/processing and cultural activities. Local residents could provide a system of local bed and breakfasts as well as a venue to sell local products, including crafts and products.

Value-Added Processing of Renewables. The Arctic tundra provides an array of bounties that might be gathered and processed in small quantities. Some examples include high-quality jams from local berries; mushroom drying; and vitamin products such as rose hips and extracts. One successful venture in the Yukon-Kuskokwim delta of Alaska is the processing of tundra botanicals for beauty products through *Arctic Botanicals*,[12] which produces high-value, high-quality facial serums.

Knowledge-Based Services. With broadband connections across Arctic regions, local residents will be able to provide services remotely to other parts of the world. For example, Arctic entrepreneurs and professionals will be able to provide services such as accounting, engineering and training services to individuals and companies in places far from their home villages or regional centers. By banding together in regional associations, such Arctic enterprises could muster the talent base and marketing skills to compete with other big city operations. At the same time, Arctic communities are already developing expertise in specific topics, such as the installation and maintenance of small wind turbines as well as other higher-tech electrical products. Broadband will enable such Arctic entrepreneurs to travel briefly from off-site locations to market and install their products while providing consulting and maintenance remotely.

The key to such sustainable economic adaptation is to ensure that Arctic communities capitalize on their inherent knowledge-based strengths while using the latest technology to provide services, training and experiences. The beauty of this economic adaptation is that it will enable local residents to develop more of a cash economy while continuing subsistence and other traditional activities.

Notes

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Perspective from a Young Scientist

Malgorzata (Gosia) Smieszek

International Cooperation on Adaptation to Climate Change

Adaptation and mitigation are two distinctive policy responses to anthropogenic climate change. In the past, international policy efforts under the United Nations Framework Convention on Climate Change (UNFCCC) were oriented primarily toward *mitigation* (reducing greenhouse gas emissions) in an attempt to reduce further anthropogenic climate change. The effectiveness of those efforts has been limited, however. Today, the confluence of improved scientific understanding about inevitable climate change impacts, combined with increased political acknowledgement that climate change is an unavoidable issue, has led to the conclusion that efforts to mitigate climate change impacts are insufficient. Consequently, the issue of *adaptation* has grown in prominence (Biesbroek & Lesnikowski 2018), involving efforts to anticipate and plan for future impacts that cannot be avoided.

The Paris Agreement signed in 2015 presented an important step in strengthening the adaptation pillar of global climate policy, and was a milestone in ongoing efforts to make adaptation an equal priority with mitigation. The Paris Agreement not only calls for stronger adaptation commitments from states and outlines stronger transparency mechanisms for evaluating them, but it also sets an ambitious pathway for adapting to climate change that extends beyond national boundaries and urges regions, nations, cities, and other non-state actors and stakeholders to act (Lesnikowski, Ford, Biesbroek, & Berrang-Ford 2017).[1]

Adaptation Actions in the Arctic

The pressing need for adaptation to climate change is more visible in the Arctic than in lower latitude regions. Over the past few decades, the Arctic has been warming at about twice the rate as the rest of the globe. The most recent projections suggest a possible complete loss of summer Arctic sea ice by 2030 and temperature increases of 4-5°C before mid-century (AMAP 2017c). Moreover, climate is not the only driver of change in the region, and the most appropriate adaptation actions need to account for cumulative impacts of not only biophysical origin but also stemming from a host of other socio-economic drivers (AMAP 2017b).

In contrast to mitigation, where the need for global action and international cooperation is widely recognized, adaptation is considered to require responses primarily on the part of individual countries and local communities. Consequently, in the Arctic, as elsewhere, any adaptations to climate change are apt to occur mainly at the domestic and even local levels, where climate change is often not the number one item on the agenda of many Arctic communities—and where the capacity to plan for and finance adaptation measures remain in any case constrained. This, in turn, raises a question about what role the Arctic Council (AC) can play in those efforts, and what the AC is best positioned to do in this respect.

The Arctic Council and Adaptation to Climate Change

Since its first scientific assessments, the AC has been at the forefront of generating information about the state of changes and developments unfolding and transforming the region. The substantive agenda of the AC has been to a large extent shaped by the Arctic Climate Impact Assessment (ACIA) from 2004/2005, which established the Arctic as a region where global climate change impacts were already significant. The ACIA drew attention to profound consequences of climate change in the region and beyond. As a result, since the ACIA, the bulk of activities of the Arctic Council's working groups have focused on deepening understanding of various aspects of climate change in the Arctic, tracking developments related to it, and formulating ways to address its impacts. Among major AC deliverables have been: Protection of Arctic Marine Environment (PAME) working group's Arctic Marine Shipping Assessment (AMSA) and its follow-ups[2]; Conservation of Arctic Flora and Fauna (CAFF) working group's Arctic Biodiversity Assessment with a detailed plan on implementation of its recommendations (CAFF 2013); numerous projects of the Sustainable Development Working Group (SDWG); the Arctic Resilience Report and Arctic Resilience Action Framework adopted in 2017; and finally and most recently, Arctic Monitoring and Assessment Program's (AMAP) Adaptation Actions for a Changing Arctic (AACA). The AACA is the first assessment dealing specifically with adaptation actions in three Arctic pilot study regions: the Barents area, the Bering-Chukchi-Beaufort Seas areas, and the Baffin Bay/Davis Strait region (AMAP 2017a).

In light of profound and accelerating changes induced across the Arctic by climate change and globalization, it is important to consider the role and potential of the Arctic Council in addressing the adaptation needs of Arctic communities and in supporting Arctic states and sub-state actors in actions for which they are primarily responsible. Several areas come to mind in this respect.

First, continuation of regional scientific assessments that have, over the past two decades, become the landmark achievements of the Council and fulfilled an important niche in supplying data and analysis to a variety of state and non-state parties. However, significant gaps remain in our knowledge about climate change impacts in the Arctic, and also in assessing the economic and societal costs of climate change damages, risk mitigation, and cost/benefit analyses of adaptation efforts, including the implications of taking no action. Furthermore, little is known about adaptation measures, strategies and policies that have been implemented, and there is a lack of tools such as scenarios, guidelines, and protocols that could provide decision makers with practical advice and orientation about how to implement adaptation activities in their specific contexts (AMAP 2018). Finally, regarding assessments of various adaptation efforts, there remain a number of methodological, conceptual, and data availability issues that surround these assessments. These need to be addressed in order to capture and monitor adaptation trends in a systematic and comprehensive manner, enabling a more uniform measurement and evaluation system to track adaptation progress across the Arctic region (UNEP 2017). With its extensive experience in producing scientific assessments and its broad networks of experts, the Arctic Council is very well positioned to provide such services, and for them to provide important support to national efforts and the formulation of national adaptation plans that are adequate to address the unique needs of the Arctic.

Second, the Arctic Council might provide a venue for developing a conceptual framework for thinking about the subject of adaptation to climate change in the Arctic. Throughout its existence the AC has become an important forum for creating a common and shared understanding of Arctic issues and challenges, and it could serve in a similar function with respect to climate adaptation. An example of the Council's actions in this arena has been work on resilience in the Arctic. One such effort (among many) is the Arctic Resilience Report and the Arctic Resilience Action Framework (ARAF), adopted by Arctic ministers in 2017 (Arctic Council 2017). The ARAF is meant to provide a platform to continue discussing priorities related to Arctic resilience, and toward that goal a circumpolar resilience forum was held for the first time in Finland in September 2018. It is not yet clear that the framework and work around resilience in the AC will be successful in shaping discussions around adaptation to climate change in the Arctic and contribute to strengthening capacities of Arctic communities to face the compound impacts of socio-environmental changes in the region. One of the important issues to consider is how work on resilience and on sustainable development come together, and how efforts dedicated to the theme of resilience help in concrete terms to advance the sustainable development agenda and contribute to realization of the Sustainable Development Goals to which all Arctic states have subscribed.

Third, the Arctic Council can facilitate exchanges regarding experiences with adaptation efforts in various parts of the Arctic, which often share similar challenges that are distinct from those faced by communities in the southern regions and capitals of Arctic countries. One example of such activity has been a project of the SDWG, the Arctic Adaptation Exchange Portal. This has been designed to connect Arctic communities, decision makers, and researchers and to provide space for Arctic residents to exchange best practices and most useful—from their own experience—adaptation strategies. Seeing the number of challenges related to climate adaptation in the region, more initiatives along this line could follow. Furthermore, through its work the Arctic Council could promote the mainstreaming of adaptation concepts into both short- and long-term planning and encourage incorporating the adaptation perspective into a wide range of projects, such as Arctic social and environmental impact assessments. Once more the AC, with its unique composition and inclusion of representatives of Arctic indigenous organizations, appears to be the right platform for these kinds of efforts.

Building on these efforts, the Arctic Council could also serve as a useful link to communicate Arctic adaptation issues to the rest of the world, a fourth area where the AC could play a role regarding climate adaptation, given that even if the goals of the Paris Agreement are met, they will not prevent further temperature increases in the Arctic region, especially in comparison to the rest of the northern hemisphere. Therefore, the Arctic serves as a primary case to draw global attention to the fact that even under the best scenarios there is a pressing need for increased adaptation efforts and that the need for climate adaptation is already critical in some regions. Moreover, the AACA Adaptation Actions for a Changing Arctic project not only points to areas that require further work that can benefit from experiences elsewhere—such as combining climate- and socio-economic scenarios—but it can also inform similar efforts in other regions and promote future discussions on adaptation within a global climate regime.

Finally, the Arctic Council can advance its work with bodies like the Arctic Economic Council (AEC) and the Arctic Coast Guard Forum on relevant matters regarding adaptation. In this respect, the relationship with the Arctic Economic Council, the entity that the AC created in 2015 but which operates independently from it, appears to be particularly worth exploring. To date, linkages between these two institutions remain underexploited while there is an increasing appreciation of a role that economic actors can play in addressing impacts of climate change. The World Bank, the Paris Agreement and the AACA all speak of economic development and economic diversification as one of the best ways and hopes for adaptation to climate change (AMAP 2017a; United Nations 2015). At the same time, procuring adequate financing by incentivizing private sector engagement into adaptation efforts is a critical outstanding challenge, from global to local levels of governance. Private entities have tended to engage in mitigation rather than adaptation projects. Whereas such a focus can be understandable among actors driven by objectives of profit maximization for whom consideration of climate change adaptation benefits has not been a primary concern, nonetheless, such benefits could be an added value to the investments of business entities in the region. It is toward this goal of greater integration of business to support adaptation to climate change in the Arctic that the AC could utilize its collaboration with the Arctic Economic Council. While one of the AEC's goals is to provide advice and a business perspective to the work of the Arctic Council, the AC could also inform discussions within the AEC to encourage the mainstreaming of an adaptation perspective across a wide range of business projects and activities in the Arctic.

By including the theme of climate adaptation into discussions in the Arctic Economic Council, which brings together economic operators both from within and from outside of the region, the AC and the AEC could broaden the circle of involved parties to non-Arctic business actors and draw their attention to issues specific to the Arctic. Accordingly, economic activities that support adaptive capacities and decrease vulnerabilities of Arctic communities should be explored. These might include creating flexible employment arrangements and seasonal working hours to reduce possible trade-offs between working in the cash economy and pursuing subsistence activities, and developing industry jobs that do not compromise indigenous community values and are, ideally, culturally close to traditional practices. With greater collaboration between the AC and the AEC, these and other ideas could be debated and promoted among a broader group of relevant actors. One possibility for advancing such discussions could be a pilot collaboration project between the Arctic Council and the Arctic Economic Council to exploit jointly one of the topics of the AEC (for instance, marine transportation or mining) and make a focused study with support of the AEC to identify the best options for how businesses can support and serve adaptation responses in the region in any given economic activity.

Conclusions

The Paris Agreement recognized that adaptation to climate change must be addressed with the same priority as mitigation. While it is still not equal to mitigation with regard to target-setting, financing, and institutional frameworks, the outcome from the UNFCCC COP21 significantly strengthened global efforts targeted at climate adaptation. Among others, it stated explicitly that "adaptation is a global challenge faced by all with local, subnational, national, regional, and international dimensions" (United Nations 2015) and that to respond to it, mobilization and cooperation with non-state actors such as cities, local communities, Indigenous Peoples, businesses and civil society is vitally needed (Lesnikowski et al. 2017). Similarly, a relevant question concerns a role that regional forums such as the Arctic Council can play in climate adaptation efforts and what kind of support such institutions can provide to states and local communities faced with the adverse effects of climate change. The Arctic Council appears to be well suited to provide several such functions, including: continuing with its scientific assessment work and help develop new tools that are responsive to the needs of decision makers in the Arctic; developing conceptual frameworks for thinking about the subject of climate adaptation in the Arctic; facilitating exchanges regarding experiences with adaptation efforts in various parts of the Arctic; serving as a link to the outside world in communicating Arctic adaptation issues; and finally, working with subsidiary bodies on matters relevant to adaptation, in particular with the Arctic Economic Council, on opportunities for private sector engagement into adaptation efforts in the Arctic. In all those functions the AC could significantly contribute to realization of the Agenda 2030 and the Sustainable Development Goals that, together with the Paris Agreement, constitute a pathway agreed upon by the global community and all Arctic states toward achieving a sustainable future. Urgent action on adaptation and dealing with the impacts of climate change is vital to the successful implementation of the SDGs, and nowhere else are the adaptation needs as high as in the Arctic.

Finland, as the Chair of the Arctic Council 2017-2019, framed its chairmanship program both around the Agenda 2030 and the Paris Agreement, and throughout its term there have been ongoing discussions about how work within the Council could contribute to the realization of the Sustainable Development Goals, and vice versa. Conceivably, one possibility would be to put even greater emphasis on adaptation work within the Council and make it one of the overarching themes within the AC. In light of the paramount challenges related to the scale and compound nature of change within the region, only sustained and explicit focus on adaptation can bear fruit, by continuously deepening the knowledge base for decision makers and strengthening the adaptive capacities of Arctic communities. To make this happen, climate adaptation should become a centerpiece and a standing agenda item of each ensuing chairmanship of the Arctic Council until 2030 and beyond.

Notes

1. Article 7 of the Paris Agreement is dedicated specifically to adaptation. It establishes the global goal on adaptation "of enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change, with a view to contributing to sustainable development and ensuring an adequate response" in the context of the overall goal of the Agreement of holding average global warming well below 2°C Celsius and pursuing efforts to hold it below 1.5°C. It requires all parties of the Agreement to engage, as appropriate, in

adaptation planning and implementation through, among others, development or enhancement of national adaptation plans, assessments of climate change impacts and vulnerability; monitoring, evaluation, and learning from adaptation plans, policies, programs, and actions, and building resilience through economic diversification and sustainable management of natural resources (Art.7 para 9). Moreover, the parties should also strengthen their cooperation on enhancing action on adaption through, *inter alia*, sharing information, good practices, experiences and lessons learned; strengthening institutional arrangements to support the synthesis of relevant information and knowledge; strengthening scientific knowledge on climate, including research, systematic observation of the climate system and early warning systems, and improving the effectiveness and durability of adaptation actions (Art.7 para7) (United Nations, 2015). Conceivably, many of the above listed action items might be facilitated via relevant regional bodies, especially those that—like the Arctic Council—have been active for a long time in facing climate change issues and play an important role at the science-policy interface.

2. Arguably, contributions from AMSA and PAME to the process of developing the mandatory Polar Code of the International Maritime Organization (IMO) present one form of adaptation and response of the Arctic Council to the changing circumstances in the Arctic. In a similar vein, the first two legally binding agreements negotiated under the auspices of the Arctic Council, on search and rescue and oil spill preparedness and response, might be also regarded as a form of adaptation to rapidly evolving conditions and growing human activity in the Arctic marine areas.

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PART IV

TRENDS IN ARCTIC RESOURCE EXTRACTION AND LOGISTICS: GLOBAL DRIVERS AND REGIONAL CONDITIONS

Global Market Developments and Implications for Arctic Resource Development

David Pumphrey

Global energy markets are experiencing pressure from an array of factors. Climate change and other environmental concerns are leading to adoption of policies driving greater energy efficiency and a shift away from fossil fuels. Research and development have reduced the cost of renewable technologies to the point that they are becoming significant contributors to energy supply. Technological breakthroughs are foreshadowing the potential for a disruption in the automotive sector. New technologies are allowing access to oil and gas resources that previously could not be developed on commercial terms. The increase in oil production from these resources has caused major oil resource holding countries to reevaluate their approach to market control, while an increase in accessible gas resources has redefined the international market for liquefied natural gas trade.

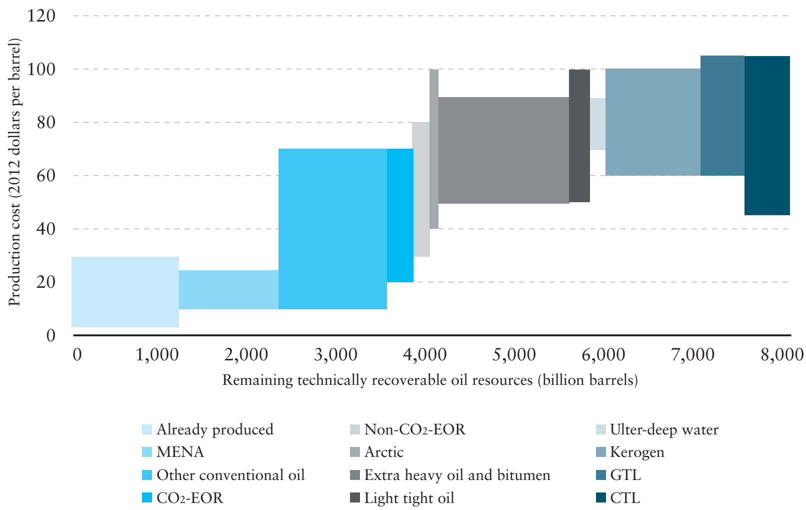
Arctic oil and gas resource development will be influenced by all of these changes. Resources in the Arctic are generally higher cost, involve long lead times and stay in production for several decades. As companies consider investment in the Arctic region, they must carefully evaluate all of the factors that will shape global energy markets before proceeding. This paper will examine the expectations of energy market analysts as well as factors that could cause energy markets to diverge from the consensus views.

Cost of Arctic Resource Development

A number of factors make the Arctic a more difficult and expensive place to operate than other petroleum areas. NPAC 2015 included an extensive review of the issues facing exploration, development and transportation of Arctic oil and gas resources. Companies must operate in remote areas far from the centers that supply the necessary equipment and materials. Harsh weather can limit operations. The infrastructure to move produced oil and gas to markets is limited and must be built as a part of opening new areas of production. Transportation infrastructure investments face the same challenges in terms of remoteness and harsh conditions—and are costlier than those in more temperate regions.

The costs of development in the Arctic can vary widely. Significant petroleum production has been commercially viable for large fields in the onshore Arctic regions of Russia and Alaska. In the offshore Arctic, regions that are ice-free year around, such as the Barents Sea, tend to face lower risks and are starting to show results. Other fields, such as Norway's Johan Castberg, are moving forward. The most difficult areas are those where there is significant ice coverage during all or parts of the year. Only Russia's Prirazlomnoye project has been completed in this type of environment.

Because of the potentially wide variability in costs, field sizes, and infrastructure needs, a precise estimate of the break-even cost for Arctic production is difficult. The International Energy Agency provided a set of cost estimates for global petroleum resources, which placed Arctic oil resources at the high end of the global oil supply curve (Figure IV.1). The Arctic represents a relatively small amount of remaining oil resources at a higher cost relative to other oil resources. In the past, when the common perception was of limited resources, this supply curve would have



Source: International Energy Agency, World Energy Outlook 2013

Figure IV.1 *Estimated Global Technically Recoverable Oil Resources* served as an indicator of how high oil prices would have to rise to bring sufficient production to meet global needs. With the current perception that petroleum resources are adequate with large amounts of competitively priced alternative sources, this supply curve provides an indication of the resources that will be developed much later than previously expected—if they are developed at all.

Natural gas development in the Arctic faces additional cost hurdles because the infrastructure needed to move natural gas to market is more expensive than that required for oil. High pressure pipelines, pumping stations, and gas treatment plants are needed for long distance natural gas pipeline systems. Liquefied natural gas (LNG) shipments require industrial-scale liquefaction plants, LNG ships and regasification facilities. Arctic natural gas fits in the global gas supply curve in a position similar to Arctic oil, being further up the supply curve with extensive undeveloped resources occupying the less expensive portion of the curve.

Global Energy Market Outlook

The basis of a company's decision to invest in major oil and gas projects is the expectation of future price paths. These price paths will be a function of the demand for the commodity, other resources that will be brought to the market and the prices and availability of other fuels. Several market outlooks were reviewed for this paper to determine if there is a consensus on the market pathways through 2030 and beyond.[1]

Oil Outlook

Most forecasts include several scenarios to reflect different assumptions about policies, economic activity, and resource availability. A consensus scenario for these recent oil market outlooks indicates a much slower growth in total oil demand through 2040, about 0.5-0.7 percent/year, which is about half the growth rate seen in the decade before. Petroleum consumption reaches 105-114 million barrels/day (Mbd) by 2040 from a 2016 base of 98 Mbd. Oil consumption grows fastest in the first ten years of this period but begins to plateau and decline after 2030. Transportation demand for petroleum remains the most important sector at about 55 percent of total liquid fuel consumption. Growth in transportation demand slows significantly, however, as vehicle fuel efficiency improves and alternative fuels, especially electricity, penetrate the market. The peaking of demand for transportation is the principal reason total oil demand plateaus and begins to decline in all forecasts. Because transportation sector demand is critical to future oil demand, the pace of introduction of electric vehicles is the key sensitivity for all oil market forecasts.

Until 2030 additional oil production is expected to come principally from tight oil resources in the United States. The performance of U.S. tight oil production is a key question in the outlooks. Tight oil production showed unexpected resilience during the oil price crash of 2014. Producers retrenched for a period and then worked to reduce production costs and improve productivity and were able to respond quickly as oil prices began to increase in 2016 and 2017. Although demand for oil will likely plateau and then fall after 2030, additional production will need to be brought on line to replace production decline in existing fields. The additional production in this period will come from Middle East OPEC countries. After growth in the early 2020's, production in non-OPEC countries outside the U.S. declines slowly.

Most oil market outlooks, especially those by major oil companies, do not publish oil price forecasts. The implications of slow and peaking oil demand in the context of large remaining oil resources are that oil prices will not likely return to the $100/barrel level in the 2030-2040 period. Given this outlook for global oil markets, Fereidun Fesharaki of FACTS Global Energy (FGE) has estimated that for investment purposes, companies should consider a long run oil price in the range of $65-70/barrel (in 2018 USD).[2]

Polices of the major OPEC Middle East producers will be important in determining future price levels. In a recent paper, BP economists discussed the policy choices facing Middle East producers with large low-cost reserves.[3] Until the U.S. shale revolution disrupted the global petroleum market, conventional wisdom said that the best development policy for OPEC countries with large reserves was to build oil production capacity slowly and benefit from the "inevitable" increase in oil prices. The emergence of U.S. oil as a global factor as well as flat oil demand growth, both driven by the high prices of the 2000's, undercut the vision of ever-increasing prices. In 2014, Saudi Arabia and other large producers abandoned defense of prices in favor of a market share strategy to squeeze high-cost oil producers. This policy change reduced oil prices from above \$100/barrel to about \$30/barrel, which has now recovered to the \$70/barrel range.

A global outlook for slow growth in demand and eventual plateauing of growth provides a motivation for these producers with large low-cost resources to no longer ration their oil reserves but instead to develop them more rapidly to assure market share. In addition, large oil resource holders have become sensitive to the impact of sustained higher prices on oil demand and supply from alternative sources.

Natural Gas Outlook

Global natural gas demand is to grow much faster than oil through 2040 with growth rates averaging about 1.5 percent/year. This growth in demand is driven by strong demand for electric power generation and industrial use, availability of low-cost supplies of natural gas, and increasing international LNG trade. Switching from coal to natural gas for power generation and industrial consumption is a key factor in natural gas demand growth. BP estimates that about half of the growth in demand can be attributed to decisions to switch from coal to gas. The decision to switch has been driven by the availability of low-cost gas as well as government policies to reduce air pollution and carbon emissions. The growth in LNG trade is also linked to the availability of low-cost gas supplies and the growing competitiveness of the international market as the previous price and delivery restrictions disappear.

Additional natural gas supplies are expected to come from U.S. shale gas production and Middle East producers, especially Qatar and Iran. U.S. shale production will account for nearly 25 percent of total global gas production in 2040.

The outlook for natural gas is very sensitive to environmental policies, resource availability and alternative fuels technology. The expectation for strong demand growth for natural gas is vulnerable to changes in these variables, and generally any change will result in slower growth in demand for natural gas. Weaker environmental policies will tend to slow the shift from coal to natural gas. Higher natural gas prices resulting from less favorable resources will have a similar impact on fuel switching and gas demand growth. Stronger environmental policies supporting faster reduction in carbon emissions will encourage more investment in renewable energy for the power sector. Ironically, natural gas demand growth will be negatively affected by either weaker environmental policies or stronger ones. In addition, continuing reductions in the cost of renewable energy as well as development of battery technology will also reduce the growth in demand for natural gas for power generation.

Alternative Scenario for Energy Markets

Some global market outlooks also contain scenarios that model the impact of countries implementing policies to significantly reduce greenhouse gases. These forecasts model policies that achieve the target of limiting the increase in global average temperatures to 2°C, about a 50 percent reduction in greenhouse gas emissions. Achieving this target requires deep decarbonization of the energy sector through investment in renewables and nuclear for the power sector, rapid introduction of electric vehicles, deployment of carbon capture systems and increases in overall energy efficiency.

The pathways to this lower level of emissions are different among the individual scenarios but the implications for global oil and gas demand are similar. For oil demand, more stringent carbon policies reduce the projected demand in 2040 by between 26 percent and 34 percent. Compared to 2016 levels, oil demand in 2040 could be about 25 percent lower. Global natural gas demand in 2040 would also be reduced by 25 percent to 33 percent under the tighter carbon polices. Compared to 2016, natural gas demand in 2040 could still show limited growth or could be up to 20 percent lower.

Tony Seba, a tech sector entrepreneur and Stanford University lecturer, has put forward an alternative vision of disruptions to both the transportation and energy markets. Seba's analytical framework looks at new technologies that create opportunities for new business models that can radically change an industry. The analysis "uses systems dynamics, including feedback loops, network effects and market forces, that better reflect the reality of fast-paced technology-adoption S-curves"[4] rather than the more incremental approach of mainstream forecasting. The principal drivers of this disruption are the deployment of electric vehicles, approval of autonomous vehicles, and the emergence of a business model that provides transportation services to individuals. Seba has looked at the state of technology development for batteries and autonomous vehicles to develop projected cost curves. Based on past trends, Seba estimates that electric vehicles are approaching cost parity with internal combustion vehicles and costs should converge by 2021. He believes that 2021 will also be the point at which regulators will approve autonomous vehicles. At this point of convergence, a business model will emerge in which companies will use autonomous, electric vehicles to provide transportation services for individuals. These companies will be able to take advantage of the long-term cost benefits of electric vehicles and higher utilization rates to offer transportation to individuals at significantly lower cost than using privately owned vehicles.[5] Seba estimates the introduction of this new transportation service model will offer the consumer a four to ten times reduction in costs per mile, versus continuing to own an internal combustion-powered car or buying a new one. This change in economics will lead to a sharp drop in new car sales and a glut of used car sales as urban users switch to the new transportation service, followed later by smaller cities and towns. The analysis concludes that within ten years, 95 percent of passenger miles in the U.S. would be provided by the new transportation system, with 60 percent of the vehicles on the road being owned by service providers rather than individuals.

This disruption in the automotive industry would be extensive, leading to the virtual disappearance of the traditional model of sales and distribution. The implications for the petroleum industry would also be significant. Total demand for oil would drop to about 70 Mbd by 2030 and prices would be in the $25/barrel range.

The Seba analysis is controversial, and mainstream industry analysts will likely dismiss the results and challenge its assumptions about cost, consumer preferences, materials and infrastructure readiness. The possibility of such disruption—even if it starts later and takes longer—still creates risks and uncertainties for major new investments in the petroleum industry.

Implications for Arctic Resource Development

The energy outlooks produced by industry analysts, energy companies and governments show that future Arctic energy projects may face a difficult economic environment through 2030 and 2040. For oil, the consensus view is that demand will increase slowly until 2030, when it will plateau and begin a slow decline. For natural gas, demand is expected to rise more rapidly—but this increase will be vulnerable to higher price levels, environmental policies and the pace of investment in renewables. Energy projects in onshore Arctic areas that have infrastructure to support production activities and transport oil and gas to market as well projects in ice-free Arctic offshore zones will be the least affected and likely be able to proceed. Projects in other areas, including those with little infrastructure support and in Arctic offshore areas with significant ice, will be challenged under these market outlooks unless there is strong government support through subsidies or preferential tax treatment.

The expectation of strict carbon emission policies, a major disruption in transportation demand for oil and/or breakthroughs for renewable energy would make the investment environment even more problematic for Arctic oil and gas projects. For greenfield projects that are intended to last over a number of decades, lower oil and natural gas prices that would result from lower demand would create a high risk of financial losses for projects and asset stranding. Existing Arctic projects would confront difficult financial decisions when fields and infrastructure need new investment to sustain production levels.

Notes

1. Sources include BP's Energy Outlook 2018, IEA,'s World Energy Outlook 2017, Facts Global Energy outlooks, and Equinor's (formerly Statoil) Energy Perspectives 2018.
2. Fereidun Fesharaki, presentation at The 26th Annual Middle East Petroleum & Gas Conference, April 22-24, 2018 Abu Dhabi
3. Spencer Dale and Bassan Fatouh, "Peak Oil Demand and Long-run Oil Prices," BP.com.
4. James Arbib and Tony Seba, "Rethinking Transportation 2020-2030" RethinkX.com
5. The service provided will be similar to Uber and Lyft but will not involve individual drivers in privately owned vehicles.

Arctic Shipping Perspective in the Context of Global Shipping

Henrik Falck

Background

For those not familiar with shipping terminology, I would like to explain some of the basics about international shipping costs, which are equally relevant for Arctic shipping, especially when considering the costs and potential benefits of using the Northern Sea Route (NSR).

- Cargo owners calculate their transportation costs in units such as cubic tons, MMBtu or simply as a lump sum if it involves transport of a large unit such as a factory.
- Ship owners always calculate their fees as a “time charter equivalent” (TCE) on a round-trip voyage basis, i.e. both the loaded leg and the ballast back to a similar loading place are included. TCE is a shipping industry measure used to calculate the average daily revenue performance of a vessel. The TCE is the freight paid by the cargo owner to the ship owner, less voyage related expenses such as fuel, port charges and canal tariffs, all divided by the number of days involved in the round voyage. Thus TCE is the net revenue per day for the ship owner.
- Freight is a revenue or income for the ship owner, but a cost or expense for the cargo owner.

The table below shows a simplistic example on how freight-per-ton translates into a time-charter equivalent. The example is a round-trip voyage from Kirkenes, northern Norway, to Shanghai using the NSR both ways.

The TCE is the daily cost for a vessel, and these rates are reported daily on the Baltic Exchange in London for various types of vessels. The rate reported for a Panamax vessel (about 80,000 dwt) on June 19th. this year was $11,902 per day.

A reported increase in the TCE can be caused by an increase in the freight level (will cost more per ton from A to B) or a decrease in the fuel

			This is what the cargo-owner is looking at
	TONS	USD	USD
Freight	80,000	22.00	1,760,000
Bunker Sailing			-362,600
Canal-NSR tariffs			-200,000
Port Costs			-360,000
Insurance ice pilot			-80,000
Commission		0.025	-44,000
Profitt			713,400
	Days		
T/C Result	46.83		15,233
This is what the ship-owner is looking at			

			This is what the cargo-owner is looking at
	TONS	USD	USD
Freight	80,000	20.00	1,600,000
Bunker Sailing			-362,600
Canal-NSR tariffs			-200,000
Port Costs			-360,000
Insurance ice pilot			-80,000
Commission		0.025	-40,000
Profitt			557,400
	Days		
T/C Result	46.83		11,902
This is what the ship-owner is looking at			

expenses. (Port charges are normally stable)

In the examples above, on the right a cargo owner would therefore prefer to hire a vessel for $11,902 and calculate “backwards” to arrive at a freight cost of $20 per ton. (Or the cargo owner might go back to the ship owner and offer $20/ton, knowing that this fee is line with the market.)

In the example above on the left, the vessel uses 24 tons of bunker (fuel used by ships) each day.We assume a price of $360 per ton at a speed of 14 knots, or $8,640 per day. Two extra days for ice conditions have been included. Now, if there is less ice and one day is saved, then the bunker cost decreases by $8,640 and the profit increases to $722,040, divided by 45.83 days, which gives a TCE of $15,745. This represents a 3.5 percent increase, a non-significant variable (unless you get stuck in the ice for 10 days).

If the new Polar Code results in a ban on heavy fuel and ship owners need to use marine diesel, which is $200 more expensive per ton, then the TCE drops 50 percent to $7,717 per day, which is a game changer.

The NSR tariff, or icebreaker cost, can vary greatly, depending on how much need there is for icebreaker assistance. If one succeeds in a transit without any assistance, then the profit increases to $913,400 with a TCE of $19,504, a 28 percent increase on the TCE basis, which represents a significant cost variable.

Over the last decade the TCE for a Panamax has varied between $5,000 and $100,000 per day. The bunker cost has varied between $150 and $500 per ton. Finally, the NSR tariff has been between nothing and $5 per ton. It is the sum of these costs that makes the NSR competitive—or not. Another element is the backhaul effect, which will be dealt with separately later in this chapter.

In short, we are talking about a very dynamic market, where today's advantage of using the NSR can become tomorrow's disadvantage.

Arctic Shipping in the Context of Global Shipping

World Seaborne Trade

Looking at the map (Figure IV.2), you will see that there is no benefit for countries in South America, Africa, the Middle East, India, and Australia to use the NSR. If you add that the U.S. is better off using the Panama Canal in most cases, then only a small fraction of world seaborne trade is actually relevant for the NSR. Bulk carriers arrive in Europe to discharge cargo that has been loaded in the southern hemisphere. After the discharge of cargo, these vessels will go south (to South America, the United States, and Africa) to find new cargo. For these trade routes, there is no need for the NSR.

The Baltic Sea is one of the few loading areas in the northern Atlantic, and the NSR offers a sailing route that is ten days shorter than through the Suez Canal to the Far East. However, the Baltic market is marginal in a global context and is normally a trading area for smaller bulk carriers because of draft restrictions.

The situation is similar in the Far East, where Japan, Korea, and China are the major discharge areas for bulk carriers. After discharge, vessels will go either to Australia or to South Africa to pick up new cargo. Again, there is no need for the NSR.

Figure IV.2 Map Illustrating Arctic Shipping in a Global Context

The West Coast of the United States is the only loading area in the northern Pacific hemisphere relevant for a discussion of the potential use of the NSR in "competition" with the Panama Canal.

To study the potential for usage of the NSR (for bulkers) we should therefore focus on the loading ports.

New loading ports along the NSR will, because of the backhaul effect (see below), offer interesting new trading patterns for ship owners, and hence competitive rates for cargo owners.

For bulk vessels:

- The Far East is an importer of raw materials that are loaded in areas that presently make the NSR irrelevant.
- Europe is an importer of raw materials that come from the southern hemisphere. Hence there is no need for the NSR for this purpose.

Apart from a relatively small part of global shipping that involves exports from the Baltic Sea to the Far East, the great majority of world seaborne trade does not benefit from the NSR. Likewise, trade from the northwest coast of the U.S. is important—yet is not significant in a global context.

In a more simplistic way, one can say that the challenge for the NSR is not so much that ice conditions remain variable or even that port infrastructure is lacking: The NSR's main problem is that it is located too far to the north.

Backhaul and Repositioning

Figure IV.3 is an illustration reflecting the various market rates for a Panamax vessel (old but representative rates showing the difference of market value (TCE) in the various markets).

A good paying loaded leg and a low-paying backhaul is the general rule in logistics. For a Panamax vessel, a typical scenario is that the time-charter rate (TCE) from the Atlantic to the Far East is $15,000 per day, while the rate back from the Far East to the Atlantic is $1,000 per day. In theory, the owner can cut the low-paying backhaul by taking the shortcut via the Arctic. However, the loading areas in the Atlantic are located in the southern hemisphere (you do not go through the Arctic if you are going to load in Brazil). The Baltic Sea (and Norway) are exceptions, and usage of

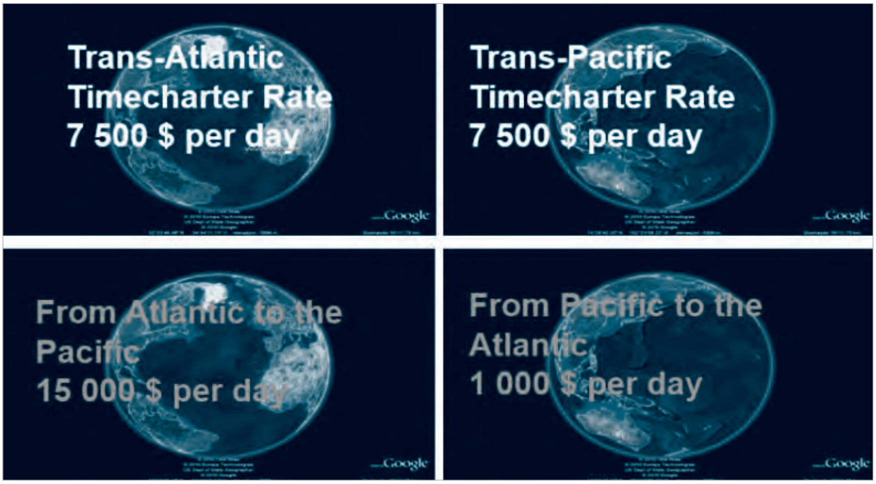


Figure IV.3 Typical Trading Pattern for Dry Bulk Panamaxes

the NSR can offer a 10-day saving. If a vessel has discharged its cargo in the Far East and has a new loading opportunity in the Baltic, then usage of the NSR could be interesting—actually very interesting if the vessel can avoid paying any icebreaker fees.

Playing with figures, 10 days out of the $1,000 market and into the $15,000 market adds $140,000 to the bottom line. Assuming that a shipowner can find sufficient cargo to use this shortcut, then over the 20-year technical lifespan of a vessel, it will equal $3 million, which is 10 percent of the new building cost (a new Panamax vessel cost around $25 million at the beginning of the year but has risen to $30 million today).

It is likely that Russia will succeed in establishing new industries in the Arctic, especially in the mining sector. These industries can benefit from the backhaul effect for vessels going westward, and therefore some remote Arctic areas will be able to compete with transatlantic freight rates. With today's bunker prices and current rules and regulations (and no Russian Jones Act), it will be cheaper to transport coal to the European continent from ports along the Russian NSR than it is to transport coal from the east coast of the United States. In a global context, it will still be insignificant volumes. In an NSR context, however, this could represent a significant increase, since the figure is so low today.

For container vessels, the backhaul shortcut would apply from the Atlantic to the Far East, but scheduling and slot times will be challenging because of unpredictable ice conditions. Any delay can be critical as container vessels have slot times in both loading and discharge ports. However, large container lines with a substantial fleet will have the flexibility to offer clients a fixed rate for their containers. The lines will have an option whether to use the long route via Suez or the shortcut via NSR.

Containers and Multi-purpose Vessels

When it comes to the export of containers from the Far East to Europe, the trading patterns are much more complex than in the case of bulk shipping, with multi-porting and slot times. Going north through the NSR, a ship passes five million people, but going south through Suez a ship passes 5 billion people. Europe is an importer of loaded containers coming from the Far East. Their backhaul and repositioning of empty containers could make the NSR interesting, but with the limitations mentioned above.

A multi-purpose vessel is a hybrid between a container and a bulk vessel that can load and discharge heavy loads and large objects with the vessels' own gear. From what we see today, this type of vessel is probably the most interesting one when it comes to future NSR destinational shipping in both East and West directions, as they can export Russian raw material and import spare parts and consumables (and even entire factories). Chinese COSCO Shipping has established a semi-liner service with this type of vessel, where load and discharge areas are defined but where the time schedules remain open. The commercial challenge is to succeed with the cargo combinations. Transportation of a large object requires long-term planning while loading of bulk cargo is more spot oriented.

Commodity Prices

Commodity prices can vary a lot among markets, opening up arbitrage for the traders. The best example on how differences in commodity prices can strongly influence the trading pattern comes from 2012, when the price for LNG in Japan rose to three times higher than in Europe following the Fukushima nuclear disaster. At that time the time-charter rate for an LNG vessel was $150,000 per day. From northern Norway (Melkøya) to Japan via the NSR was 21 days shorter than going through Suez, and a roundtrip using the NSR represented a saving of $8 million for the ship owner (adjusted for bunker and canal costs). Another example is when Tschudi undertook their first commercial voyage in 2010, when the price for iron ore was $30 per ton higher in China than in Europe. The advantage of using the NSR resulted in a higher time-charter equivalent for the owner and a higher netback for the sellers, i.e. vessel and cargo divided the cost advantage of taking the shortcut.

Economy of Scale

From northern Norway to China, the NSR is 50 percent shorter than the Suez route. However, even for this particular route, it is cheaper per ton to transport 180,000 tons through the expanded Suez Canal than 80,000 tons through the NSR. The largest ice-classed bulker is still around 80,000 dwt.

Trading Peculiarities

We have been looking a lot at the trade of frozen fish going from northern Norway to the Far East, where the advantage of using the NSR should be obvious. However, it turns out that the cold-storage cost is so much cheaper in Europe than in the Far East that the buyers prefer to keep their inventory in Europe. Bringing the fish from northern Norway to Europe is 60 percent of the total freight-cost and only 10 percent of the total distance to the Far East. Likewise, the trade of frozen fish from

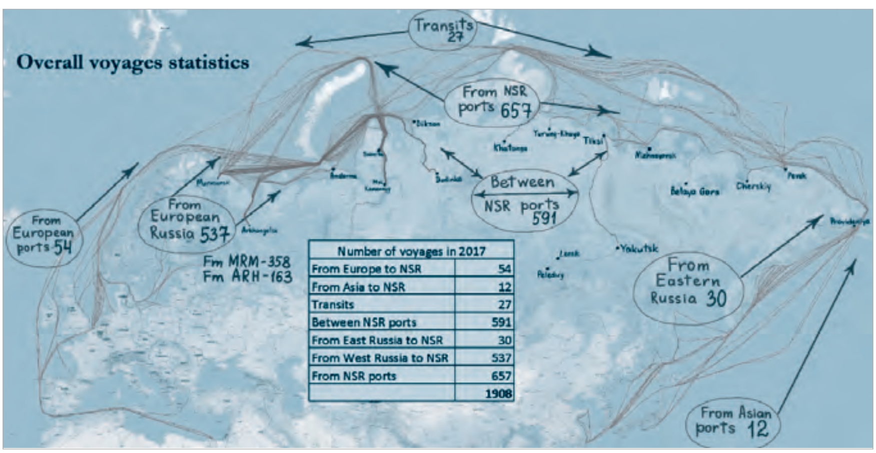


Figure IV.4 Transits Versus Destinational Shipping.

Dutch Harbor to Europe goes through the Panama Canal. A cold storage in northern Norway could be an interesting business case. This is only one example where we see a need to educate the market on the cargo side. Cargo owners need to be confident that this route works in a reliable and predictable way.

It is important to make a distinction between transits and destinational shipping. As seen from Figure IV.4 below, there were only 27 transits in 2017 compared to 1,908 voyages in the NSR area. I have used number of vessels instead of tons on purpose. A relatively small multipurpose vessel can carry cargo that equals the value of several Panamax cargoes. (80,000 tons of iron ore at $60/ton gives a cargo value around $5 million.)

Transits

Since Tschudi Shipping conducted the first commercial transit in 2010 (from a non-Russian port to a non-Russian port with a non-Russian vessel), the number of transits in a global context has been almost non-existent. From 2010 until 2013, the number increased from four vessels to about 15, then fell to two vessels in 2014 and 27 last year. This is compared to about 19,000 vessels going through Suez: total NSR transits over this time period were less than about a half day's Suez traffic. This came as a surprise to those who believed that the opening of the NSR for commercial international shipping would result in much greater activity, given the much-quoted fact that the distance between Rotterdam and Shanghai via the NSR was 40 percent shorter than the Suez route. This comparison between the NSR and Suez is based on a misconception when it comes to bulk shipping, as they are both discharge ports for bulk vessels. For bulk vessels, it is trade to/from the Baltic Sea and Norway on the Atlantic side and to/from the West Coast of the United States, Canada and Alaska on the Pacific side, where a Suez/Panama Canal/NSR comparison is relevant. In a global context, this trade is not significant.

The opening up of new ports along the NSR might change the trading pattern. If a vessel is going in ballast from the Far East and loads cargo along the NSR for discharge in Europe, then that voyage will most probably be defined as destinational shipping, but the point here is that the whole NSR will be utilized.

Destinational Shipping

It is in destinational shipping where we have seen a strong increased activity and where we can expect a further increase in the future. The strong growth seen so far is mainly connected to the construction of the new LNG plant and terminal at Sabetta. The construction of this $28 billion project has created a huge demand for transportation of equipment and supplies to the 30,000 people living in Sabetta. Further south there has also been major construction work at Novy Port and their new oil terminal.

For dry bulk it is interesting to note that Sabetta is also a port for general cargo with a good draft. This opens up for transshipment of cargo coming from and going to the Rivers Ob and Irtysh. A new railway is also planned from Bovanenkovo on the west coast of the Yamal peninsula to Sabetta. This will then connect the new deep-water port of Sabetta to the Russian rail system.

Wherever a river meets an ocean there is frequently a port. For the Ob and Irtysh River systems that actually run all the way down to Kazakhstan, there are two new ports being built at Sabetta and Novy Port (for oil). Dudinka, at the inlet of the Yenisei River, has also upgraded its port. Tiksi at the estuary of the Lena River is still lagging behind, but an upgrade in the future is expected. Pevek, where Russians are placing a floating nuclear plant, has been upgraded and can be a future loading port for minerals coming from new mines being developed in the vicinity.

River Shipping

Most Russian natural resources are located in Siberia, and there are about 40 million people living in this part of Russia. The opening of the NSR, combined with the new port facilities being built at the estuaries of the large Russian river systems, means that a new transportation route is about to emerge as an alternative to the Trans-Siberian rail road. The Trans-Siberian railroad is renowned for its inefficiency and high cost. Transportation from Siberia can now be done by river vessels going north to a seaport along the NSR instead of going south on the rivers to the cross point with the Trans-Siberian railroad and then reaching a seaport either in the Baltic or in the Russian Far East. In theory, this new trading route going north using river and seagoing vessels could be a much more cost-efficient transportation route than going south using river vessels and railroads. A more detailed analysis has to be made.

Summary

Since 2010 there have been around 300 transits (internal Russian and international) and several thousand voyages defined as destinational shipping or cabotage. Basically all types of vessels have been involved as well as all major flag states. The conclusion is that the NSR is now recognized as an international seaway open for commercial traffic, with certain limitations related to ice conditions and infrastructure issues.

For reasons elaborated above, we do not foresee a large use of the NSR as a transit route, but we expect a continued large increase in destinational shipping. The new LNG, oil and mineral projects will create a significant increase in exports from the area. Transshipment to and from the rivers enabled by the new port infrastructure will take a longer time to develop but might have a substantial impact on some global shipping patterns in the future.

I repeat that a ship owner will always look at his income, expressed in the time-charter equivalent (TCE), and a cargo-owner will always look at the freight cost expressed in money per unit. Keeping these two facts in mind, combined with the increased Arctic activity we see already today, and looking ahead to 2030 and beyond, a possible scenario could be as follows:

With increased activity in the Arctic, ship owners will start looking at this as a new market for vessels with ice-class capabilities. Ice-classed vessels are more expensive to build and to run (among other things, they use more bunkers), and they can only provide a commercial benefit in the winter market in the Baltic and on Canadian lakes. If a new Arctic market opens up that requires ice class in the summer, then ship owners can receive the benefit of their ice-class vessels throughout the year. Increased supply of tonnage (more ice-classed vessels) will result in lower prices (read: freight costs) in a traditional supply/demand equation. This again will make Arctic production more competitive and we may see a development where rational behavior from both ship and cargo owners will have an accelerating effect on the activity in Arctic shipping.

Finally, it must be remembered that everything can change quickly due to both national and international politics as well as new rules and regulations. For example, Russia is still considering the impacts of its new policy requesting vessels loading natural resources from the Arctic to be built in Russia and sail under the Russian flag. There are so many exceptions to these rules that it is still very unclear what impact these regulations will have in the future. A full copy/paste of the Jones Act will be extremely detrimental.

In addition, implementation of the Polar Code will most certainly have an effect.

International sanctions can hit anywhere and it is very harmful to international involvement in the general development of the NSR. Who will risk building an expensive ice-classed vessel for a long-term contract with a Russian company if that company is sanctioned?

Commercialization of the NSR with the 4th Industrial Revolution

Sung-Woo Lee and Jisung Jo

Introduction

The potential for expanded use of the Northern Sea Route (NSR) has been triggered by an ongoing reduction of Arctic sea ice, combined with the discovery of new natural resources in the Arctic region (Farre et al. 2014). The Arctic states, and notably the Russian government, have tried to create a better environment to commercialize the NSR since the 1990s. Russia officially opened the NSR for international shipping in 1991 (although it successfully transited a diesel submarine S-423 from Murmansk to Vladivostok via the NSR in 1940). In 2013, Russia established a federal law regarding the NSR boundaries, and approved an NSR comprehensive development plan in 2015. In March 2018, Vladimir Putin announced a plan to increase the volume of cargo traffic along the NSR tenfold—to 80 million tons by 2025.

The three main goals of the Russian government in the Arctic are to: 1) develop onshore and offshore natural resources, 2) develop Siberia into a logistics network serving the NSR, and 3) develop the NSR as into competitive transit route between Asia and Europe. Russia has large quantities of oil and natural gas along the offshore Arctic that they have not extracted and processed. According to the USGS (2008), the Arctic offshore holds approximately 84 percent of the world's undiscovered oil and gas reserves.

The Russian government has successfully completed several Arctic offshore hydrocarbon resource development projects: Yamal LNG (2014-2040), Novy port oil deposit (2014-2035), and Norilsk Nickel (1975-2040). With these installations in place, the Chung Yang Financial Research Institute at the Renmin University of China (2018) emphasizes the importance of cooperation between Russia and China to construct hub ports for what China has called the "Polar Silk Road."

Lee (2017) suggests if it were possible to collect, process, and export minerals and forest resources dispersed throughout the Siberian region to the NSR via inland waterways such as the Lena, Yenisei, and Ob Rivers, it would go a long way toward generating cargo traffic currently lacking along the route—and would in turn increase the financial viability of using the NSR.

Ice-covered Siberian rivers that flow to the Arctic Ocean have also responded to recent warming in the Arctic. Shiklomanov and Lammers (2014) investigated long-term trends in the beginning and ending dates of ice events, duration of ice conditions, and ice thickness between 1955-2012. According to their research, the duration of the navigable season for due to ice conditions increased by seven days in the Severnaya Dvina, Lena and Yenisey Rivers, and by almost 20 days in the Ob at Salekhard. This environmental change could be an opportunity to Siberia, which has plenty of resources distributed across the region but does not have a logistics and transportation network connecting north and south. The Chung Yang Financial Research Institute at the Renmin University of China (2018) also suggests developing Tiksi Port, which is connected with the Lena River from Lake Baikal, as one of five main hub ports to be promoted. Further, heavy cargo has been transported several times through the NSR-Ob River-Kazakhstan route, with the Ob River in between (Lee 2017).

Lastly, in terms of efficient transit, the NSR could offer a better choice rather than the traditional Suez route because it reduces sailing distance between Asia and Europe significantly when little or no sea ice exists. For example, the distance from Busan to Rotterdam by the NSR is 7,667 nautical miles, compared to 10,744 nautical miles by the Suez Canal (Lee & Song 2013). Furthermore, shipping through the Arctic Ocean via the NSR could save about 40 percent of the sailing distance from Yokohama to Rotterdam compared to the Suez Canal. (Liu & Kronbak 2010).

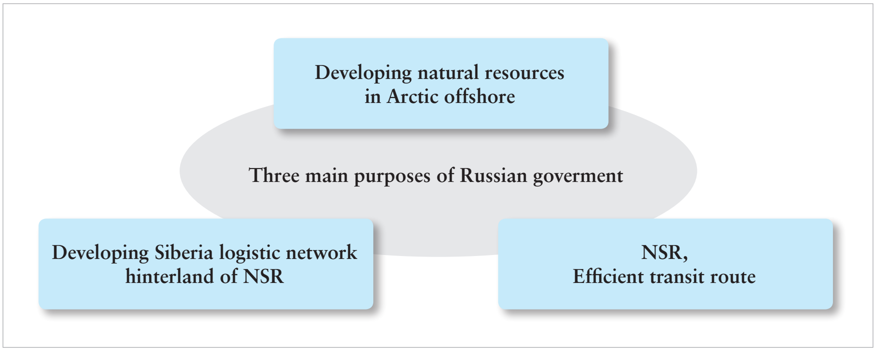


Figure IV.5 Three Main Goals of the Russian Government in the Arctic

Despite these positive economic and political points, there are studies that indicate shortcomings and limitations of the NSR (Pruyn 2013; Paxian et al. 2010; Larusson 2010; Li 2013; Lee & Song 2013). Paxian et al. (2010) indicate that the procedure used to estimate economic advantages of the NSR are too simplified, and need to consider extra costs involved in NSR transit. Larusson (2010) and Li (2013) mentioned numerous dangers and challenging conditions that need to be considered in assessing the NSR's viability. In this research, we would like to investigate the more skeptical analyses regarding the commercialization of the NSR, and suggest a new model to resolve the obstacles by applying state-of-the-art technology.

Issues and Obstacles in Developing the NSR

To derive economic benefits from shipping via the NSR, researchers offered several premises to make the situation simpler, most of which neglect the unique characteristics of the Arctic: unpredictable and unstable ice conditions, harsh winter conditions, including the need for icebreakers, lack of manpower, and seasonality, which increase costs of navigating in the NSR. Though changing ice conditions such as extent and thickness are important to consider, spatial and temporal uncertainty make gathering information difficult (Stephenson et al. 2013). However, predicting long-term trends in ice status would be a necessary condition for increasing the number of safe voyages through the NSR.

The extremely cold weather in the Arctic causes winter challenges and requires special vessels for a transit via NSR. According to ABS (2017), owing to Arctic winter conditions, ballast tanks and fresh water tanks can freeze, becoming impossible to pump out or having the potential to cause structural damage from expansion experienced during the phase change of water into ice. Operation of internal combustion engines, piping, and electrical systems can be problematic in extreme cold. Therefore, when we design technology and infrastructure to operate in the NSR, the extreme weather conditions in the Arctic should be considered from the start.

It is true that energy demand in the global market is gradually growing, and there are huge amounts of natural resources in the Eurasian Arctic. However, not many people live in the coastal area of the NSR and in Siberian Russia. In order to operate in this sparsely populated region, we need to find a way to resolve the lack of available manpower, either by instituting government policies that increase the work force, or by engineering production strategies that involve limited manpower.

According to Zhang et al. (2016), from 2012 to 2015, the NSR shipping season was less than five months per year. Even with this short season, the NSR is now generally accepted as a seasonal route linking Pacific and Atlantic Oceans. Lee (2017) emphasizes the potential of riverine shipping connecting the Siberian region to NSR as part of a logistics network, but again, seasonality could serve as a factor to weaken economic efficiency in this scenario. Thus, it would be desirable to consider new technology that could make the NSR, combined with river transit, available even in the winter season.

The Arctic: The Best Testing Grounds for the 4th Industrial Revolution Technology

There are some concerns regarding the impacts of implementing the 4th Industrial Revolution Technology, which involves utilizing breakthrough innovations in robotics, nanotechnology, artificial intelligence, remote operating systems, and other cutting-edge technological advances. This technological revolution has the potential to grow economies and improve the quality of life for people; however, at the same time, the 4th Industrial Revolution could yield greater inequality, particularly in its potential to disrupt the labor market (ISPSW 2017). According to Erik Brynjolfsson and Andrew McAfee, as automation substitutes for labor across the entire economy, the net displacement of workers by machines might exacerbate the gap between returns to capital and returns to labor (World Economic Forum 2016). This is the reason why many workers are skeptical about radical technological change.

This social concern has been an obstacle to the smooth introduction of the 4th Industrial Revolution technology. However, at the same time, this "obstacle" is the main reason why we need to apply this technology to the Arctic area. The lack of a viable workforce in the Artic has remained an unresolved obstacle to extract and transport natural resources through the NSR. Also, technological advances and infrastructure investments may ameliorate navigation challenges, enabling increased shipping of natural resources from the Arctic to the global market (Farre et al. 2014). In this manner, we would like to suggest the Arctic as an ideal testing ground for the 4^{th} Industrial Revolution.

Three industrial revolutions have passed, and now we're facing a fourth, which can be characterized by the interconnection and merging of the digital and physical realms (World Economic Forum 2017). Based on the five main technologies of the 4^{th} Industrial Revolution—internet of things (IoT), artificial intelligence (AI), robotics, big data, and clouding—we could develop efficient strategies to overcome navigation challenges in the NSR. In this chapter, we evaluate the technical feasibility of each technology by reviewing each one's current status, and explore some promising future applications.

Autonomous Trucks and Vessels

The Society of Automotive Engineers (SAE) characterizes automation vehicles (AV) into five classes.[1] In level 1, some driving assist system may be included in the vehicle design, but the vehicle is still controlled by the driver. Partial automation (level 2), where a few functions such as steering and acceleration are automated, is already commercialized. The other classes are conditional automation (level 3), high automation (level 4) and full automation (level 5), which are known as Highly Automated Vehicles (HAV). In levels 1 and 2, drivers perform driving tasks with some degree of automation function, but still must monitor their surroundings at all times. However, at level 3, though drivers need to be involved in controlling the vehicle, they are not required to monitor the environment continuously. In levels 4 and 5, the automation systems can fully perform driving tasks without a driver's attention (see Table IV.1).

AV-related companies and international councils expect full automation (level 5) will be achieved by 2030. The leading AV Company, Google, has already developed level-4 technology and is planning to commercialize a high-automation vehicle by 2020. Also, they are anticipating that a full automation vehicle would be available by 2030. According to the Information Handling Services (IHS), automated vehicle development has been a gradual process, but fully automated vehicles will be commercialized by 2030. Lastly, the European Technology Platform on Smart System Integration (EPoSS) sets its own road map for automated vehicle technology development; they also anticipate full automation to be achieved by 2030.

More specifically, we are interested in the development of autonomous trucks and vessels in the context of the NSR. The government of the

Table IV.1 *Definitions of Automation Levels*

SAE level		Description	Current status
0	No automation	The driver performs all driving tasks.	
1	Driver Assistance	Some driving assist system may be included in the vehicle design, but the vehicle is still controlled by the driver.	
2	Partial Automation	Vehicle has combined automated functions, like acceleration and steering, but the driver must remain engaged with driving tasks and monitor the environment all the time.	Commercialization
3	Conditional Automation	Driver is a necessity but is not required to monitor the environment. The driver must be ready to take control of the vehicle at all times with notice.	2015~2019, Limited applying 2020, Commercialization
4	High Automation	The vehicle is capable of performing all driving functions under certain conditions. The driver may have the option to control the vehicle.	2018, Test level 2022, commercialization
5	Full Automation	The vehicle is capable of performing all driving functions under all conditions. The driver may have the option to control the vehicle.	2018, Developing technology 2026~, commercialization

Source: NHTSA, Automated driving systems, 2016. Highly Automated Vehicles (HAV) refers to vehicles in levels 3 to 5.

Netherlands wants truck platooning to be possible through the EU, and already Dutch legislation has been amended to allow trucks to be tested on public roads.[2] In February 2015, Scania and TLN demonstrated platooning trucks on Dutch public roads, and in March 2016, DAF trucks and TNO successfully completed a platooning project called EcoTwin. Also, the Netherlands offers international testing grounds for innovation mobility (The Government of Netherlands, 2017). In January 2017, The Singapore Ministry of Transport (MOT) and PSA Corporation signed agreements with two automotive companies, Scania and Toyota Tsusho, to develop and test a truck-platooning project. It consists of two phases from 2017 to 2019. A 10 km test route along the West Coast Highway and inter-terminal haulage between Brani Terminal and Pasir Panjang Terminals are included in phase 2.[3] Also, in June 2018, Volvo Trucks and FedEx successfully demonstrated truck platooning on the North Carolina Turnpike in the United States.

Compared to self-driving cars, autonomous ships face different challenges that make technical requirements harder to meet in some ways, but easier in others.[4] For autonomous vessel technology, the most important goal is not to completely remove humans from the decision system, but to eliminate the necessity of being physically on the vessel at all times. Thus, the main idea of an autonomous system suggested by Rolls Royce and Kongsberg & Yara is to utilize remote control. Specifically, an automated system for entering a port is difficult to design, so people in a control center would control such a system.

Autonomous shipping companies have plans to release autonomous vessels in the near future. To develop autonomous vessels, Rolls Royce leads the Advanced Autonomous Waterborne Applications Initiative (AAWA), funded by the Finnish Funding Agency. Rolls Royce expects a remotely operated local vessel being in its the first stage and in operation by 2020. By 2025, they are planning to have a remotely operated autonomous vessel in international waters, and by 2030, a remote controlled unmanned ocean-going ship is planned. Kongsberg & Yara would like to deploy the first autonomous and fully electric cargo ship—the *YARA Birkeland*—in 2019; they are planning to gradually apply AI system. Thus, in the first stage, the vessel would start from a manned ship in 2018. Then, in 2019, they have plans to have a remote operation vessel and fully automated vessel by 2020.

Based on these trends, the technology to utilize autonomous trucks and vessels in the NSR seems possible in the near future; however, there are some issues to be resolved. First, legal, regulatory, standards, and insurance issues exist and must be considered with technology development. Second, autonomous and remote vessel technology need to resolve some tasks, such as entering a port. This might be resolved by installing remote-controlled systems in tug boats and an interconnection communication system using IoT.

Maintenance Management Systems

For safe voyages of autonomous vessels through the NSR, preventing onboard machinery troubles and managing maintenance work are important issues. There are some efforts to design maintenance software using IoT and cloud computing. ClassNK has developed a comprehensive software solution to support safe ship operations and carry out efficient maintenance. It consists of five systems: a system to manage the maintenance work schedule and monitor machinery maintenance work processes (ClassNK CMAXS PMS); an efficient tool for managing a ship's spare parts (ClassNK CMAXS SPICS); a system for managing the deck and engine's Abstract Log data (ClassNK CMAXS ABLOG); a diagnostic platform for machinery that uses an advanced data algorithm (ClassNK

CMAXS LC-A); and a complete onboard system for the main engine that uses an advanced data algorithm (ClassNK CMAXS e-GICSX). Also, the CMAXS Data base provides a ship's information and shares between ship and shore (ClassNK 2015). Further, a Remote Maintenance System (RMS) developed by JRC is one kind of system designed to control the navigation schedule, reduce maintenance costs, and store the latest equipment data and history. They also construct an information system to track the ship's condition, history, and maintenance information.

The maintenance management system has been gradually improved owing to IoT and cloud computing technologies. We expect that drones can create a significant synergy effect with this system. A drone could inspect and explore onboard machinery troubles that are hard to be fixed electronically. IoT technology will connect drones, management systems, and information centers instantaneously. Actually, this drone technology is already developed and served FLYABILITY (a Swiss drone manufacturer specializing in drones for use in inaccessible places) operations in 2016. Thus, a complete technological convergence between systems operations and drone technologies does not seem like it is too far in the future to enable the safe navigation of autonomous vessels.

Drones (Autonomous Underwater Vehicles)

Extremely cold weather in the Arctic is an obstacle to for the application of state-of-the-art technology. However, there have been many attempts to explore the mysteries of Antarctic shelves using underwater drones (robots). According to the University of Washington (2018), seven underwater robots will embark on a year-long mission under the ice in the Antarctic to observe the melting process under the Pine Iceland Ice Shelf. They will collect data such as temperature, pressure, water chemistry, and turbulence, then send it to a satellite orbiting above the Antarctic that is also capable of giving instructions to drones. Experts expect that these data will significantly improve predictions of future ice conditions. Further, *Boaty McBoatface*, an autonomous submarine developed by the UK's National Oceanography Centre (NOC), safely returned from a 48-hour expedition under the Filchner Ice Shelf in the Antarctic in March 2018. CSIRO has a plan to use a fleet of wind- and solar-powered autonomous vehicles—Saildrones—for monitoring temperature, salinity, ocean carbon, and biota of the ocean off the Gippsland coast in Victoria.

These attempts show that applying autonomous drones to explore the NSR would be technically possible. Thus, this kind of system could include underwater drones monitoring underwater data and sending it to GLONASS K2.[5] In the second stage, GLONASS K2 could convey the information to a "smart control tower," discussed below, so that these drones could connect to autonomous vessels.

Smart Control Towers

To complete our model, we need smart control towers based on AI technology. The main feature of this kind of center is to gather and share information from autonomous vessels and trucks, maintenance management systems, and drones via the satellites, then share and manage the information with each subject in supply chain. A similar concept to smart control towers has been developed by the Maritime and Port Authority of Singapore (MPA) and IBM, called project Sense-making Analytics for Maritime Event Recognition (SAFER). SAFER is designed to improve maritime and port operations to cope with Singapore's growth in vessel traffic. SAFER consists of seven modules: automated vessel movement detection, infringement analytics, pilot boarding detection, bunkering analytics, prohibited area analytics, vessel traffic arrival prediction, and utilization detection and prediction. This offers a paradigm shift from human observation that reports to automation.

In the next section, we describe a master concept for commercializing the NSR based on a combination of these ideas. Then, we discuss the limitations of this research and provide further research.

Master Concept: Applying New Technologies to the Arctic Route

The Arctic offshore and Siberian regions of Russia would be an ideal testing ground for automation technology. The quantity of undeveloped oil and natural gas in the Arctic offshore is enormous, and the inland waterways connecting the Siberian region of Russia to the north and south have the potential to play an important role as a logistics network serving the NSR. However, the lack of available manpower remains an issue, which means that automation technology such as automated mining systems, unmanned warehouses, autonomous trucks and Prompt Port Facilities (PPF) would be useful. With this in mind, we suggest a new business model of exploring, mining and transporting natural resources in the Arctic offshore and the Siberian area by integrating the current 4th Industrial Revolution technologies (see Figure IV.6).

The main technologies being applied are IoT, cloud computing, AI, and robotics. IoT and cloud computing would be used in all subjects to connect supply chains, which would consist of basic data sets. AI and robotics are ground-based technologies to help monitor and control autonomous trucks, vessels, drones, and unmanned warehouses. Now, we describe the master concept in six stages: producing areas, ground transportation, river ports, river transportation, seaports, and marine transportation.

At the producing stage, autonomous drones would disperse and collect images and data of mining areas in Siberia. This data will be utilized for remote controlling and automation of the whole mining process. Using robotic mining, we could extract resources that lie deep in the earth and under the ocean safely and efficiently (EU robotics 2015). Then, extracted resources will be loaded and transported by autonomous trucks to an unmanned warehouse. All the procedures are controlled remotely based on real-time systems. This includes the ground transportation stage. This automated mining system will be useful in improving safety for workers, developing sustainability, and providing cost effective services.

At the river port, PPFs can be used to facilitate transport across inland waterways such as the Lena, Yenisey, and Ob Rivers, process resources,

Figure IV.6 Master Concept for Commercializing the NSR and supply necessary power and living accommodations. Also, automated mobile harbor cranes and lifting vehicles could be used to handle cargo. For inland waterway transportation, autonomous vessels could be used (especially for the duration of ice conditions), and autonomous caterpillar trucks could be an alternative to carry cargo to seaports.

Vessels could anchor safely at seaports with an automated mooring system, and cargo could be handled by automated stacking cranes, quay cranes, guided vehicles, etc. Lastly, at the marine transportation stage, autonomous drones would first explore the deep sea in the Arctic to get data on weather conditions. The data gathered by drones would be sent to GLONASS K2, which would be connected with a smart control center. Based on this information, the center could control autonomous vessels and icebreakers across the NSR to operate safely and efficiently.

In this research, we would like to suggest a new model of applying new technologies to the NSR to make commercialization earlier. Since this research is the first attempt to design an overall schema for the NSR to apply new technologies, it can be valuable to a range of interested parties.

Further Discussion

In this research, we've suggested that the Arctic could be an excellent testing ground for the 4th Industrial Revolution technology, and discussed specific technological concepts for commercializing the NSR. More work is needed. First, this study only suggests overall master concept for commercializing the NSR. Further research should consider the implementation level of each stage. It might include economical and physical feasibility of each technology, and detailed strategies of suggested master concept. Second, as previously mentioned, the level of technology is developed or will soon be developed enough to begin applying these innovations. However, what about governance, operation, and finance issues?

According to WEF and Asian Development Bank (2017), this technological revolution also calls for new ways to formulate policies and regulations. Also, WEF (2016) insisted that active government engagement is crucial, because without engagement and collaboration with those leading the revolution, governance will always be a step behind. Comparing the speed of the 4th Industrial Revolution with the previous three, we know that this revolution is occurring much faster. The old way to formulate cross-border governance, regulation, and standards is no longer useful; instead, we need a new way that is more agile and flexible in order to respond to unpredictable and quickly changing environments. Also, the NSR consists of multiple stakeholders that include not only coastal nations in the Arctic, but also non-Arctic nations such as Korea, China, and Japan. Thus, integration and cooperation should be core concepts in terms of designing this new governance or community. This new, integrated governance plays an important role in implementing new operating systems to achieve this master concept for the NSR. For the next step, we need to take a deep look into each application and consider common use agreements for new integrated governance and operating systems.

In addition to these issues, we need to discuss financial issues surrounding the extraction of natural resources, infrastructure development, and constructing network systems. This discussion could include governments, private investors, private-public partnerships (PPP), international aid, or international development banks (Lee 2011). For example, the Asian Infrastructure Investment Bank (AIIB) and Arctic Development Bank could likely support our master concept of applying the 4th Industrial Revolution to the NSR. However, another important issue to consider is who will receive the benefits from any investment. As previously mentioned, there are plenty of stakeholders in the NSR universe. As a result, all investments in the Arctic should be conducted in the context of this new, integrated governance concept to ensure reasonable cost/benefit allocations and resolve conflicts among stakeholders. We leave these topics for future research.

Notes

1. The National Highway Traffic Safety Administration (NHTSA) of the United States issued automation vehicle policy (AV policy) on September 20, 2016, based on SAE definition.
2. Government of Netherlands (https://www.government.nl)
3. https://www.businesstimes.com.sg/transport/mot-psa-to-start-truck-platooning-trials, http://www.portstrategy.com/news101/world/asia/singapore-to-start-truck-platooning-trials

4. https://www.techemergence.com/autonomous-ships-timeline/
5. GLONASS K2 is the next satellite design of the GLONASS radio-based satellite navigation system in Russia, which will be launched in 2019. The orbit of GLONASS K2 makes it especially suited for usage in high latitudes, where getting a GPS signal could be problematic. GLONASS would be connected with drones, autonomous vehicles, unmanned warehouses, and more in the Arctic area to provide the grounds for digitalized system.

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Arctic Offshore Oil: Sweet Dream or Bitter Reality?

Nina Poussenkova

Color of the Arctic Night

As Thane Gustafson wrote in his 2012 book *Wheel of Fortune*, Russian oil has three colors: brown (depleting fields in the European part of Russia and mature fields in West Siberia), green (new fields in West Siberia, Timan-Pechora, East Siberia and the Far East), and blue (the Arctic, primarily its continental shelf). So, which color is Russia betting on in its domestic oil policy? And what is the future of the blue spectrum in the intricate mosaic of the Russian oil sector?

The Arctic became one of the hottest subjects on the global petroleum agenda after the U.S. Geological Survey stated in April 2007 that the Arctic subsurface probably contains up to 25 percent of the undiscovered world hydrocarbon resources.[1] Then, Russia began to strongly focus on the Arctic: In September 2008 it approved the Fundamentals of the Russian State Policy in the Arctic up to 2020; in summer 2012 the government reviewed the Program of the Continental Shelf Development up to 2030; and in February 2013, President Vladimir Putin approved the Strategy for the Development of the Arctic Zone of Russia and Ensuring National Security up to 2020. It is noteworthy that the Strategy objectively analyzed a suite of formidable social, economic, technological and environmental challenges connected with producing Arctic oil and gas, and indirectly admitted that Russia was not ready yet to develop Arctic resources up to 2020.[2]

This Arctic euphoria was also encouraged by estimates of the potential petroleum riches of the Russian extreme north: according to the Ministry of Natural Resources, the Arctic zone (both onshore and offshore) contains initial recoverable resources of 258 billion Tonnes of Oil Equivalent (toe), which represents 60 percent of total Russian hydrocarbon resources.[3]

Admittedly, petroleum production in the onshore Arctic is already underway, and in 2017, 96.2 mt of oil was produced there (up 3.8 percent from 2016) and 568.9 bcm of gas (up 9.6 percent).

So, it is the development of offshore Arctic hydrocarbons that presents a particularly exciting new challenge for Russia. According to the draft

General Scheme of the Russian Oil Industry Development up to 2035, the total hydrocarbon resources of the Arctic shelf amount to 83 billion toe, predominantly consisting of gas. The development of this offshore Arctic wealth appeared as an opportunity to show the world that Russia was an energy power capable of making an impressive breakthrough into the new petroleum frontier, on par with creating the West Siberian oil province in the 1960-1970s. In other words, the idea had strong political undertones. Significantly, Rosneft Executive Chairman Igor Sechin (who was Russia's Vice-Premier in charge of the energy sector at that time), stated during the presentation of Rosneft's strategic alliance with ExxonMobil, which mainly focused on the Arctic offshore oil, that developing Russian Arctic hydrocarbons exceeded in terms of scale such projects as moon landings. In terms of investments, it was akin to the development of the Brazilian shelf or the North Sea.[4]

Initially, Russian authorities were very bullish on Arctic petroleum potential. In 2008, President Dmitry Medvedev said that the strategic objective would be to transform the Arctic into Russia's resource base of the 21st century.[5] However, since then the situation in the global energy sector drastically changed. Current realities (including low oil prices, Western sanctions targeting Russia, and the U.S. shale revolution) forced Russia to moderate its ambitions concerning Arctic hydrocarbons, particularly on its continental shelf. In 2016, the Ministry of Energy estimated that Arctic offshore oil production would grow to 31-35 mt/yr by 2035,[6] while before that the Draft Energy Strategy up to 2035 had predicted that production would reach 35-36 mt.

Thus, the future of oil production in the Arctic is particularly interesting. On the one hand, the situation with onshore oil reserves is getting increasingly more challenging given the decline of West Siberian fields, and significant new petroleum provinces are needed to support the aging West Siberian giant; the Arctic offshore could have become such a province. On the other hand, environmental concerns about hydrocarbon development in the Arctic (particularly the dangers of offshore oil spills for the fragile northern environment) place another constraint on Arctic offshore developments.

The real potential of the Russian polar seas is an open question, since the offshore Russian Arctic remains virtually a virgin land; Russia has yet to explore more than 90 percent of its Arctic shelf (and 53 percent of the onshore Arctic territory). Seismic exploration of the Arctic shelf has been negligible: 0.31 km/km^2 in the Barents Sea, 0.1 km/km^2 in Kara, Laptev and Chukchi Seas, and only 0.003 km/km^2 in the East Siberian Sea.[7] So, there is a high probability of both great successes and expensive disappointments. But the main difficulty would be to open the tap on these discovered hydrocarbon reserves, since technological, financial, human and managerial challenges (in addition to harsh climate, complex geology, and absence of infrastructure) seem almost insurmountable, particularly in the areas to the east of the Urals.

Indeed, the Arctic offshore is not uniform. It has territories that are covered by ice several months per year, where hydrocarbons are already being produced with available technologies. There are areas that are covered by ice more than half a year, and evolutionary technologies are required for these reserves to be developed in environmentally safe and economically efficient manners. In addition, there are zones that are still covered by ice almost the whole year, and their development would require revolutionary technologies that are not available yet. Russia's offshore Arctic to the East of the Urals mountains largely belongs to this third and most challenging category.

Financially, Russian experts admit that oil production at Arctic offshore fields is economically unfeasible with oil prices below \$90/bbl[8] without significant state support. Consequently, in April 2012 the government provided substantial fiscal benefits to offshore developments, presumably due to strong lobbying efforts of Rosneft and personally by Igor Sechin, then its Board chairman and Vice-Premier in charge of the energy sector.

Shelf projects were to be exempt from export duty, and a lower rate of mineral production tax would be applied (5-15 percent, depending on the complexity of the project). Moreover, guarantees of the stability of these terms were provided for 15 years, a particularly important caveat for such expensive projects with long payback periods. Many experts admitted that the Russian fiscal regime for offshore projects became one of the most attractive in the world—yet only Rosneft and Gazprom could reap its fruits. Later, benefits were expanded: According to a law adopted in 2017, taxes that oil companies paid on their profits would be reduced in line with their exploration expenditures.

In addition to technological and financial constraints, the development of Russia's Arctic petroleum offshore wealth has been hindered by a number of objective factors, such as the shortage of personnel qualified to produce oil in the north in an environmentally sustainable manner. It is noteworthy that Rostekhnadzor (Russian Agency for Technical Supervision) investigated an oil spill at the Trebs and Titov onshore field in the Arctic in 2012 and concluded that inexperienced personnel caused the accident during a workover of deep wells in the extreme north.[9] So there are strong concerns that the Russian oil industry does not possess enough skills to operate wells in the Arctic seas, since these facilities face much more complicated natural conditions and other problems associated with the region's isolation. In the same vein, the global insurer Lloyd's stated in its 2012 report, "Arctic Opening—Opportunity and Risk in the High North," that after the disaster with the drilling platform Kolskaya in December 2011, there were strong doubts about the Russian readiness to deal with emergency situations.[10]

Moreover, this shortage of skills is aggravated by the fact that currently there are only two companies in Russia that have access to the new fields on the continental shelf: Rosneft and Gazprom. Both companies lack sufficient experience in developing Arctic offshore fields on their own. It is noteworthy that Rosneft has mainly worked on the continental shelf on the Sakhalin-1 project, where ExxonMobil was the operator, so Rosneft has not had a real opportunity to manage such complex projects.

In addition, the development of Arctic offshore energy assets is strongly hindered by the dismal situation in the Russian civilian shipbuilding industry, which has been in considerable decline since the early 1990s. Around that time, amidst the general economic collapse in the country, many qualified workers quit the sector and sought more gainful employment. Consequently, Russia experienced a serious shortage of shipbuilding technology and personnel, and, as one result, Russian energy companies had to place orders for vessels abroad. Rosneft then created a shipbuilding subsidiary named Zvezda (the Star) which was to establish Russia's first super-wharf for large-tonnage shipbuilding, located in the Russian Far East. This super-wharf is necessary for the development of the continental shelf, including the Arctic, and is supposed to help revive Russia's shipbuilding sector (and to support the domestic producer). Rosneft has invited leading international companies to participate in the project, including General Electric, Hyundai Heavy Industries, Fincantieri, ExxonMobil, Keppel, MH Wirth, and others. However, in addition to the establishment of partnerships for construction of the wharf and building of ships, the success of Zvezda hinges upon securing a large portfolio of orders, which Igor Sechin set about doing his best to ensure. In July 2015 he asked Vladimir Putin to provide support to Zvezda, proposing the introduction of special legislative measures aimed at placing all orders by Russian companies for the construction of vessels and naval equipment in Russia through Zvezda.[11] But despite all the lobbying of Sechin, Rosneft was unable to force Russian companies to place orders solely through Zvezda. By mid-2018, Zvezda succeeded in securing only 70 percent of the orders that it needs to achieve payback on its investment.[12] So, Zvezda faces very considerable challenges, and its success is far from ensured. Consequently, Arctic offshore projects may not receive all the vessels they require.

What is the Best Oil Bet?

It is probably not surprising that with these various adverse factors, currently Russian "blue" oilfields seem to be losing to "brown" and "green" ones. In part, that is because there are at least three viable alternatives to Arctic offshore projects.

The first alternative is enhancing oil recovery ratio, a method widely applied in the developed petroleum producing countries, notably Norway, and even in developing world countries such as Saudi Arabia and Oman. The Russian government admits that this direction is highly promising. The head of Rosnedra, the mineral resources agency under the Ministry of Natural Resources, said in 2013 that "if we raised oil recovery ratio from the current 38 percent to 42 percent, we can additionally produce 30 mt/yr,"[13] which is roughly what the Arctic offshore could potentially yield by 2035. In addition, raising the oil recovery ratio will extend the life of the giant mature fields in West Siberia, in regions with well-developed social and production infrastructure. This would also help resolve the problem of declining old oil towns built in West Siberia near the aging giants, thus mitigating potential social tension.

The second alternative is to develop hard-to recover reserves (heavy oil, highly viscous oil, oil from low porosity sediments, etc.), including shale oil found in the Bazhen formation in West Siberia, as well as in the Khadum, Domanic and Abalac formations. These hard-to-recover reserves lie in regions with well-developed social and production infrastructure; some of them are even conveniently located in the European part of Russia.

In 2017, hard-to-recover reserves provided some 38-39 mt of production (including 1.6 mt from Bazhen, Abalak, Khadum and Domanic formations). This contributed 7.2 percent of total Russian production, and that share is growing. It is expected that by 2035, hard-to-recover reserves will yield some 82 mt/yr and will account for roughly 17 percent of the total Russian oil production.[14] This will considerably exceed the expected output from the offshore Arctic.

It is noteworthy that in December 2017, Kirill Molodtsov, then-Deputy Minister of Energy, stated that "the development of Bazhen formation, though it is more expensive and risky than the development of traditional reserves, still looks more attractive than a number of alternatives aimed at supporting oil production, *such as the Northern continental shelf to the east of the Urals* (emphasis mine) and the virgin lands of East Siberia,"[15] demonstrating a much more realistic revision of the official government attitude towards Arctic offshore assets.

Small and mid-size non-integrated oil companies (some 250 firms operating in Russia) that work on small or depleted fields that are not interesting for big companies present a third alternative to Arctic offshore development. Currently, theses smaller firms produce roughly 14 mt/yr; however, the Energy Center of Skolkovo estimates that if they are given certain benefits, their production could increase to 42 mt/yr by 2030.[16] This figure, again, is higher than the Arctic continental shelf is expected to produce.

These three options are simpler, cheaper, and environmentally safer than developing Arctic offshore reserves. They are less "sexy" for the image of Russia as the energy power, but they are socially oriented and commercially viable instead.

Money Makes the Oil World Go Round …

Arctic offshore projects have always been more costly than onshore ones. However, during the recent period of high oil prices, both Gazprom and Rosneft theoretically could have coped with financial challenges inherent in Arctic offshore developments even though they lacked state-of-the-art maritime operations technologies. But recently, low prices and international sanctions have combined to be an almost insurmountable problem for Arctic activities.

What follows is two case studies from the Russian oil sector that show that now Arctic offshore projects are impossible financially without strong state support, and technologically almost impossible without foreign partners: Gazprom Neft, which produces oil in the Arctic; and Rosneft, which explores for oil in the Arctic. These problems are particularly acute for Rosneft.

Gazprom Neft: Production Challenges

The case of Prirazlomnoye in the Pechora Sea provides a particularly interesting example. Here, the operator is Gazprom Neft, an oil subsidiary of Gazprom. The field was discovered in 1989, but commissioned only in December 2013 by Gazprom Neft. It became the only Russian oil company that actually produces hydrocarbons in the offshore Arctic. Production at Prirazlomnoye amounted to 2.15 mt in 2016, and rose to 2.64 mt in 2017. Peak output is expected to reach 5 million toe, which means that even if production targets are met, this field will provide an insignificant proportion of the total Russian oil production.

It is noteworthy that in 2014, Alexander Dyukov, CEO of Gazprom Neft, said that fiscal benefits provided to the project would ensure efficiency of the Prirazlomnoye development even if oil prices dropped to USD 80/bbl.[17] Of course, subsequent events showed that he was overly optimistic in his forecast of oil prices (but realistic in assessing the value of state support).

In order to survive low oil prices, Gazprom Neft successfully lobbied for significant fiscal benefits from the government. For starters, the mineral production tax was reduced to zero for this field. (Initially, this tax exemption was granted until the beginning of 2019; it was later extended to the beginning of 2022.) Since April 1, 2014, a lower export duty rate was granted for Prirazlomnoye oil. In July 2014, the Ministry of Natural Resources proposed to transfer Prirazlomnoye from the second category of complexity to the third category of complexity of projects. This change would result in the reduction of the mineral production tax from 15 percent to 10 percent, after a certain level of production was achieved. Also, a tax maneuver introduced in 2015 (under which export duties are decreased and mineral production tax is raised)[18] helped the project by further reducing export duties. Thus, presumably Prirazlomnoye could be successful even with low oil prices, due to the lobbying effectiveness of Gazprom Neft.

Still, in March 2016, Gazprom Neft wrote a letter to the Ministry of

Natural Resources, in which it said that sanctions and declining oil prices had a negative impact on the ability of companies to invest in exploration of the shelf. Therefore, the company wanted to obtain additional fiscal benefits for its shelf exploration projects.[19]

While Gazprom Neft-Shelf already produces oil from Prirazlomnoye, other offshore licenses of Gazprom Neft are still at the exploration stage. Gazprom Neft-Sakhalin holds licenses for four plots on the Arctic shelf: Severo-Vrangelevskiy (East Siberian and Chukchi Seas), Kheisovskiy (Barents Sea), as well as Dolginskiy and Severo-Zapadniy plots (Perchora Sea). The Dolginskoye field, with 200 m.toe of reserves, seemed to be the closest to entering the commercial phase. But in 2015, Gazprom Neft lobbied for changes in its license for the field, anticipating that production there would begin in 2031 rather than in 2019, as had been planned earlier. The change request followed unsatisfying results from drilling an exploration well.[20]

In the era of Western sanctions aimed at Russia, Gazprom Neft began searching in the East for partners to implement its shelf projects. The company entered into negotiations with the Indian Oil and Natural Gas Corporation (ONGC) and with the Chinese National Offshore Oil Corporation (CNOOC) to discuss opportunities for working in the Polar Seas—even though it is not clear if these companies have sufficient skills to sustainably operate in the Arctic offshore environment.[21]

Rosneft: Pitfalls of Exploration

Rosneft is the biggest Russian license holder for offshore Arctic hydrocarbon development: As of January 1, 2017, it owned 55 licenses for the polar, Far East and southern Russian seas, with total hydrocarbon resources estimated at 41.5 billion toe. Rosneft has 19 projects in the western Arctic (seven in the Barents Sea, eight in the Pechora Sea, and four in the Kara Sea), as well as nine projects in the eastern Arctic (five in the Laptev Sea, one in the East Siberian Sea, and three in the Chukchi Sea)[22].

Rosneft was the most active Russian player in terms of establishing partnerships with foreign companies for exploring and developing the Arctic offshore. In 2011, Rosneft and ExxonMobil created a joint venture, in which Rosneft held 66.7 percent and ExxonMobil 33.3 percent, to develop the Kara Sea as well as the Tuapse Trough in the Black Sea. Total investments were estimated at $3.2 billion, with the Arctic accounting for

$2.2 billion. ExxonMobil was to bear the burden of exploration expenses, and to assist Rosneft in developing hard-to-recover reserves in West Siberia, as well as invite Rosneft into ExxonMobil's international ventures. In 2013, Rosneft and ExxonMobil expanded the scope of their strategic cooperation by including seven additional licensing plots with a total area of 600,000 km^2 in the Chukchi, Laptev and Kara Seas.

In addition to its agreement with ExxonMobil, on April 25, 2012, Rosneft signed with the Italian company ENI an agreement concerning the joint development of the Fedynskiy and Tsentralno-Barentsevskiy blocs in the Barents Sea and the Val Shatskogo oilfield in the Black Sea. Total recoverable reserves of the two Arctic structures are estimated at 36 billion b.o.e. Once again, the foreign company was obliged to finance the exploration efforts, this time to the tune of $2 billion. Rosneft candidly admitted that the government had helped it to reach an agreement with ENI by providing generous tax benefits.[23]

Soon after that, on May 5, 2012, Rosneft and the Norwegian company Equinor (formerly Statoil) signed a Cooperation Agreement under which they would jointly develop plots in the Barents Sea and in the Okhotsk Sea. Total estimated resources of these licenses were put at two billion tons of oil and 1.8 trillion m^3 of gas.

It is noteworthy (and praiseworthy) that Rosneft took the initiative by signing a joint Declaration on Environmental Protection and Preserving Biodiversity in Exploration and Development of Mineral Resources of the Arctic Continental Shelf of Russia with its three Western allies. This initiative signifies that Russian oil companies are becoming increasingly aware of environmental hazards and challenges inherent in the development of the polar seas.

In August 2014 Rosneft and ExxonMobil began drilling the northernmost well in Russia, the $600 million Universitetskaya-1, using the West Alpha drilling platform. The area of the Universitetskaya structure covered 1200 km2 and resources were estimated at more than 1.3 billion toe. Anticipation was high, as the Kara offshore province could have exceeded the Gulf of Mexico, Brazilian shelf, and Arctic shelf of Alaska and Canada in the size of its reserves.[24]

In September, Rosneft discovered the Pobeda ("Victory") field, which had initial estimated reserves of 130 mt of oil and 499 bcm of gas under C1+C2 categories. However, the celebration of "Victory" was soon cut short as the introduction of the U.S. sanctions meant that ExxonMobil had to halt operations on the Arctic shelf in Russia—and Rosneft was unable or unwilling to proceed without its partner in the Kara Sea.

Still, Rosneft has vowed to continue its Arctic adventure on its own, and in April 2017 began drilling the Tsentralno-Olginskaya-1 well in the Laptev Sea. Rosneft announced in June 2017 that it discovered there a field with geological reserves of 298 mt of light and sweet oil, which might mean the launch of a new petroleum province in the Eastern Arctic.[25] However, the company's ability to manage and finance a full-field development must be viewed skeptically, especially if they proceed without an international partner.

The future of ENI's and Equinor's offshore exploration efforts with Rosneft is also in question, as both companies fear the risks of contravening international sanctions.

In time of sanctions, in addition to its Western partners, Rosneft invited companies from Asian countries (such as China, India, and Vietnam) to the Arctic continental shelf, but with rather disappointing results to date.

Ultimately, international sanctions and low oil prices forced Rosneft to downgrade its plans for shelf exploration. High costs of drilling (from $350 million to $700 million per well), problems with raising financing, and the shortage of sea drilling rigs, auxiliary vessels and ice-breakers resulted in missing deadlines established in its licenses. Therefore, Rosneft asked the Ministry of Natural Resources for permission to delay exploration and production at its offshore fields. Rosnedra agreed to let Rosneft postpone exploration activities at 19 plots in the Arctic, Far East and southern seas for two to five years, and also allowed Gazprom and Gazprom Neft to postpone activities at 12 plots. Experts calculated that because of the postponed deadlines, offshore oil production in the Arctic would reach only 13 mt by 2030, instead of the previously planned volume of 18 mt.[26]

Thus, it is quite noteworthy that recently the experts of the Analytical Center under the Russian Federation government, a high-ranking think tank, stated that "given the long-term forecasts of the internal and external demand for oil and gas, and taking into account their available reserves and production plans in the continental part of Russia, it appears that up to 2035 there is no need in broad-scale production of hydrocarbons at the Arctic shelf of Russia."[27] The longer-term forecasts are virtually impossible in this sphere, since political events such as introduction of anti-Russian sanctions (which have a strong impact on the development of the offshore Arctic fields) have always been extremely hard to predict.

But this realistic forecast up to 2035 gives Russia breathing room. Currently, the country is not ready yet for an environmentally sustainable Arctic offshore oil production. Russian oil companies therefore have enough time to develop relevant competencies and skills, and to train personnel in environmentally safe practices, and the government to introduce strict legislation and norms, so that the next generations will inherit a cold and clean Arctic.

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Perspective from China's International Cooperation in the Framework of the Polar Silk Road

Yang Jian and Henry Tillman

Adaptation to the challenges emerging from the changing Arctic is an important component of future Arctic governance. Evidence of the impacts of climate change abounds in the Arctic—and rebounds around the world. This includes observations about the relationship between ice melting in the Arctic and extreme weather events at lower latitudes, as well as how changes in the duration and extent of Arctic sea ice cover are transforming global trading patterns. Given the global impacts reverberating from climate change, collective actions and a synergy of adaptation strategies are needed. As one of the world's major economies and as an investor in the Arctic infrastructure network, what impact will China's engagement in the Arctic impose on the balance of economic activities and environmental protections in the Arctic, and on efforts to build resilience at both the Arctic regional level as well as at the global level? This question will be important both to Chinese policy makers and to the international community, now and in the years to come.

In January 2018, the Chinese government issued "China's Arctic Policy White Paper" (White Paper) as an attempt to explain China's policies and positions regarding Arctic affairs to the outside world, and to build trust between China and other partners.[1] In particular, the term, "Polar Silk Road" (PSR) used in the White Paper has attracted wide attention.[2] The PSR refers to a series of cooperative international ventures among Russia, the Nordic countries, and certain East Asian countries. There is a synergy between China's Arctic policy and policies from other parties, related to sustainable development in the Arctic region as well as adaptive strategies to climate change in a global context. China hopes to strengthen such cooperation under the Belt and Road Initiative (BRI), following principles of extensive consultations, joint contributions, and shared benefits—while emphasizing policy coordination, infrastructure connectivity, unimpeded trade, financial integration, and closer people-to-people ties.[3]

Now the PSR is ready to launch. Exactly how the concrete projects outlined in the framework of the PSR should be carried out, and what objectives should be realized through these joint efforts, will be questions that should guide the work of researchers, policy makers and practitioners.

The PSR is not only a part of China's BRI initiatives, but also represents a contribution to joint efforts by Arctic nations, international organizations, and other stakeholders in Arctic governance, as well as in the coordination of Arctic policies for developing and protecting the Arctic. As part of China's Arctic policy, the PSR's launch underscores that China has the willingness to jointly build up the infrastructure in the Russian Arctic region for peaceful utilization of new sea routes that are currently developing—and are likely to expand in the future. Recent investment commitments to Russia have signaled that China will support Russia to jointly enhance the Northern Sea Route (NSR) and other sea routes in the Arctic, based on the concepts of "win-win" and globally accepted sustainability principles. This project also echoes the Arctic Corridor railway project by Finland, Norway, and the European Union (EU), and will encourage contributions from Japan and Korea to jointly strengthen international utilization of the NSR.

In the White Paper, China expresses its intention to work jointly with all parties concerned to build the PSR by developing Arctic shipping routes. It encourages its enterprises to participate in infrastructure construction for the routes where China COSCO Shipping has conducted commercial trial voyages since 2013, in order to pave the way for these routes' commercial and routine operation. By advancing international cooperation on Arctic affairs, the PSR will focus on three concrete cooperation projects: (1) joint efforts to build a "blue" economic passage linking China and Europe via the Arctic Ocean,[4] (2) enhancing Arctic digital connectivity, (3) building a global infrastructure network in the Arctic region, and (4) enhancing adaptive capability and green technology innovation through international cooperation.

How Does the Concept of a Polar Silk Road Form Through Interactions Between Russia and China?

At the 2011 conference, *The Arctic: Territory of Dialogue*,[5] Russian President Vladimir Putin said, "We see its [NSR's] future as an international transport artery capable of competing with traditional sea routes in cost of services, safety and quality." Although Russia's Minister of Emergency Management Sergey Shoygu put forward the concept of the PSR (originally introduced as the "Silk Road on Ice") for the first time during this 2011 conference, the concept was not immediately met with resounding echoes of support from other parties.[6] However, in September 2013, Chinese President Xi Jinping introduced the BRI for the first time during an official visit to Kazakhstan.[7] Earlier that year, China COSCO Shipping undertook its first commercial trial voyage from a Chinese port to Rotterdam via the NSR with the *MV Yong Sheng*. The commercial ship followed in the steps of China's icebreaker *RV Xuelong's* maiden transit through an Arctic sea route of a Chinese-flagged vessel from China to Iceland in 2012.[8] China furthermore was granted formal Observer status to the Arctic Council with other Asian countries in 2013.[9] Since then, there has been incremental growth in Arctic commitments by Chinese stakeholders, with a steep surge since mid-2017 through effective steps to enhance Arctic cooperation between China and its international partners, including in the realms of Arctic policy and economy.

China's Foreign Minister Wang Yi stated that China would support Russia's initiative to jointly build a "Silk Road on Ice" during a meeting with his Russian counterpart, Foreign Minister Sergei Lavrov, in May 2017.[10] In June 2017, a policy document was co-released by China's National Development and Reform Commission (NDRC) and its State Oceanic Administration (SOA), which provided new insights about how international cooperation in the Arctic (as with the proposed blue economic passage linking China and Europe) might be more closely tied to international trade and the BRI.[11] In November 2017, Xi Jinping and Russian Prime Minister Dmitry Medvedev agreed that China and Russia should jointly develop and cooperate on the use of the NSR and building the PSR. In January 2018, the first ever White Paper published on China's Arctic policy supported the efforts to jointly build the PSR and facilitate connectivity and the sustainable economic and social development of the Arctic. The White Paper says that China hopes to work with all parties to build the PSR by developing Arctic shipping routes. In effect, China calls for stronger international cooperation on infrastructure construction and operation of these Arctic routes.[12]

China attaches great importance to navigation security in Arctic shipping routes. It has actively conducted studies on these routes and continuously strengthened hydrographic surveys with the aim to improve the navigation, security, and logistical capacities in the Arctic region. China abides by the Polar Code, and supports the IMO in playing an active role in formulating navigational rules for Arctic shipping. China also advocates the protection and rational use of the region, and encourages its enterprises to engage in international cooperation regarding the exploration for and utilization of Arctic resources by making the best use of their advantages in capital, technology, and its large domestic market.[13]

Polar Silk Road Projects and Possible Future Projects

Energy Projects

The most important commercial Arctic project to date is Yamal LNG. The project, which became operational at the end of 2017, is seen as vital in utilizing Russia's Arctic resources and in addressing China's energy needs. Yamal LNG is an integrated project encompassing natural gas production, liquefaction, and shipping. The project consists of the construction of a liquefied natural gas (LNG) plant with an output capacity of around 16.5 million tons per year (by 2019), using the South Tambey Field as a resource base. The field's proven and probable reserves are estimated at 926 billion cubic meters, making it one of the largest Arctic producers of LNG.[14]

Beijing's winter haze has become an air pollution problem in China over the past decade, and is well known around the world. Air pollutants not only increase the incidence of lung and bronchial diseases among Chinese residents, but also increase the atmospheric particulate matter concentrations around East Asia. The Chinese government has been instituting pollution control measures since 2013, including shutting down some of the most polluting companies and forcing some winter heating enterprises to use natural gas, a relatively clean energy alternative to coal to provide heat. For this reason, China's demand for natural gas has greatly increased in the winter, and China's natural gas imports from Central Asia, Russia, and the United States have all increased by a large margin. During President Trump's visit to China in 2017, natural gas from Alaska accounted for an important part of the deal signed between China and the United States.

Extensive transportation infrastructure is being built with a similar scope as the Yamal LNG project, including a seaport (began in 2013) and the Sabetta Airport. The $3.22 billion Belkomur railway project connecting the Sabetta Port to the Eurasian railway network was awarded Russia's infrastructure project of the year 2016. To date, this project has employed as many as 30,000 Russian workers from its central and southern regions. Now that the Yamal project is operational, Russia aims to gain a larger share of the global market in liquefied natural gas. This seems like a highly realistic goal, as the Yamal-Nenets Autonomous Region is the world's largest natural gas producing area, accounting for approximately 80 percent of Russia's natural gas production and approximately 15 percent of the world's gas production.[15] Even under current sea conditions, Yamal is projected to double Russia's share of the growing global LNG market by the time it reaches full capacity in 2020.[16]

In November 2017, Novatek, one of the largest independent natural gas producers in Russia, signed a Strategic Cooperation Agreement with the Chinese National Petroleum Company (CNPC), which already owns 20 percent of Yamal LNG (also know as Arctic LNG-1), a $27 billion production project. The strategic cooperation agreement confirms the parties' intentions to cooperate in implementing the Arctic LNG-2 project, as well as collaborating in different segments of the LNG and natural gas markets, including LNG trading and gas infrastructure development.[17] Novatek also signed an agreement with China Development Bank for cooperation as part of this project.[18] France's Total oil corporation also has a 20 percent stake in the Yamal LNG project (LNG-1) and would like to participate in the upcoming Arctic LNG-2 (as would other possible international investors), which has a potential producing capacity of approximately 19.8 million tons per year. The Arctic LNG-2 project could unlock more than seven billion barrels of oil equivalent of hydrocarbon resources in the onshore Utrenneye gas and condensate field. The first of three phases is planned for markets in 2023, partly utilizing the NSR to connect the produced natural resources to global energy trading supply chains.[19]

China's involvement has been vital to this important project, especially in light of the economic sanctions imposed by the United States and other Western countries against Russia. China's Silk Road Fund owns 9.9 percent of the equity in Yamal LNG-1.[20] The Russian natural gas producer Novatek, which holds the remaining 50.1 percent stake, has subsequently concluded an agreement for $12 billion in loans, payable over 15 years, with the China Development Bank and China Export-Import (EXIM) Bank, dominated in euros and Chinese yuan.[21] Yamal LNG, which ships to East Asian markets (China, Japan and Korea) in summer, could be piped to Europe in winter. Through Sino-Russian cooperation in LNG projects, Chinese energy and infrastructure construction companies have accumulated extensive experience in the Arctic environment, and Chinese enterprises have both the technological capabilities and financial resources to be at the forefront with regards to future resource development in the Arctic region.

The China-Iceland cooperative relationship is also a successful example of Arctic cooperation. In 2012, China signed framework agreements with Iceland to support greater cooperation on geothermal energy, along with marine and polar science.[22] Developing geothermal energy is part of China's comprehensive energy-transforming strategy. It is also one of the adaptations that China has made to address the challenge of climate change. By April 2018 Sinopec in China and Iceland's Arctic Green Energy Corporation (AGEC) have developed geothermal projects in 40 cities in China.[23] In 2013, the two countries signed a free trade agreement, and have engaged in a series of bilateral initiatives, including the Joint China-Iceland Aurora Observatory.[24] A special session on the BRI was held by the Arctic Circle Assembly in 2017, and the Arctic Circle Assembly will discuss the Polar Silk Road again in 2018.[25] Geothermal and Arctic cooperation remain among the top priorities for cooperation between China and Iceland, as was evident during the visit of Iceland's Foreign Minister Gudlaugur Thor Thordarson to China in early September 2018.[26] New agreements were signed on geothermal cooperation and trade-related topics such as e-commerce and the import of food products, including mutton meat and seafood products.[27]

Arctic Shipping and Commercialization of the NSR

In October 2017, the oil and gas shipping unit of China's COSCO Shipping approved a plan to acquire a 50 percent stake in the Mitsui OSK (MOL) subsidiary that owns four conventional LNG carrier newbuildings booked to deliver cargo from Yamal LNG, expanding the two firms' joint fleet to 17 LNG carriers, with a total investment of $877 million. The deal is the fourth joint LNG project between MOL and China COSCO Shipping. The two firms jointly own four ships delivered in 2015-2016 for charter to ExxonMobil, six vessels due for delivery in 2016-2018 for charter to Sinopec, and three of the 15 icebreaking LNG carriers that will load Yamal LNG cargo at the Port of Sabetta in the Russian Arctic.[28]

China COSCO Shipping has become the most significant large-scale international shipping operator in the Arctic region and the first to include the NSR into its transportation network as a regular route. In 2013, COSCO's *Yongsheng* transited the NSR for the first time, and in 2015 COSCO completed two-way transit shipping. By the end of 2017, China COSCO Shipping had sent a total of 10 vessels on 14 trips through the NSR, successfully carrying cargo that included building materials, machine parts, and other equipment. These achievements mark that regular shipping activities along the NSR carried by Chinese shipping companies have already begun to take shape.[29] In 2018 COSCO completed eight NSR voyages, including China's first cargo ship specially designed for sailing in polar waters, the *MV Tian En*.[30] The goods carried through the NSR by China COSCO's specialized carriers include paper pulp from Finland to China and offshore windmills made in China to Europe.

In September 2017, numerous Chinese companies stated that they are keen to invest in a new project near Arkhangelsk, a historic Russian port city, which would include the Belkomur railway project and the development of a deep-water port in the northern Dvina River. A new port will be built near Mudyug Island in the Dvina River Delta close to the existing port facilities for larger vessels. China EXIM bank has committed to provide loans for the project while COSCO has said it would like to participate, as would Chimbusco, a Chinese bunker company, Poly Group, and the China Marine Fuel Service Corporation.[31] The new port is estimated to reach 30 million tons of cargo by 2030 and act as a central Arctic hub for Russian exports and imports in trade with Europe, the Asia-Pacific region and North America.[32]

In an op-ed in the *China Daily*, Iceland's Foreign Minister Thordarson furthermore underscored that his "government follows carefully and with interest the Belt and Road Initiative, including the "Silk Road on Ice," which is focused on opening up new shipping routes through the Arctic."[33] Iceland has the potential to become a shipping hub in the Atlantic Arctic, especially for traffic through the central Arctic shipping route that China has been at the forefront of exploring,[34] and will be further equipped to do so with the launch of its first domestically built icebreaker the *RV Xuelong 2*.[35] There are planned port projects in the northeast of Iceland, at Finnafjordur and Dysnes,[36] which have been linked to potential Chinese investors and users.[37]

The Arctic Corridor Project: Possible Cooperation under the PSR Framework

One of proposed projects in the Nordic Arctic is the "Arctic Corridor,"[38] a railway project that would connect the city of Rovaniemi in northern Finland with the Norwegian port of Kirkenes. Under the plan, ships could dock at Kirkenes, where cargo would be offloaded to the railway and sent southward through rail connections in Scandinavia to Helsinki and on through the proposed Helsinki-Tallinn undersea railway tunnel that would connect to Central Europe. The projects will include the rebuilding of the Kirkenes deep-water port, railway, and logistic hub in Rovaniemi, an air logistic hub in Helsinki, and linking to the Baltic Tunnel. The Arctic Corridor Project could be well suited for cooperation under the PSR framework, for several reasons. First, the Arctic Corridor and related projects are infrastructure projects with high relevance to the NSR that will facilitate the connectivity of East Asian and Arctic economies to the Baltic region and Central European market in a more comprehensive way than at present. Second, the Arctic Corridor is a huge ensemble of costly projects, and some parties concerned have come to China to discuss the possibility of cooperating with Chinese companies; the project even has a brochure in Chinese.[39] Hence, the project has the potential to make the Eurasian market more integrated and holds additional added value for connectivity between East Asian and EU markets through the NSR.

The Arctic Corridor Project involves two Nordic countries, Norway and Finland, and the EU. The Chinese and Norwegian Governments are seeking to revive stalled free trade negotiations,[40] and Norway's shipping groups are especially interested in greater engagement with China. Norway is actively considering the possibility of greater involvement by Chinese Arctic shipping stakeholders.[41] Kirkenes is the northernmost ice-free port located by the Barents Sea and is the closest Western port to East Asia via the NSR. Under this plan, ships could move goods from China as well as oil and gas from Arctic fields in Russia westward along this northern route to Kirkenes. Cargo would be offloaded to the railway and sent southward through rail connections.

Kirkenes is a free trade, logistics and industrial port in use for supplies and services to the Russian Barents, Pechaora and Kara Seas, Yamal, and other northern Russian onshore and offshore sites.[42] Kirkenes has an ultra-deep, large fjord port that enjoys a dry and calm inland climate and is sheltered from harsh coastal weather. It is open, accessible, and operational for conventional, non ice-class vessels at all times. In addition, Kirkenes has unlimited port and industrial site expansion potential for the Arctic Corridor's future development. The mayor of Sør-Varanger municipality (which includes Kirkenes), Rune Gjertin Rafaelsen, visited Shanghai as a member of a delegation lead by Norwegian Minister of Research and High Education Iselin Nybø, in April 2018. The mayor said that Kirkenes is well prepared for the Arctic Corridor and the opening of the NSR.[43] The Norwegian National Rail Administration, the Norwegian National Coastal Administration, and the National Road Administration have all made recommendations to the Ministry of Transport and Communication in support of the Arctic Railway. If it could be built, the line would be integral to the flow of freight transport along the NSR, connecting Finland and the Baltic region to Kirkenes, the vast oil and gas production areas, and the western part of NSR. Such a vision has been a long time coming, and in September 2010, the Bulk carrier *MV Nordic Barents* successfully became the first non-Russian flagged commercial vessel to transit the NSR, sailing directly from Kirkenes through the NSR and Bering Strait to Lianyungang in China with a cargo of iron ore.[44]

China and Finland agreed to establish a future-oriented strategic partnership and cooperation in the Arctic, with technology innovation as one of the key components. Helsinki serves as a key air hub in the Nordic region. It serves seven airport destinations in greater China with 38 weekly flights, which is more than to any single European country.[45] As the Arctic capital of Finland, Rovaniemi is known globally for issues of Arctic interest. It has a number of areas of planned expansion/shared interest with China, including energy, mining, tourism, ICT, and clean-tech. A maritime cable project linking Europe and Asia via the NSR is planned to pass through Rovaniemi.[46] An increasing number of tourists choose to go to the Finnish Lapland area in the winter.

In February 2018, the *Helsinki-Tallinn Transport Link Feasibility Study—Final report* was released. The Fin-Est study indicated technical details for the proposed $15-23 billion (€13-20 billion), 103km-long rail tunnel connecting Finland to Estonia under the Gulf of Finland, including two huge artificial islands and a tunnel 250m below the sea's surface.[47] Once constructed, it would be the world's longest undersea tunnel. In Helsinki, the line would run in parallel with the planned airport rail line providing connections to the rest of Finland, Sweden, and northern Russia.

On the Tallinn side, the link would connect directly to the airport, which is already connected to the rest of the rail network and Rail Baltica—the new pan-Baltic rail project due to start construction in 2019. Rail gauges differ between Finland and Estonia, so the line will need to be built to the European, 1435mm standard gauge to allow it to connect directly into Rail Baltica.[48]

Technology Cooperation for Science, Monitoring, and Search-and-Rescue

Promoting Arctic digital connectivity and jointly building an international infrastructure network are also important indicators for developing the PSR. In addition to international cooperation in digital technology on the ground, China's international cooperation with Arctic nations and other stakeholders on space technology and submarine cable projects are also on the PSR's agenda. The Ministry of Industry and Information Technology of China and China Telecom (one of the biggest telecom operators in China) are cooperating with Finnish counterparts on a planned trans-Arctic submarine cable project, a 10,500-kilometer fiber-optic maritime cable link across the Arctic Circle. The trans-Arctic submarine cable project is a joint one, led by Chinese and Finnish initiators and joined by Russian, Japanese and Norwegian partners.[49] According to the joint communiqué of the 20th regular meeting of the Prime Ministers of China and Russia in 2015, "China and Russia have made it clear that they should further strengthen practical cooperation in satellite navigation between the Russian GLONASS system in China's Beidou system through improving the compatibility and inter-operation, enhancing the system functions, building station network for applications, and exchanging the data of monitoring and evaluation."[50]

The particularity of the environment along the PSR has forced all parties concerned to think about ways to develop a green economy. The development of sustainable energy systems—including wind power, ocean tidal energy, geothermal energy, and hydropower—is a pivotal path for green development. In addition, ecotourism and low-carbon emission food and aquaculture products are also promising areas. China's White Paper on its Arctic policy specifically mentions clean energy and low-carbon polar tourism. China has pledged to strengthen clean energy cooperation with Arctic countries, exploring the supply and utilization of clean energy and achieving low-carbon development.[51]

Cooperation in the Arctic Will Enhance the Adaptive Capability of China and Its Enterprises

China's contribution to adaptation efforts addressing the changing socio-ecological system on a planetary scale should include: (1) playing an active role in devising and implementing institutional management for collective adaptation, (2) taking effective measures to meet its commitments to the global environmental and climate regimes, (3) building resilience in local Chinese communities, and (4) enhancing its adaptive capability while China and its enterprises join activities in other regions, especially in the Arctic.

A Stricter Environmental Protection Legal System

The Arctic is rich in natural resources, but these abundant resources are stored in an environment with a fragile ecology and harsh production conditions. Therefore, the exploration and exploitation of Arctic natural resources requires sufficient assessments focused on environmental impacts, ecological sensitivity, and production safety. It is necessary for Arctic governance to solve the contradictions between the exploration and exploitation of Arctic natural resources and the protection of this fragile environment, with a more complete understanding of how human activities create barriers for the migration and reproduction of Arctic birds and animals, and how environmental pollution such as oil spills affect fragile ecosystems. Climate change is causing significant impacts and threats to the Arctic ecosystem, including the disruption of food chains upon which many species in the Arctic depend. Increasing the availability of such knowledge and instituting effective responses are essential for the sustainable utilization of resources in the Arctic region.

While many projects for Arctic development have yet to be built, and while no one can accurately predict the pace of sea ice melting and technological advances, a number of projects are making progress across many of these countries—and real momentum for Arctic partnerships has been developed. Many of the long-held economic goals of many Arctic countries are likely to be realized over the next 20-30 years, and much closer links may be formed among China, Russia, and northern Europe as a result of all of this planning and the combined efforts of the relevant governments, businesses, and other stakeholders.

The Chinese Government has committed to regulate and supervise the activities of Chinese citizens, legal persons, and other organizations in the Arctic in accordance with the emerging legal framework, in order to ensure that their activities accord with international law and respect the relevant national laws on environmental protection, resource conservation and sustainable development. Chinese enterprises need to be mindful of the fact that their partners along the PSR are developed economies, and environment protection is a precondition for economic activities in the Arctic. These elements are both challenges and opportunities for the Chinese government and Chinese companies to gain new experiences. The institutional systems of these countries will impose institutional restrictions on China's activities in these areas. Enterprises participating in the PSR must have high environmental protection capabilities, high legal awareness, and strong responsibilities to the local communities where they are operating.

A New Experience in Cooperation with Developed Economies

In other regions of the Belt and Road cooperation such as Central Asia and Africa, most countries lag behind China in terms of technology, the business environment, education, and labor training, etc. With regard to cooperation along the PSR, the majority of Arctic countries are highly developed economies. These countries are more developed than China in terms of GDP per capita, their level of productivity, and their degree of affluence. They are also among the leading countries in technological innovation worldwide. In the global innovation index rankings, Arctic countries hold high positions. With the exception of Russia, the 2017 innovation indexes of the Arctic countries were all higher than that of China, while China overtook Iceland, Canada and Norway in the 2018 rankings.[52] Other countries along the Belt and Road, such as countries in Central Asia and North Africa, have a strong sense of urgency for development. They focus on achieving economic growth that coincides with China's high speed of building infrastructure. The social development goals of the more developed Arctic economies are more diversified and comprehensive, including social justice, ecological balance, economic development, inter-generational equity, enterprise ethics, and climate response, among other values. The decision-making procedure for social resource allocation is more complicated in the Arctic countries.

In terms of the institutional environment for business operations, Arctic countries have sound market systems, developed industrial structures, sophisticated economic operation mechanisms, and systematic market legal norms. In addition, these countries have high standards and protection norms for labor rights and environmental protection. The degree of economic correlation of the Arctic countries with the rest of the world shows that these countries have a high degree of economic internationalization, a large contribution of foreign trade to economic development, open financial markets, and a mature development of transnational corporations. Russia's economy is, by comparison, relatively weak, but it is also an economy with comprehensive educational and industrial systems, with a rich history of achievements in heavy industries. Despite the sharp pain of the collapse of the Soviet Union, Russia still has the economic potential for strategic development as a great power.

Compared with cooperation in other regions, the cooperation along the PSR represents a higher level of technology—and the flow of technology, capital, and information runs in both directions. The Arctic countries have high expectations for China's infrastructure capacity, technology and investment, but they also have rigid criteria for foreign investment. Such high standards will help China's outbound investments become increasingly realized in the future. The development of the PSR can expect to encounter many contradictions and challenges. The ecological and environmental crisis caused by melting ice will trigger even higher environmental standards for economic activities in the Arctic, which will raise the costs of investments. Moreover, commercial benefits will also be affected by the speed of sea ice melting, the improvement of navigation conditions on traditional routes, the status of the world economy, fluctuations of international crude oil prices, and innovations in renewable energy. Therefore, the return of investment along the PSR often needs to be considered within a medium- and long-term perspective. While Chinese stakeholders engage in the ongoing bankable projects in the Arctic, they should take all the above-mentioned factors into account, gain experience, and work with local partners to ensure that the projects (including infrastructure, energy, shipping, etc.) are consistent with this adaptation process.

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Sino-Russian LNG Trade Perspectives

Keun-Wook Paik

In contrast to successful Sino-Russian oil cooperation over the past two decades, Sino-Russian gas cooperation failed to deliver much substance. But as a result of the May 2014 historic agreement on Power of Siberia (POS) 1's gas pipeline development,[1] Russia's east Siberian gas is projected to start to flow in December 2019 to the Bohai Bay areas, where Beijing and Tianjin are located. The POS 1 project became a very serious financial burden to Gazprom, which had failed to secure any financial support from Beijing, as construction costs of POS 1 jumped from 450 billion rubles ($7.8 billion) to 554 billion rubles ($9.7 billion).[2] On top of this, Gazprom's dream of exporting Altai gas to the western part of China made no progress at all, despite continuous rhetoric about intangible "progress" being made during ongoing discussions.[3] In short, there has been too much talk but very little substance regarding POS 2 or Altai gas exports to China. Ultimately, a breakthrough in Sino-Russian gas cooperation came from an unexpected source: Russia's Arctic onshore-based LNG exports to China.

Due to U.S. and EU sanctions against Russia in the wake of the Crimean Peninsula's annexation in 2014,[4] Russia's Novatek struggled to finance its ambitious Yamal LNG project development. The provision of a $12 billion loan for gas from Beijing in late April 2016 became the lifeline for the Yamal LNG development.[5] Consequently, Novatek announced that on December 5, 2017,Yamal LNG commenced producing LNG at the first LNG train with the nameplate capacity of 5.5 mtpa.[6] During the official loading ceremony in Sabetta on December 8, President Vladimir Putin gave the formal command to start loading LNG onto the Arc7 ice-class tanker *Christophe de Margerie*. According to Novatek, Yamal LNG shipped the first LNG cargo, containing 170,000 cubic meters. The first cargo was sold to Petronas LNG UK Limited (PLUK). LNG supplies based on long-term contracts commenced in April 2018.[7]

In late June, it was reported that two LNG vessels from Sabetta—the *Vladimir Rusanov* and *Eduard Toll*—headed for China for the first time in 2018.[8] The first direct LNG shipment from Russia's Arctic region to Asia was made to PetroChina's Rudong terminal in Jiangsu province on July 19, the first time the gas has arrived in Asia directly via the Northern Sea

Route since the Yamal LNG plant came online in December 2017.[9] It was a major achievement by a private Russian company to lay the groundwork for Russia's large-scale Arctic LNG exports to China.

It is worth noting that on January 26, 2018 the State Council Information Office of the People's Republic of China published a white paper titled "China's Arctic Policy."[10] China's first Arctic policy white paper stated that the government would encourage enterprises to build infrastructure and conduct commercial trial voyages, paving the way for Arctic shipping routes that would form a "Polar Silk Road." It was a clear reflection of China's ambitions to extend President Xi Jinping's signature Belt and Road Initiative (BRI) to the Arctic by developing shipping lanes opened up by global warming.

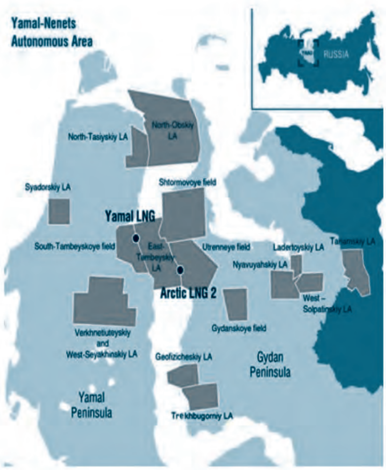
In parallel with the successful launch of Yamal LNG, Novatek began to pay attention to its Arctic LNG 2 project development. In February 2018, the company announced that it signed a Memorandum of Understanding (MOU) with Saudi Aramco, the Saudi Arabian National Oil Company.[11] And on May 24, 2018, the French giant Total decided to take a 10 percent

Source : China Daily, July 20, 2018. Photo by Chen Jianming. http://www.ecns.cn/business/2018-07-20/detail-ifywhfmh2714619.shtml

Figure IV.7 *The First Direct Shipment of LNG from Russia's Arctic Region* equity in the project, as well as the right to acquire up to five percent more if Novatek decided to decrease its participation interest in the project below the currently planned 60 percent. The project's value is estimated at $25.5 billion.[12]

What drove China to play the pivotal role in supporting Russia's Arctic onshore gas based LNG exports? First of all, during the winter of 2017-2018, Chinese energy planners learned a big lesson from a gas supply shortage.[13] The significant reduction of pipeline gas supply from Turkmenistan during September and November 2017, just as China's gas demand was rising very rapidly, reinforced the importance of diversifying gas supply options to promote price competitiveness and increase reliability. The timely start of Yamal LNG exports has highlighted the strategic importance of Russia's Arctic LNG 2 as a hedge against possible future reductions in Central Asian gas supply. Preparing back-up gas supply options is critically important, and Arctic LNG supply is very well suited to contingency situations envisioned by Chinese planners.

In December 2017, Novatek revealed its ambitious 2030 strategy. The gist of the strategy is that the company aims to produce as much as 55



PRMS Reserves at 01.11.2017	Gas, bcm 100% / share[1)]	Condensate, mmt share[1)]
Total for LNG	1,726 / 1,256	69 / 53

including:

PRMS Reserves at 01.11.2017	Gas, bcm 100% / share[1)]	Condensate, mmt share[1)]
Total for LNG	1,726 / 1,256	69 / 53

PRMS Reserves at 01.11.2017	Gas, bcm 100% / share[1)]	Condensate, mmt share[1)]
Total for LNG	1,726 / 1,256	69 / 53

1) *Including NOVATEX proportionate share in JVs*

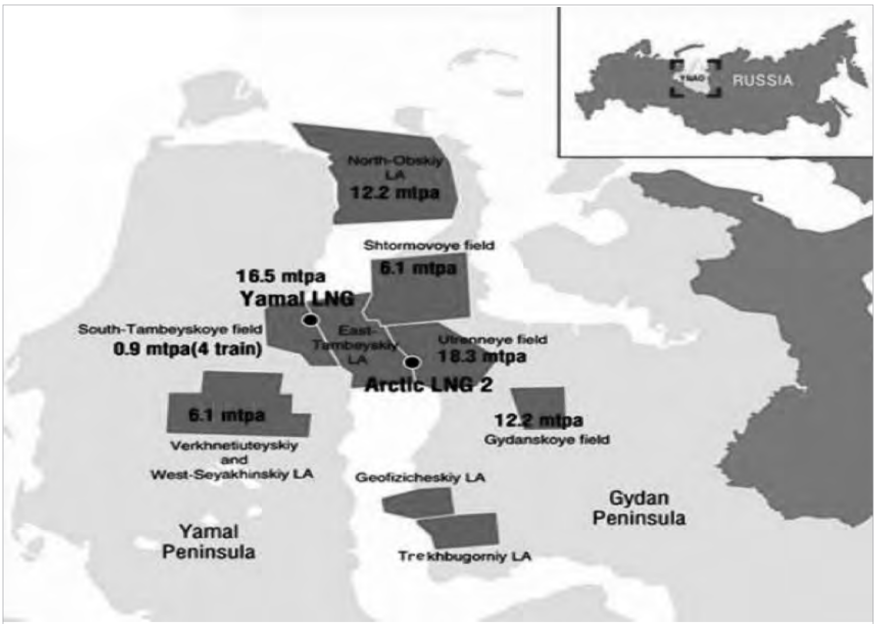
Source: Novatek 2017 Strategy (December 2017 : http://www.novatek.ru/en/investors/strategy/)

Figure IV.8 Yamal and Gydan Reserves

mtpa from the Gydan Peninsula. If this volume is combined with Yamal LNG, it will be 72 mtpa. That would make Novatek the single largest LNG producer in the world.

Gydan Peninsula's LNG Production Potential

At the end of 2017, China became the second largest LNG importer in the world, with a volume of 38 mpta.[14] As shown in Berstein's projection, China's total gas demand in 2030 is projected to be 600 bcm/y, of which domestic gas will supply 300 bcm/y.[15] The difference has to be covered by pipeline gas and LNG imports. Of course, the scale of gas imports will be reduced if China can manage to produce more than 60 bcm/y of domestic shale gas by 2030. The projected volume of China's LNG imports by 2030 is as much as 149 bcm, or 108 mtpa, almost the capacity of Japan and



Note: Yamal LNG : 16.5 mt + 0.9 mt = 17.4 mtpa. Gydan LNG : 18.3 mt + 12.2 mt + 12.2 mt + 6.1 mt + 6.1 mt = 54.9 mtpa.

Source : Novatek 2017 Strategy (December 2017: http://www.novatek.ru/en/investors/strategy/)

Figure IV.9 *Yamal-Nenets Autonomous Area*

Korea's LNG imports combined in late 2010s. China's expansion of LNG imports to 70 mtpa by 2030 will decide the fate of the development of global greenfield LNG projects.

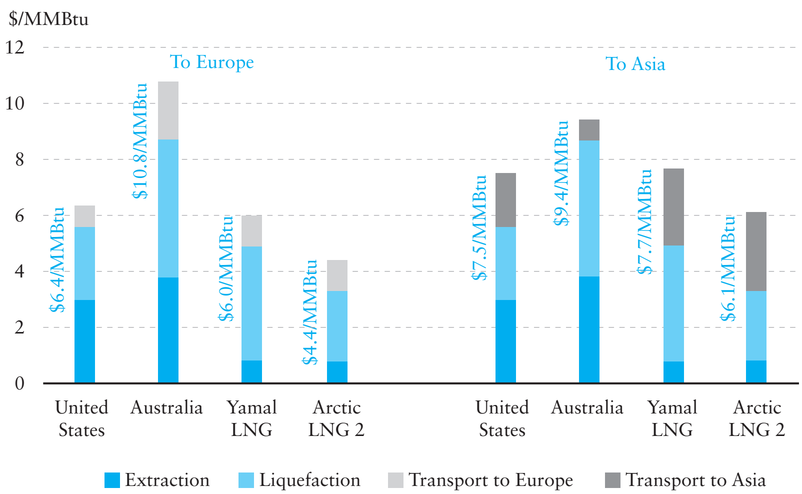
Table IV.2 Shale Gas Production may reach 24 bcm by 2020 and 60 bcm by 2030

Year(bcm)	2016	2017E	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E
Demand	206	238	270	297	325	343	361	385	411	438	467	497	530	565	603
Domestic Supply	137	147	152	164	164	186	198	209	222	234	260	260	273	287	301
Non-Shale	129	138	140	146	152	159	168	176	186	192	212	212	222	233	241
Shale	8	9	12	18	24	27	30	33	36	42	48	48	51	54	60
Imports															
Pipeline	38	43	53	65	75	82	90	95	98	98	98	98	98	98	98
Central Asia-A&B	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Myanmar	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Central Asia-C	4	8	18	25	25	25	25	25	25	25	25	25	25	25	25
East Siberia	0	0	0	5	15	22	30	35	38	38	38	38	38	38	38
LNG	34	49	59	63	63	65	65	65	65	65	65	65	65	65	65
Additional Imports							9	16	26	41	57	75	94	115	139
Central Asia-D								5	10	15	20	25	25	25	25
West Siberia											10	15	20	25	30
LNG								11	16	26	27	35	49	65	84
Total Imports	72	92	112	128	138	147	164	176	189	204	220	237	257	278	302
Imports % of demand	35%	39%	41%	43%	43%	43%	45%	46%	46%	47%	47%	48%	48%	49%	50%
Total LNG bcm	34	49	59	63	63	65	74	76	81	91	92	99	114	130	149
Total LNG (MTPA)	24	36	43	46	46	47	53	55	59	66	66	72	83	94	108

Source: "The Long View: China Shale 2.0. Will China Shale spoil the LNG party?" *Berstein Report*, June 11, 2018, p. 8.

Secondly, Beijing sees the need and merit of diversifying its supply sources, especially considering the price competitiveness that Arctic LNG 2 might bring to the market. In the coming decade, Qatar, Australia and the U.S. are projected to dominate the global LNG supply. As China has no leverage against those major LNG supply sources, China sees benefits in helping Novatek's rise as a major LNG supplier. When Russia's Deputy Minister Pavel Sorokin said that Russia might set a goal of producing 100-120 mtpa LNG by 2035, China immediately understood that the main obstacle to Russia's LNG production expansion was finding ways to finance it. Moscow-based Skolkovo pointed out that Yamal LNG export costs to Shanghai are estimated to be just above $8/mmbtu by 2025. (As shown in the figure, it is worth noting that a recent figure reported by Interfax Natural Gas Daily, the Yamal LNG's CIF price to China is estimated at $7.7/mmbtu and Arctic LNG 2's CIF price is estimated at $6.1/mmbtu.) Novatek argues that their Gydan LNG development cost will be 30 percent cheaper than Yamal LNG,[16] and it remains to be seen how competitive their price will be.

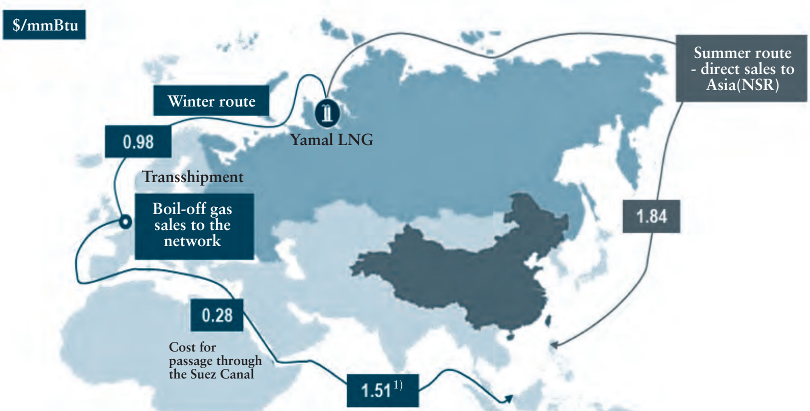
Thirdly, as shown in Polar Silk Road initiative, Beijing is determined to take a solid position with regard to future Arctic affairs, including undeveloped resources.[17] As part of the meeting on March 27, 2018 in Shanghai, Novatek chairman Leonid Mikhelson and COSCO Shipping Corporation chairman Xu Lirong reviewed the cooperation record on the Yamal LNG Project and agreed to expand their mutual cooperation



Source: Interfax Natural Gas Daily, Sep 7, 2018, p. 4.

Figure IV.10 LNG Cost Breakdown by Origin and Destination in scope and depth—and especially to expand their dialogue on Arctic transportation collaboration.[18] As Novatek aims to develop a 20 mpta capacity trans-shipment terminal in the Kamchatka Peninsula with an investment of $1.5 billion, Novatek's LNG export to Asian markets using the eastern route in the 2020s will increase.[19] Considering that forecasts suggest that by 2020 the bulk of shipped goods through the NSR will be five to 15 percent of China's international trade,[20] it appears certain that China's interest in expanding NSR trade will grow during the next decade.

It is worth noting that this growing Chinese interest in Arkhangelsk and the Russian Arctic was confirmed in April 2017 when a 70-person delegation headed by Vice Premier Wang Yang took part in the Arctic



	YAMAL LNG		Navigation via NSR 12 months (Kamchatka)
Transportation costs to Asia 2)	Navigation via NSR 5 months	Navigation via NSR 9 months	
$/mmBtu	Costs	Costs	Costs
Western routh via transshipment	2.49	2.49	NA
Eastern rout via NSR	1.84	1.84	1.65
Average costs to Asia	2.22	2.00	1.65
Average costs across the portfolio including sales to France and Spain	1.40	1.32	NA

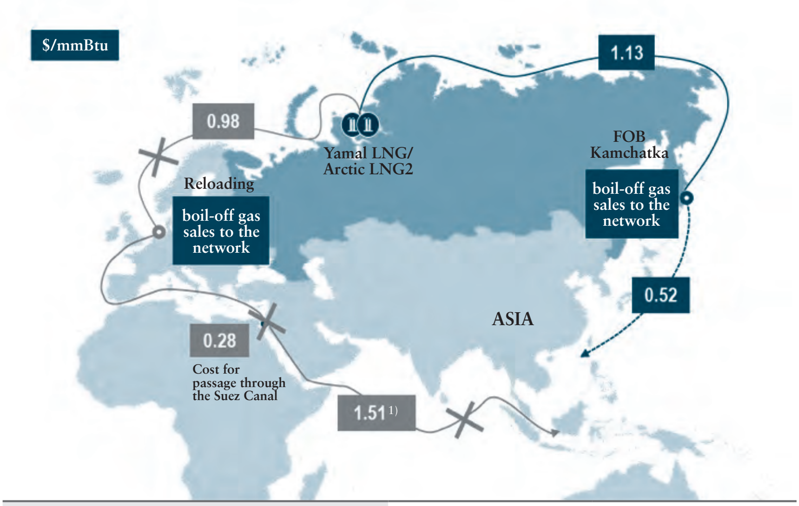
1) *Including costs for passage through the Suez Canal*
2) *NOVATEX*

Source: Novatek 2017 Strategy (December 2017: http://www.novatek.ru/en/investors/strategy/)

Figure IV.11 LNG Transportation Costs: East Versus West Routes

Forum. In early September 2017, when a delegation from Arkhangelsk visited Beijing, the China Exim Bank confirmed its readiness to offer credit to the Belkomur railway project. Besides, Beijing had confirmed its support of the development of a deep-water port in the Northern Dvina River. A key Chinese stakeholder in both projects is the Poly Group. COSCO and the China Marine Fuel Service Corporation have also confirmed their participation.[21]

In short, despite a slow start as mentioned above, the prospects for future Sino-Russian LNG trade are very promising. Beijing aims to maximize the synergy of combining BRI and its Polar Silk Road Initiative, and the Arctic LNG supply to China will play a very important role in this effort. However, there should be no repeat of mistakes by Gazprom



Western route to Asia[2)]	36 days	2.49 $/mmbtu
Eastern route to Asia (Via Transshipment on Kamchatka)	19 days	1.65 $/mmbtu

- Decrease cost by ~ 0.8 $/mmbtu for volumes delivered via the Suez Canal
- Increase LNG sales volumes due to lower boil-off gas volumes from the shorter transport distance
- Direct access to premium markets and full control of the supply chain

1) *Including costs for passage through the Suez Canal*
2) *NOVATEX*

Source: Novatek 2017 Strategy (December 2017: http://www.novatek.ru/en/investors/strategy/)

Figure IV.12 Future LNG Project Logistics and Rosneft during the last two decades. In the case of Gazprom, the POS 1 gas pipeline construction failed to use Chinese financing, which would have reduced the financial burden of large-scale borrowing. The Altai gas pipeline construction completely ruled out the option of opening an upstream sector of the gas supply source. These two factors had affected Sino-Russian gas cooperation quite negatively.

As for Rosneft, which had not made any mistakes until 2015 as it concerned Sino-Russian oil cooperation, the allocation of the Taas-Yuriakh oil and gas field to the Indian consortium in March 2016, just as the Beijing Gas Group was in the process of conducting its final due diligence, was a big misjudgment. Even though Rosneft ultimately agreed to allocate 20 percent equity of the Verkhne-Chonskoye field right after China Development Bank (CDB) and China Exim bank agreed to make the $12 billion loan for gas for Novatek's Yamal LNG development,[22] it was seen as a face-saving act rather than an effort to dampen Sino-Russian oil and gas cooperation. A year later, Rosneft made another major mistake by allocating 14.2 percent of company equity to CEFC China energy, whose young chairman's real intention was to develop a global gas trading business from its strategic partnership with Rosneft. When CDB, as the main financing vehicle for CEFC China Energy, refused a $5 billion loan for the acquisition, the collapse of CEFC China Energy's unrealistic initiative was inevitable. The position of Rosneft was protected by Qatar's sovereign fund's timely step to secure 18.9 percent equity,[23] but it could have introduced a very awkward situation in Sino-Russia's oil and gas cooperation.

Unlike Gazprom and Rosneft, Novatek took a very practical stance with a commonly accepted logic. Novatek's goal is to be a global LNG supplier with a very competitively priced supply. Novatek's innovative initiative for Russia's Arctic onshore gas exports—including LNG shipping to China—will play a pivotal role in strengthening Sino-Russian gas cooperation in the coming decade. How far Sino-Russian gas cooperation can go can be measured by the level of commitment from Beijing with regard to Gydan Peninsula's onshore gas conversion into LNG for their exports. There is no doubt China will open its door wide open for the LNG supply from Russia's Arctic LNG 2 project, but a big question remains about whether Beijing's commitment will be confined to the Arctic LNG 2's first stage (3 trains x 6.6 mtpa = 19.8 mtpa)or will move far beyond the first-stage development. If Beijing decides to offer significant financing for the Gydan Peninsula's comprehensive LNG export scheme, it will open a new chapter in global LNG supply sector in the 2020s. Time will tell whether we can call it as a new "game changer" for the 2020s.

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Japan's Role in Arctic Resource Development and Logistics

Natsuhiko Otsuka

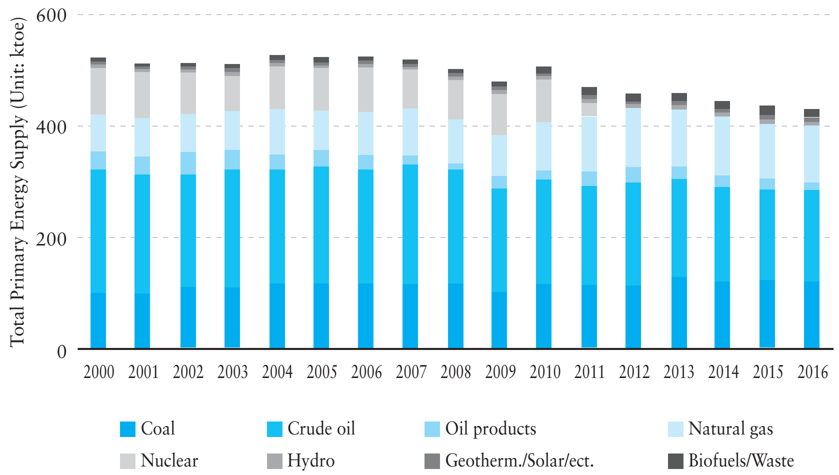
Introduction

In 2006, the U.S. Geological Survey published *Estimates of Undiscovered Oil and Gas North of the Arctic* Circle that brought global attention to the Arctic. At the time, the Arctic was still a largely unexplored region for natural resource exploitation, with the exception of Russian domestic use. But in the 2010's, Russia gradually started natural resource exploitation in the Pechora Sea and Kara Sea areas, including Varandey, Prirazromnoye, and Novi Port. From these development sites, year-round transportation of crude oil by ice-class tankers, with Russian nuclear icebreaker support, has been increasing. In parallel with these activities, Yamal LNG, which is the first LNG production facility along the Arctic coast, started commercial production at the end of 2017 and began LNG transportation in 2018. This achievement in LNG transportation via the Northern Sea Route (NSR) serves as motivation for Japan's energy sector to become more aware of the possibility of energy resource procurement from the Arctic.

Japan has very few domestic fossil fuel sources, which play a central role in its energy needs. As such, it depends heavily on imported hydrocarbons. Since the Great East Japan Earthquake in 2011, the use of nuclear power, which had accounted for about 15 percent of total energy supply before the earthquake, has almost halted. At the same time, the supply of natural gas, which is the third largest energy resource of Japan, increased to become about one quarter of the total energy supply (after crude oil and coal). This paper aims to investigate Japan's Arctic engagements in relation to Arctic LNG development and transportation of LNG via the NSR.

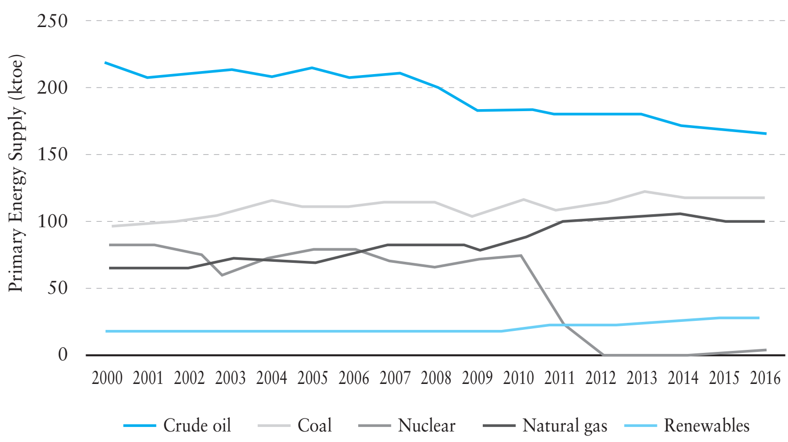
Japan's Energy Supply and Consumption

In the 21st century, Japan has been gradually decreasing crude oil consumption for primary energy production and increasing its dependency



(Source: Synthesis of Energy Statistics. Ministry of Economy, Trade and Industry. Viewed on Sept. 2018. http://www.enecho.meti.go.jp/statistics/total_energy/xls/stte_038.xlsx

Figure IV.13 *Japan's Primary Energy Supply*



Source: Same as Figure IV.13

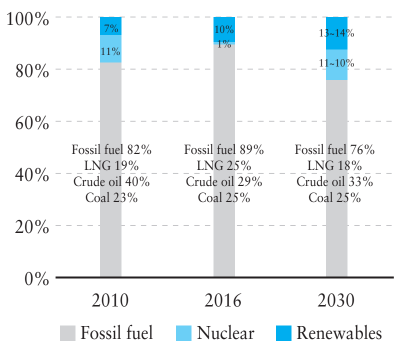
Figure IV.14 *Change in Japan's Primary Energy Sources* on coal and natural gas. At the same time, nuclear production has been almost stable, and the total primary energy supply showed a slight decrease. Then, after the Great East Japan Earthquake in 2011, nuclear power, which had been one of the Japan's four pillars of energy resources, almost halted. Japan was then obliged to rely almost completely on the other three energy sources: crude oil, coal and natural gas. (Figure IV.13 shows Japan's total primary energy supply calculated by Agency for Natural Resources and Energy Japan based on "the International Energy Agency 2017.") To compare the latest statistical data from 2016 with data prior to the Great East Japan Earthquake, Japan's annual primary energy supply decreased 0.8 percent, with a decrease in nuclear power of 93.7 percent and crude oil 10.7 percent (Table IV.3). On the other hand, natural gas has increased both in percentage of total supply (18.4 percent) and in volume (15.8 ktoe (tons of oil equivalent), now accounting for 23.8 percent of Japan's total energy supply.

Table IV.3 Change in Japan's Primary Energy Supply between 2016 and 2010

	Coal	Crude oil	Oil products	Natural gas	Nuclear	Hydro	Geotherm. /Solar/etc.	Biofuels /Waste
Change (percent)	0.9	-10.7	-35.1	18.4	-93.7	-5.8	99.2	26.1
Change (ktoe)	0.992	-19.878	-6.068	15.811	-70.408	-0.421	3.480	2.939

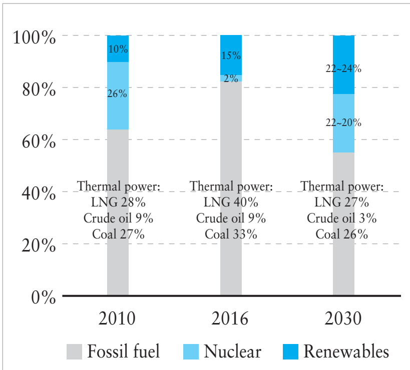
Source: Same as Figure IV.13

Based on the "Basic Act of Energy Policy," which was enacted in 2002 in order to ensure a steady implementation of energy policy, the first and second Strategic Energy Plans were drawn up in 2003, and the third plan was designed in 2010. Then, due to drastic changes in both domestic and international circumstances surrounding energy supply after the Great East Japan Earthquake and the accident at Fukushima Daiichi Nuclear Power Plant, Japan developed its fourth Strategic Energy Plan in 2014. The fourth Plan placed an emphasis on minimizing Japan's dependency on nuclear power and fossil fuels by achieving more robust energy conservation and accelerating the implementation of renewable energy. Following the fourth Plan, the Ministry of Economy, Trade and Industry (METI) approved the "Long-term Energy Supply and Demand Outlook for FY2030 (Energy Mix)" in 2015 (METI 2015). This report projects the electric power supply-demand structure in FY2030 to be as follows: renewable energy–22-24



Power supply (Energy Mix 2015)

Figure IV.15 *Power Source Perspective of Japan*



Primary energy supply (Energy Mix 2017)

Figure IV.16 *Primary Energy Source Perspective of Japan*

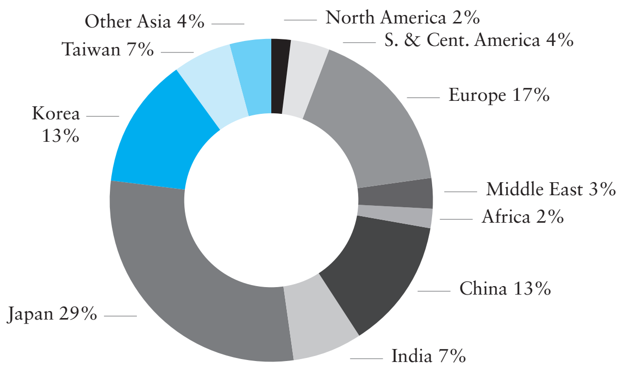
percent; nuclear–22-20 percent; LNG–27 percent; coal–26 percent; and oil–3 percent (Figure IV.15). Among other projections, the report estimates an increase in the efficiency of coal-fired and LNG-fired thermal power generation, and promotes their effective utilization. The plan also secures the minimum required extent amount of oil-fired thermal power production capacity as a back-up in case of emergency.

In July 2018, the fifth "Basic Act of Energy Policy" was approved in order to reorder the energy mix and update it with a target of FY2050 (Ministry of Justice 2018). The Energy Mix toward FY2030 stipulates measures and policies that will accelerate renewable energy to become a dominant power source (13-14 percent), minimize dependency on nuclear power to 10-11 percent, and reduce the proportion of fossil fuel use to 76 percent (LNG 18 percent, coal 25 percent, oil 33 percent) of primary energy (Figure IV.16). The plan includes improving energy consumption efficiency (total energy consumption/real GDP) by 35 percent. Here, LNG is included as a hedge to compensate for reduced nuclear power production and to account for a phase-in of renewables, together with crude oil in terms of Japan's plans for its future energy supply.

Procurement and Consumption of LNG

Japan is the world's largest importer of LNG, importing nearly one third of all global LNG supplies (Figure IV.17). LNG has been accounting for about 20-25 percent of Japan's primary energy supply since 2011 (Figure IV.13). In order to fulfill Japan's future energy demands, LNG is expected to play an important role. Securing stable, dependable LNG sources will be an important issue for Japan's energy policy. Following the projected energy mix, the Tokyo Electric Power Group and the Chubu Electric Power Group established a comprehensive alliance in 2015 covering the entire supply chain, from upstream fuel investment and fuel procurement through power production, as "Japan's Energy for a New Era Co., Inc. (JERA)." JERA aims to achieve an integrated value chain in the conventionally divided energy business in order to enhance the competitiveness of LNG and other fuel procurement. JERA aims to become the world's largest energy company by FY2019 for both LNG procurement and thermal power generation.

On the other hand, JERA announced that it is planning to decrease the amount of LNG procurement under long-term contracts by 42 percent from current levels by 2030. This is because future LNG consumption might be reduced should nuclear power plants restart and the use of renewables increase, both of which are expected in the future. However,



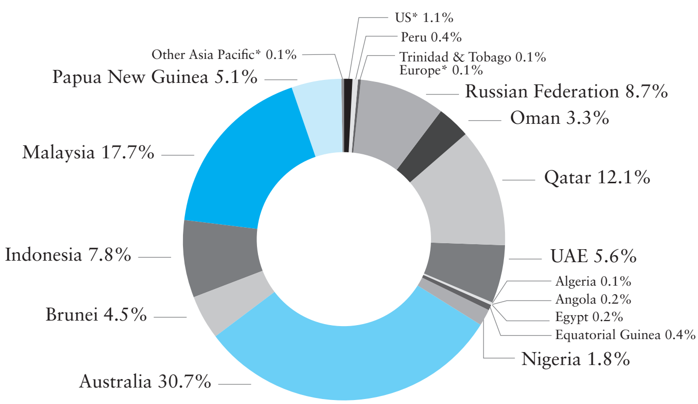
LNG Import 2017,
source: BP Statistical review of World Energy (June, 2018)

Figure IV.17 *LNG Importing Countries* there is still intense debate about restarting nuclear power plants, so it's still not clear whether suspended nuclear power plants will restart as planned.

In September 2018, a large earthquake hit Hokkaido, the northernmost island of Japan, with a population of about 5.5 million. Due to this quake, the entire island of Hokkaido lost electricity for a few days. This incident quickly caused a new debate about both the importance of nuclear power and the risks of earthquakes to nuclear power plants in Japan. Thus, the long-term view of LNG procurement of Japan is again clouded—as is the world market for LNG. Even if Japan's LNG imports have peaked, new emerging markets such as China and India may double or triple their net natural gas imports by 2030, and will become major importers in the future world LNG market (IEEJ 2017).

Arctic Natural Gas Development and Japan

Figure IV.18 shows LNG exporters to Japan. The Asia Pacific region accounts for the largest percentage at 66 percent, (with Australia supplying 30.7 percent and Malaysia 17.7 percent), followed by the Middle East (21 percent) and Russia (8.7 percent). From Russia, Japan has been importing 8 million tons of LNG since 2009 from Sakhalin-2, which has two



LNG exporters to Japan
source: BP Statistical review of World Energy (June, 2018)

Figure IV.18 *LNG Exporters to Japan*

production trains capable of supplying 9.6 million tons of LNG per year. Expansion of Sakhalin-2 production would be a likely source of future LNG procurement from Russia.

Yamal LNG and Arctic LNG-2, which are planned to produce 16.5 million tons/year and 20 million tons/year respectively, could be very competitive in production scale compared to the current Sakhalin-2. Before the start of commercial production, however, Yamal LNG faced many risks and issues. Before the start of LNG shipping by a newly built icebreaking tanker, imports from Yamal faced difficulties in navigating the NSR without Russian nuclear icebreaker support. However, construction of an LNG plant in the Arctic (two Japanese engineering companies, JGC Corp. and Chiyoda Corp., were two of the three main construction contactors) and commercial production of LNG was successfully carried out at the end of 2017. LNG shipping to the European region via the Kara Sea in winter was completed in January 2018, and LNG shipping via the NSR eastward toward China succeeded in early July 2018 (Figure IV.19).

As a result, the prospect of Arctic LNG-2, which comes up in conversation, could be a matter of market and business issues rather than an adventuresome and pioneering project in the Arctic. In relation to Arctic LNG-2, the Japan Bank for International Cooperation (JBIC), which has already provided $200 million for Yamal LNG (JBIC 2016), spoke about the possibility of providing financing for the project if Japanese companies were involved (Reuters 2017). Preceding the JBIC, Japan's major trading companies Mitsui & Co, Mitsubishi

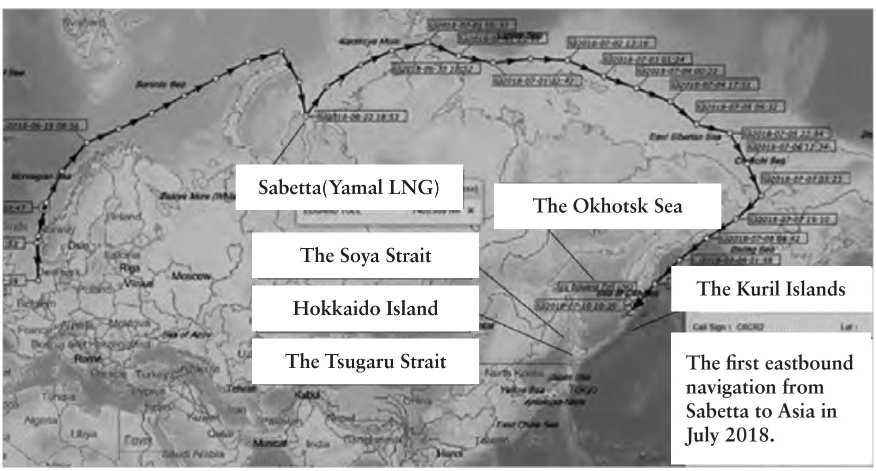


Figure IV.19 The First LNG Transport from Yamal to Asia

Corp, and Marubeni Corp signed MOUs with NOVATEK, to pursue strategic cooperation in the upstream and liquefaction sectors in Russia, including Arctic LNG-2 in 2016. (Marubeni 2016; NOVATEK 2016). It would be unsurprising if the two Japanese engineering companies that succeeded in the construction of Yamal LNG, would express interest in Arctic LNG-2. Similarly, Mitsusi O.S.K. Lines, which owns three icebreaking LNG tankers for LNG shipment from Yamal LNG and four conventional LNG tankers for transshipment (in conjunction with China COSCO Shipping), would most likely also be interested in the project.

Northern Sea Route, New Energy Corridor?

After starting LNG production with its first train in 2017, followed by the second train in 2018, Yamal LNG has been preparing a third train to start production in 2019. Thus after 2019, Yamal LNG is planning to reach full operation of 16.5 million tons of LNG annually. If these full operation goals become reality, more than 160 shipping operations will be carried out annually. This LNG will drastically increase the annual cargo volume traveling the NSR about 2.6 times more than in 2017, which was record high of 10 million tons. Thus, the LNG will become the most dominant cargo of NSR in a few years. Furthermore, recently, Novatek, which owns 50.1 percent of Yamal LNG, plans to develop an LNG transshipment complex in the Kamchatka Peninsula in order to optimize LNG transport operation and lower costs via NSR, while increasing the efficiency of LNG delivery to Asian consumers. With this goal in mind, Mutsui O.S.K. Lines signed an MOU with Novatek to consulting about a Floating Storage & Regasification Unit (FSRU) transshipping complex in Kamchatka.

Thus, the NSR is expected to become a new energy corridor for Asian consumers if all these activities, which increase the potential future maritime transport of energy resources, become reality. However, Arctic shipping is still a difficult activity because of the region's remoteness and existence of sea ice, harsh weather, unpredictable natural conditions, and the importance of environmental protections. Thus, research and development in the Arctic shipping will be continuously required for safe and sustainable use of Arctic resources. At the same time, the geopolitical importance of routes serving the NSR in the Pacific, such as Soya Strait and Tsugaru Strait, as well as the maritime areas along the Kuril Islands where shipping route might cross between the Pacific Ocean and Okhotsk Sea, will increase among China, Japan and Russia (Figure IV.19).

Summary

- Japan is the world's largest LNG importer, and LNG imports are expected to continue to play an important role in Japan's energy supply. The fifth "Basic Act of Energy Policy" has set a target of 18 percent of domestic energy consumption in 2030 coming from natural gas, after crude oil (33 percent) and coal (25 percent). Russia's growing LNG exports will play a role in meeting this target and providing stable procurement of LNG for Japan. However, there is considerable uncertainty about Japan's future LNG demand, mainly due to the uncertainty about the restart of nuclear power and the rate of implementation of renewables.
- Against the background of uncertain LNG demand as stated above, JERA, which intends to become the world's largest energy company for both LNG procurement and thermal power generation, is planning to reduce the amount of LNG purchased on long-term contracts in 2030 by almost half, compared with today.
- With the success of construction, production and transportation of LNG via the Northern Sea Route achieved by Yamal LNG, Arctic LNG exploitation is becoming a realistic supply option. JBIC, which has already provided $200 million for Yamal LNG, expressed the possibility of providing financing for Novatek's LNG-2 project. Japan's trading companies have already signed MOUs with Novatek for future cooperation, and a shipping company has already been consulting about a future LNG transshipment complex in Kamchatka.
- Arctic shipping is still a difficult activity because of the region's remoteness, existence of sea ice, harsh weather, unpredictable natural conditions and the importance of environmental protections. Research and development in the Arctic shipping sector will be continuously required for the safe and sustainable use of the Arctic.
- In parallel with the increase in LNG shipping from the Arctic, the geopolitical importance of routes that serve the Northern Sea Route in the Pacific Ocean, such as those along the Kuril Islands, Hokkaido, and adjacent international straits, will increase.

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PART V

THE SDGS AND AGENDA 2030 IN THE ARCTIC

An NGO Perspective

Dwayne R. Menezes

The year 2015 witnessed two developments of monumental significance in the international, collective endeavour to respond to the twin global challenges of addressing climate change and promoting sustainable development for all. First, the negotiations on the Post-2015 Development Agenda culminated in the adoption of the 2030 Agenda for Sustainable Development, which included the 17 Sustainable Development Goals (SDGs), at the UN Sustainable Development Summit in New York on 25 September 2015.[1] Second, on 12 December 2015, the negotiations at the 21st UN Climate Change Conference in Paris (COP21) resulted in the historic Paris Agreement, which set out and strengthened the global response to climate change and its impacts.[2] While the signatories of the 2030 Agenda and the Paris Agreement are state parties, the success of both are contingent on the commitment and cooperation of multiple stakeholders across various sectors, including non-state actors such as think-tanks, foundations, universities, businesses and civil society groups.

The case of the Polar Research and Policy Initiative (PRPI) offers valuable insights into the role that a think-tank can play both at the heart and in the margins of the negotiating arena, and then in championing the implementation of the resultant agreements thereafter. Incorporated at the end of September 2015 and launched in February 2016, PRPI is a UK-based international, independent think tank dedicated to Arctic, Nordic and Antarctic affairs. Headquartered in London and with a presence across North America, Europe and the Asia-Pacific, PRPI operates principally in the international arena and is committed to supporting sustainable regional development through multi-stakeholder, multi-sectoral and multi-national dialogue and cooperation. At COP21, PRPI and its sister think-tank, Human Security Centre (HSC), jointly provided negotiating support to interested states to buttress their negotiating capacity, and also participated in the largest side event on the Arctic convened in the margins of the conference.[3] In September 2016, PRPI was invited to join the Paris Climate Change Agreement Ratification Ceremony at the UN Headquarters in New York as a Civil Society Observer.

In informal bilateral meetings with the Executive Office of the UN

Secretary-General in New York ahead of the then-UN Secretary-General Ban Ki-Moon's keynote address at the 4th Arctic Circle Assembly in Reykjavik in October 2016, with the White House Office of Science and Technology Policy in Washington, D.C. during the U.S. Chairmanship of the Arctic Council, and with the Finnish Prime Minister's Office and Ministry of Foreign Affairs in Helsinki just prior to Finland assuming the Arctic Council chairmanship, PRPI advocated the need for multitrack diplomacy in building consensus and mobilising action on advancing the SDGs in the Arctic. Subsequently, Ban's address at the Arctic Circle Assembly marked the first time that a high-level representative of the UN highlighted the relevance of the SDGs in the Arctic context and stressed how the traditional knowledge of Arctic Indigenous Peoples could contribute to achieving the SDGs and addressing climate change. Likewise, Finland, which had already positioned itself as leading the way in promoting sustainable development in the Arctic in its *Finnish Strategy for the Arctic Region 2013*, identified the implementation of the SDGs as one of the key priorities in its Arctic Council chairmanship agenda.[4]

In line with the priorities of the Finnish chairmanship of the Arctic Council, 2017-2019, and in support of the UN's 2030 Agenda on Sustainable Development, PRPI has since taken the lead in convening high-level dialogues on "SDGs in the Arctic" in cities and relevant conferences around the world. Following the inaugural dialogue, hosted in partnership with the Icelandic Ministry of Foreign Affairs at the 5th Arctic Circle Assembly in Reykjavik, Iceland in October 2017, PRPI convened subsequent dialogues in Rovaniemi, Finland (November 2017); Peterborough, Canada (December 2017); Canberra, Australia (January 2018); London, UK (February 2018); Boston, U.S. (March 2018); Seattle, U.S. (April 2018); Tromsø, Norway (April 2018); Tórshavn, Faroe Islands (May 2018); New Delhi, India (June 2018) and Copenhagen, Denmark (November 2018). Through its high-level dialogues, PRPI has sought, firstly, to build global consensus about the relevance and importance of the SDGs in the Arctic context. It has sought, secondly, to encourage the entire gamut of Arctic stakeholders to integrate more effectively within their Arctic discourse, decisions and agenda a commitment to the SDGs, whereby climate security remains an integral and indispensable goal, but without an accompanying neglect of issues such as energy, food and water security, as well as access to education, employment, housing, healthcare, transport, telecommunication and infrastructure.

Each dialogue brings together the world's leading decision makers and experts to identify the needs, opportunities and challenges in a particular focus area (whether Arctic tourism, transportation or telecommunications) in line with the SDGs, and to explore what role the different sets of stakeholders might play. The discussions in each session are either transcribed or summarised and published as proceedings thereafter. What the dialogues have established thus far are how the 17 SDGs provide for a timely and necessary re-articulation of global discourses on the Arctic by advancing a unifying, overarching and mutually intelligible framework into which the human, environmental, and economic dimensions in the Arctic can be integrated, with their complementarity, connectedness, and comprehensiveness duly acknowledged. By enabling a move away from the false dichotomies and unhelpful polarizations that recur in prevalent Arctic discourse and providing a valuable shared vocabulary, they also free different stakeholder groups to move forward in communicating their concerns, coordinating their activities and cooperating on priorities along the lines of shared and mutually-intelligible goals and indicators—when beneficial, through multi-level, multi-stakeholder partnerships. The 2030 Agenda allows stakeholders to have universal, defined and measurable goals that, moreover, are interrelated, interdependent and indivisible, and to hold people, governments and businesses accountable to those goals.

One question that arose in nearly every dialogue is whether some SDGs were more relevant than others when it came to the Arctic. After all, the SDGs were drafted in large measure by people thinking about other parts of the world, so do they really apply to the Arctic. The response is a resounding yes. While some SDGs—such as Goal 13 (Climate Action), Goal 14 (Life Below Water) and Goal 15 (Life on Land)—may bear a more obvious connection to the Arctic, the recognition that the Arctic is not just vast, pristine and endlessly white, but is home to Indigenous, lower case for northern and immigrant peoples living in cities, towns and remote communities scattered across its sprawling landscape and who may lack adequate food, water, energy, housing, healthcare and education facilities, employment opportunities, and transport and telecommunication infrastructure, makes all the other goals equally relevant. Even then, some goals may remain harder to articulate or translate more specifically for the Arctic context. Take Goal 5 (Gender Equality), for instance. Nevertheless, the dialogues established how gender issues also proved relevant in the Arctic. For María Mjöll Jónsdóttir, who participated in the inaugural dialogue while she was Director of UN Affairs and Gender Equality in Iceland's Ministry of Foreign Affairs, "The Arctic is gendered. Fisheries, for example, are male-dominated. We have women going for education and not returning. For sustainability of Arctic communities, we need to look into gender and how we can empower women and young men. This goal can be a key driver to achieve other goals."[5] The issue at heart is the interconnectedness, interdependence and indivisibility of the goals. At the second "SDGs in the Arctic" dialogue in Rovaniemi, Finland, Aleqa Hammond, the former premier of Greenland and chair of the Greenland Committee in the Danish Parliament, observed that "because communities are the centres of society…if communities are sustainable, then everything else falls along."[6] For another participant, Jeremy Rayner, professor at the Johnson Shoyama Graduate School of Public Policy at the University of Saskatchewan, "How we tackled the relationships between energy and climate change has an important impact on food security, water security and life on land." Citing the President of the Saami Parliament, Rayner added that "the health and wellbeing of the people of the Arctic depends on the land," so "we need to balance and think of the SDGs as an integrated whole... The challenge is to achieve a balance."[7] For a third speaker at the same dialogue, Terzah Tippin Poe, instructor at Harvard University Graduate School of Arts and Sciences, progress on any of the goals would be impossible without "partnerships that are collaborative with communities and Indigenous Peoples," and partnerships served as "an umbrella to make the rest of the goals actionable."[8] Indeed, Hammond noted:

> "I believe these 17 SDGs are a reflection of the Inuit lifestyle. We recognise them all in our way of understanding the sustainability of the world. That is how we survived in one of the harshest regions in the world... Sustainability is not one word. It is economic, cultural, financial, political and so many things. The next step should be to redefine our own terms of sustainability in the Arctic if we want to achieve any of the 17 goals."[9]

The final point takes the lid off three related challenges. The first of these challenges is how to translate national and global goals for local and regional peoples, including how we set targets and indicators for each of the goals that make them more applicable and sensitive to Northern contexts, and how local and regional considerations can be aligned with national and international goals. The challenge here, as Hammond points out in the case of Greenland, is ensuring that "national goals and international goals must be understood and comprehended by families making a living off nature" as "Indigenous Peoples of the Arctic will not have a sustainable goal for their economic development if it is all based on definitions that they will not comprehend."[10] Furthermore, families that live off nature "must have their own say when setting up goals for sustainable development in society." As the goals, at present, are not based on the input of local peoples and communities, their ideas and opinions must be sought when translating and setting goals for the local and regional context.[11] Heather Nicol, professor in the School of the Environment at Trent University, who framed her remarks in the context of the Canadian North states:

> "What is rather interesting is, if you look through the education goal itself, the sorts of things that are important in terms of inclusivity and gender equity apply to Northern populations. But, there are also things there that do not apply that makes us think that some of the Sustainable Development Goals for education might be worked through…For example, one of the solutions to problems in education in the goals is scholarships for students. That's wonderful, but in the North, having somewhere to take up a scholarship is also important. That might involve leaving the community. If you don't leave the community, how do you support the network of schools and facilities that must be as well-resourced as they might be in larger centres?"[12]

The challenge is that of social innovation.

The second of the three challenges, and one that is closely related to the first, relates, conversely, to how sustainable development in the Arctic is understood outside the Arctic region. The historic opposition of environmental groups to sealing and whaling, and the social and economic impacts on Arctic Indigenous communities of legislation such as the EU Ban on Seal Products, were cited by Hammond as evidence of an unhelpful and, in reality, harmful knowledge gap:

> "Very often, the outside world does not understand sustainable development when we are talking about fisheries, sealing, whaling or rights to use our animals… This creates a clash between interest

> groups and Indigenous people. Often, we don't have strong voices compared to animal rights lobbyists. It affects the livelihoods of many people in the Arctic. I think the dialogue between the Arctic region and the rest of the world has to occur with a mutual understanding that sustainable living in the Arctic has a basis in sustainability and responsible policy. We do not want to harm our animals or environment. We are living in harmony with the environment, as we have done for thousands of years. We in the Arctic have a responsibility to reach out to the rest of the world and talk about SDGs."[13]

Likewise, national and international policymakers have the responsibility to learn more about the region and to listen to its peoples if they wished to advance the SDGs therein. As Rayner observed, "It seems that the challenge here is to balance the top-down forces and the bottom-up forces. You cannot have an exclusive emphasis on one or the other. Unless the Sustainable Development Goals link to the lived reality of communities, this will be yet another alien imposition onto communities of the world that have seen so many impositions already."[14]

This leads to the third challenge: How do international organizations or forums, such as the UN, the OECD and the G-20, ensure that the 17 goals remain integrated when measuring the progress a country makes in realizing the SDGs, so that countries are not incentivized to base their responses to how well they are doing on certain cherrypicked goals? The challenge here is that of policy integration and coordination. This is an area where regional bodies, such as the European Union, Nordic Council of Ministers, and Arctic Council have an important role to play by providing opportunities for multi-stakeholder, multi-sectoral, cross-disciplinary and cross-border regional cooperation; supporting projects that do not isolate the goals, but harness their interrelatedness to achieve progress on multiple fronts; and offering technical assistance to member states when it comes to designing policies and programmes to achieve the SDGs, as well as monitoring, measuring and reporting progress. By aligning its policies, action plans, programmes, services, enterprise support mechanisms, infrastructure investments and stakeholder networks and forums with the SDGs, the EU has clearly indicated its commitment to the 2030 Agenda.[15] Likewise, aligning project funding through its Arctic Cooperation Programme with a programmatic mission to support the SDGs is one way in which the Nordic Council of Ministers is contributing to the realization of the 2030 Agenda in the Arctic.[16] The Arctic Council through its six Working Groups—the Arctic Contaminants Action Program (ACAP), Arctic Monitoring and Assessment Programme (AMAP), Conservation of Arctic Flora and Fauna (CAFF), Emergency Prevention, Preparedness and Response (EPPR), Protection of the Arctic Marine Environment (PAME) and Sustainable Development Working Group (SDWG)—has been largely successful at adopting and promoting a more holistic approach to Arctic engagement.

While the work of all six Arctic Council Working Groups ties in with the SDGs, the relevance of the SDWG to the SDGs is perhaps the most obvious. In March 2017, the Arctic Council's Senior Arctic Officials (SAO) approved the SDWG Strategic Framework for the period 2017-2030, which enshrined its commitment to the SDGs and outlined areas that reflected the SDGs in which it would encourage projects and activities. Several of its projects that started under the U.S. chairmanship and continued into the Finnish chairmanship, such as "The Arctic as a Food-Producing Region," "Arctic Indigenous Youth, Climate Change and Food Culture (EALLU)," "Arctic Remote Energy Networks Academy (ARENA)" and "Arctic Renewable Energy Atlas (AREA)," or that commenced during the Finnish chairmanship, such as "Arctic Resilience Action Framework (ARAF)," "Assessing the Use of Heavy Fuel Oils in Indigenous Communities," "Circumpolar Resilience, Engagement & Action through Story (CREATes)," and "Arctic Generation 2030," have been very much in line with the SDGs. However, once again, in the absence of adequate monitoring and reporting mechanisms, it is hard to tell whether some of the endorsed projects actually received funding or made substantial progress. This is an area where all six Working Groups could benefit from improvement, and without which the Arctic Council cannot define its role or measure progress when it comes to achieving the SDGs. It would also help if all project leads going forward articulated the aims and objectives of their projects to indicate which SDGs would be consciously and inadvertently advanced by the project, which SDGs (if any) could be negatively affected, how a balance could be struck, and how the success of the project could be measured along various SDGs axes.

Given the relevance of developments in the Arctic to the world beyond and vice-versa, and the roles that non-Arctic states and non-state actors can play through and alongside the Arctic Council, it would also be of interest to define why, if at all, should non-Arctic states and non-state actors take an interest in pursuing the SDGs in the Arctic, and if there are any well-defined roles for them in this regard? Thus far, there have been 13 non-Arctic states admitted as Observers to the Arctic Council; eight of which are European (France, Germany, Italy, Netherlands, Poland, Spain, Switzerland and the UK) and five of which are Asian (China, Japan, Korea, India and Singapore). At present, all eight European non-Arctic Observer states are member states of the EU, though this will change once the UK formally leaves the EU. Nevertheless, with three Arctic States (Denmark, Sweden and Finland) and seven to eight Observer states, the EU remains an influential actor in the Arctic arena, even if it is not yet an Observer to the Arctic Council. Within the non-Arctic states that have been admitted as Observers to the Arctic Council, the key actors interested and/or invested in Arctic affairs could include both state actors and non-state actors, not all of which might feature in the state's official Arctic policies or strategies, but which may still be active and influential in the Arctic arena. Furthermore, there are non-Arctic states (such as Brazil and Australia) that are not Observers to the Arctic Council, but which have existing or emerging interests in the Arctic. Likewise, there are non-state actors with an interest in the Arctic, but that are based in countries that are neither member nor observer states in the Arctic Council.

Although non-Arctic states, such as the UK, France and Germany, may not have any territorial claims in the Arctic, their interests can be so wide ranging as to render them critical actors in realizing the SDGs in the region. In the case of the UK, the northernmost non-Arctic state and one with a long history in the Arctic, its current interests range from being a major producer of Arctic research (surpassed only by the United States, Russia and Canada) to being a world-leading centre for financial services, maritime, mining, oil and gas, renewable energy, and creative industries. When it comes to the maritime sector, the UK remains the world's leading maritime centre, with its ports sector being one of the largest in Europe, and the UK continues to command a dominant share of global maritime insurance premiums and Protection & Indemnity Clubs. London remains the market leader in maritime insurance, shipbroking, financing, legal and arbitration services, with the capital also playing host to regulatory bodies such as the International Maritime Organization (IMO) and International Association of Classification Societies. London is also home to the world's oldest and leading insurance market, Lloyd's of London; one of the world's leading maritime classification societies, Lloyd's Register; and the world's leading source of market information on trading and settlement of both physical and financial shipping derivatives, the Baltic Exchange.[17] When it comes to mining, many of the world's biggest, as well as many smaller, mining companies are listed on the London Stock Exchange, including its Alternative Investment Market (AIM), and London is home to the mining industry's key lobbying organization, the International Council on Mining and Metals; the world's most important metals price fixing mechanism, the London Metal Exchange; and the leading precious metals trader, the London Bullion Market Association.[18] Beyond the UK's importance in sectors of relevance to the Arctic, trade between the UK and Arctic states is also significant. In 2017, the UK was the most important export market for Norway; 2nd largest for Iceland; 3rd largest for Denmark, Sweden and Canada; 5th largest for Finland; 6th largest for the United States; and 10th largest for Russia. Given its expertise and interests, the UK can play a key role in contributing to the SDGs in the Arctic by integrating them into all policy and research frameworks, and by encouraging their adoption by businesses. Indeed, the UK has already enshrined its commitment to the SDGs in this regard in its latest Arctic Policy; it has been active in the development of the Polar Code, the Black Carbon framework and international agreements on scientific cooperation and fisheries in the Arctic.[19]

For Japan, its recent Arctic engagement has been predicated upon scientific research and cooperation, green technology, the Northern Sea Route, involvement in an advanced wind power generation project in the Sakha Republic, investment in offshore exploration in Greenland, co-ownership of the Yamal LNG project and, as the world's largest importer of LNG, ensuring stable access to natural gas.[20, 21] For Korea, its Arctic interests have included scientific research and cooperation, development and exploitation of energy resources, use of Arctic sea routes, developing Arctic sea operators' capacity and Arctic coastal ports, cooperation in sustainable fisheries resource management, shipbuilding and safety technology for polar-class vessels, and new business opportunities for Korean shipbuilders represented by the increased demand for offshore platforms and special vessels, such as icebreakers and ice-hardened ships.[22, 23] On the other hand, for Singapore, which has one of the largest ports in the world and the busiest container transhipment hub, the development of Arctic shipping routes represents not so much an opportunity, but more of a threat, prompting the microstate's interest in Arctic development.[24] Sam Tan, Minister of State in the Singaporean Prime Minister's Office and Ministry of Manpower, pointed out in 2016, "our marine industry has built up strong credentials in sectors such as shipbuilding and repair, offshore engineering, and marine support services, and we are well-placed to provide enabling technology for Arctic development. Some of our companies are developing Arctic capabilities to leverage on the economic potential of the region. For example, Keppel Corporation has constructed a number of ice-class vessels, including the first icebreakers built in Asia in 2008, and is now working with oil majors and drilling contractors to develop the world's first Arctic-grade, environmentally-friendly 'green' rig."[25] Other interests or concerns range from mitigating risks relating to rising sea levels, to sharing its experience or ongoing work in oil spill management and conservation of migratory shorebird populations, to promoting education and public interest in Arctic issues.[26]

Among the bigger Asian powers, China, as its recently-published Arctic white paper makes clear, has sought to legitimise its Arctic interests by presenting itself geographically as a "near-Arctic state" and appealing to its historic commitment to scientific research and cooperation. But China also lays out that its interests go well beyond to include commercial activities, such as oil and gas, mining, shipping, fisheries and tourism.[27] While China reiterates its commitment to upholding the institutional and legal framework for Arctic governance and respecting the sovereign rights of Arctic states, it also seems to appeal to international law to assert its right to participate in Arctic affairs even as a non-Arctic state.[28] The development and financing of large capital and infrastructure projects in the Arctic also stands out as a priority, with China announcing that its Belt and Road Initiative (BRI) will include the building of a "Polar Silk Road" and facilitate sustainable economic and social development of the Arctic.[29] Sustainability often arises as a theme in the white paper and is taken to mean "promoting the sustainable development of the Arctic by ensuring the sustainability of environmental protection, resource utilization and human activities in the area" and "realizing harmonious coexistence between man and nature, better coordination between ecological protection, economic growth and social progress, better balance between utilization, management and protection, and intergenerational equity." While sustainability is indeed cast as "the fundamental goal of China's participation in Arctic affairs," it remains to be seen how sustainability—and the SDGs—will actually factor in Chinese policy-making, business activities, investment decision making and BRI projects relating to the Arctic.[30]

Unlike China, India does not have an official Arctic policy or, in fact, a cohesive national framework for multi-stakeholder, multi-sectoral Arctic engagement, and much of its Arctic engagement thus far has been scientific. At the "SDGs in the Arctic" dialogue that PRPI convened in New Delhi in June 2018, it became clear that while India does not see itself as a "near-Arctic state," it does cast the Himalayas as the Third Pole and, hence, believes it could contribute to, and benefit from, cooperation in cryosphere and climate research. The effects of climate change in the Arctic on the monsoons in India, sea levels in the Bay of Bengal and low-lying areas of the surrounding regions—and what that could mean in terms of climate-induced displacement and a potential influx of climate refugees—are also of concern. Other interests include exploring the scope for maritime cooperation, sharing knowledge and best practices when it comes to disaster governance in cold weather extreme environments, and developing the International North-South Transportation Corridor (INSTC), a multi-modal transportation network linking Mumbai with St Petersburg. The implications of the potential northward and westward extension of the INSTC on connectivity and trade with the Baltic, Nordic and Arctic regions, and existing/emerging Indian business interests in oil and gas, renewable energy, mining and ports in Arctic states, are other reasons why India is likely to take an interest in policy themes such as sustainable development in the Arctic. When it comes to non-Arctic, non-Observer states, the threat posed by rising sea levels to small island developing states in the Caribbean, Indian Ocean, and the Pacific, as well as low-lying regions in Bangladesh and Indonesia, explain their interest in the Arctic, while opportunities in mining, as well as the potential for cooperation on climate action and Indigenous issues, are reasons why state and non-state actors in Australia, New Zealand, and Brazil might take greater interest. Likewise, non-Arctic, non-observer states such as Austria, Belgium, Czech Republic, Estonia, Latvia, Mongolia, and Portugal already have Arctic research interests, capabilities and/or institutions. Again, the SDGs could provide a useful framework whereby non-Arctic observer and non-observer states and non-state actors could align and articulate their interests or concerns to respond—whether individually or through collective efforts—to the regional and global challenges that the goals represent.

When it comes to non-state actors with an interest in Arctic affairs, these may include think tanks, universities, other research institutions, foundations, civil society organizations, and businesses. While this paper thus far has highlighted the role that research and policy institutions, such as PRPI, can play in advancing the SDGs in the Arctic, the role of businesses and institutional investors in this regard also warrants special attention. Why are the SDGs relevant to businesses and institutional investors? Why should businesses and institutional investors engage with the SDGs in their decision-making? How can investors justify a commitment to the SDGs when their clients or beneficiaries might primarily expect risk-adjusted returns? According to the PRI (Principles for Responsible Investment), an independent, international investor initiative in partnership with the UNEP Finance Initiative and UN Global Compact, the SDGs act as a definitive list of the material environmental, social and governance (ESG) factors that should be considered a critical part of investors' fiduciary duty, which requires them to act in the best interests of beneficiaries.[31] Furthermore, they represent risks and opportunities at both the macro- and the micro-levels. At the macro-level, the SDGs simultaneously represent key global challenges and drivers of global economic growth, so asset owners with a highly-diversified, long-term portfolio, investing in a range of asset classes and geographies, will face macro financial risks if they are not realized, or benefit from the ultimate structural source of financial return if they are.[32] On the other hand, at the micro-level, the SDGs provide a common way to strengthen investors' ESG risk frameworks by reflecting the specific regulatory, ethical and operational risks which can be financially material across industries, companies, regions and countries, while serving as a capital allocation guide for investors who believe that providing solutions to sustainability challenges also offers attractive investment opportunities and, hence, implement investment strategies that explicitly target SDG themes and sectors.[33] In their *Global Opportunity Report 2018* and their digital platform *Global Opportunity Explorer*, Sustainia, DNV GL and UN Global Compact identified several business opportunities and concrete solutions relating to the SDGs, such as new technology developed to capture CO_2 from industrial processes and use it to produce new products, such as polyols used in running shoes, sofas, building insulation, chemicals, bio-oils and fuels; new initiatives to turn plastic bottles into fabrics along a 100 percent transparent supply chain; and new processes to remove algal blooms from ponds and lakes and utilise them to manufacture biodegradable 3D printing filaments.[34, 35]

A number of the high-level dialogues and conferences on "SDGs in the Arctic" convened in 2017-2018 focused on the role of businesses and investors. While PRPI's first two "SDGs in the Arctic" dialogues in Iceland (October 2017) and Finland (November 2017) both touched upon the subject, the high-level conference hosted by the Governments of Denmark, Greenland, and the Faroe Islands in Copenhagen in December 2017 and PRPI's 5th high-level dialogue held at the Palace of Westminster in London in February 2018 focused on the topic in greater depth. Among the key insights arising from the conference in Copenhagen were that companies that align their interests with the SDGs are better suited to meet future market demands; that innovation in support of the SDGs needed to be incentivized; that the private sector encourages coherent, ambitious and global strategies and regulatory frameworks based on the SDGs; that public-private partnerships were the way forward when addressing sustainable development in the region; that rules and regulations guiding businesses in the Arctic should be uniform in all parts of the Arctic; and that international cooperation across borders ought to be strengthened.[36] An example from the Faroe Islands was the production and processing of seaweed for various purposes like energy and food while at the same time being beneficial for the reduction of CO_2 emissions.[37] Another interesting example was optimized production processes such as using the shells from shrimp for various other innovative purposes, thereby reducing food waste.[38]

However, some of the above-mentioned insights are precisely where the key challenges arise: How can the investment climate across the Arctic region be made more attractive, business-relevant rules and regulations made more uniform, cross-border business activities be incentivized, and enterprise support mechanisms be strengthened when the investment landscape across the eight Arctic states is not homogenous. Not only can conditions in the Arctic or northern regions of those states vary greatly from conditions in the southern regions, but also the North American Arctic can differ significantly from the Nordic Arctic and the Russian Arctic in terms of politics, economy, geography and environment, which has an effect on enterprise, project and infrastructure investment. Given the varying investment climates across and within the Arctic states, understanding the national and subnational frameworks for the financing of micro-, small and large enterprises, as well as capital projects and infrastructure, is crucial for developing strategies, policies and mechanisms to encourage and support innovation, industry and infrastructure in their respective Arctic regions, and for exploring potential frameworks for regional cross-border cooperation, even at the circumpolar Arctic level. The most basic requirement for acquiring such understanding and facilitating such cooperation, however, would be the availability and accessibility of adequate, timely and relevant data at the subnational, national and circumpolar-regional levels. Yet the range, thoroughness, and accessibility of data currently available differs greatly across the three levels, with the inadequacy of data obtained and made available through existing monitoring and reporting mechanisms most notable at the subnational level. Furthermore, on comparing national frameworks across the eight Arctic states, one encounters the absence of universal definitions and universally recognised indicators for the purposes of monitoring and reporting, which can also hinder circumpolar cooperation.

In the case of small and medium-sized enterprises (SMEs), for instance, there is no universal definition of what comprises an SME. As per national statistical definitions, SMEs in Canada have 1-499 employees; in Denmark 1-250 employees; in Finland and Sweden less than 250 employees and annual turnover below EUR 50 million and/or a balance sheet below EUR 43 million; in Norway less than 99 employees; in Russia less than 250 employees and not more than RUB 1000 million; and in the U.S. fewer than 500 employees. As the OECD points out, having a standardized definition and a standardized template for data collection would be vital for timeliness, comparability, transparency and harmonization of data.[39] Likewise, banks, investors, businesses and investors could work together with international, regional, and national authorities to align definitions of other financing and investment terminology, and to monitor and report on developments made across a standardized set of indicators. The case of SMEs is particularly relevant to any Arctic dialogue about sustainable development, given their role in alleviating poverty, creating jobs, promoting innovation, supporting economic growth, reducing inequalities, ensuring sustainable consumption and production, and developing inclusive, resilient and sustainable communities. After all, SMEs account for more than 99.5 percent of the total number of businesses and employ more than 60 percent of the workforce in Canada, Denmark, Iceland, Finland, Norway, and Sweden; and more than 99.5 percent of the total number of businesses (though less than 50 percent of the workforce) in the United States. While SME shares of total businesses and employment in Russia are considerably lower, these figures do not indicate the weakness of the SME sector in Russia but reflect the country's particular history: there are more than 6.2 million micro, small, and medium-sized enterprises in Russia that make up less than 50 percent of the total number of businesses and employ up to 30 percent of the workforce. When it comes to enterprise support, one of the principal activities at PRPI has been monitoring SME access to debt finance, equity finance, and asset-based finance, as well as assessing the effectiveness of existing and potential government-developed policy instruments to foster SME access to finance across the Arctic region.[40]

Beyond the development of mechanisms to support SMEs, investors can play a leading role in promoting sustainable development by integrating sustainability considerations in investment analysis and decision making. This would apply equally to investments in SMEs, large enterprises, capital projects and infrastructure. The integration of ESG criteria in infrastructure investment, for instance, could improve business models and offer long-term performance advantages. Long-term investors (LTIs) could play a valuable role in this regard. As James E. Pass, Senior Managing Director at Guggenheim Partners, wrote recently:

> "The ability of LTIs to hold assets throughout business cycles and their preference for alternative investments, such as infrastructure and real estate, make them attractive partners to local leaders, planners, conservation groups and other stakeholders to create sustainably developed environments, while preserving plentiful natural habitat. They can provide capital that understands the convergence of long-term value and sustainability. LTIs have provided capital for essential projects for decades, including power, water, transportation and real estate development."[41]

The incorporation of sustainability factors in infrastructure planning could also provide the impetus for a radical expansion of low-carbon, climate-resilient, sustainable infrastructure.

Multilateral development banks (MDBs) generally have the experience and expertise to execute complex infrastructure projects, so if they commit to increasing lending to sustainable projects, other financing institutions may also come on board. Luis Alberto Moreno, president of the Inter-American Development Bank, and Nicholas Stern, professor at the LSE, argued in *The Guardian*, "By establishing a robust institutional structure of

MDB-led lending, private capital could be mobilised on a scale that could mean countries meet their Paris commitments, while responding to the development needs of their people."[42] In a report published by Brookings Institution, Stern joined Amar Bhattacharya and Jeremy Oppenheim in also calling on national authorities "to clearly articulate their development strategies on sustainable infrastructure," the G-20 to "play an important leadership role in taking the actions needed to bridge the infrastructure gap and in incorporating climate risk and sustainable development factors more explicitly in infrastructure development strategies," central banks and financial regulators "to support the redeployment of private investment capital from high- to low-carbon, better infrastructure," the official community working with institutional investors to "lay out the set of policy, regulatory, and other actions needed to increase their infrastructure asset holdings," and the international community to "agree on the amounts of concessional financing needed to meet the SDGs, how to mobilise this financing and how best to deploy it to support the economic, social and environmental goals embodied in the SDGs," notably through models that deploy official development assistance (ODA) through public-private partnerships.[43] Likewise, Pass called for more active partnership from governments: "LTIs can provide some of the capital to fund revenue producing assets but governments need to be a partner in investment, with input from local communities, planners and conservationists. When LTIs provide targeted capital for specific purposes, public capital can flow where it is needed most. To ensure the long-term license to operate for these private and public investments, national and regional development plans with strong social license are needed."[44] Guggenheim Partners was also the first financial services firm to formally endorse the Arctic Investment Protocol, which was developed by the World Economic Forum's Global Agenda Council on the Arctic, in line with the SDGs. The Arctic Investment Protocol put forward six principles for investors in the region to follow on a voluntary basis:

- Build resilient societies through economic development
- Respect and include local communities and Indigenous Peoples
- Pursue measures to protect the environment of the Arctic
- Practice responsible and transparent business methods
- Consult and integrate science and traditional ecological knowledge
- Strengthen pan-Arctic collaboration and sharing of best practices

While the Protocol has subsequently been endorsed by the Arctic Economic Council (AEC) that has sought to explore how its principles can be integrated in investment analysis and decision making, the Protocol is positioned as a starting point, rather than an end product. There remains the need for the development of precise and robust standards, tools and indicators to measure sustainability—namely, the environmental impact and societal impact. In order to promote the Protocol among businesses and investors, one course of action could be launching an Arctic Global Compact, along the lines of the UN Global Compact. The UN Global Compact is the world's largest corporate sustainability initiative. It encourages and supports businesses worldwide to align their strategies and operations with Ten Principles on human rights, labour, environment and anti-corruption, and to take strategic action to advance broader societal goals, such as the UN SDGs. The UN Global Compact would provide the ideal template for a similar Arctic Global Compact where businesses worldwide—particularly those with an interest in the Arctic—would be encouraged and supported to align their Arctic engagements with the Arctic Investment Protocol. Investors and governments could play a key role by integrating a code or guidelines based on the Protocol in their decision-making.

To conclude, it ought to be said that even when non-state actors, such as think tanks or businesses, have played a leading role in championing the advancement of the SDGs in the Arctic, this does not necessarily reflect a well-defined role delineated for them or funding demarcated for their efforts by governments. Bearing in mind the necessity of multitrack diplomacy and stakeholder engagement in advancing causes such as the SDGs, Arctic states ought to assign a more clearly defined role to non-state actors working to promote the SDGs, work in partnership with them, as well as make funding available for efforts that promote their realization.

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An Arctic State Perspective

Elena Nikitina

Introduction

This article explores the state-level perspective in the governance of sustainable development in the Arctic, considering a wide array of impacts arising from environmental and societal transformations underway in this region and globally. It analyses possible designs in multilevel governance for 2030 and beyond, and looks at opportunities and risks in the implementation of the SDGs in the context of Arctic change. It focuses on questions for discussion regarding prospective sustainable development quests and instruments for attaining core sustainability goals within Russia's national strategies for the Arctic and its northern provinces, as well as on its approaches to international cooperation in the region. Coordination and linkages among various levels of Arctic governance and partnerships among multiple stakeholders are emerging into the foci of sustainability challenges formulated by the Russian Federation's (RF) national planning for the region around the 2030 timeframe.[1]

Governance for Sustainable Transformations in the Arctic

Today, we are witnessing a merging of the Arctic sustainability agenda and global sustainable development goals (SDGs) set at the highest levels of policy making. This emphasis on the Arctic sustainable development perspective for 2030, presented in 2018 at the UN Forum on Sustainable Development,[2] underscores three key themes: 1) rapid change in the Arctic, 2) linkages between the dynamics of global and regional processes and trends, and 3) international cooperation as a tool for sustainable development (Arctic Council, 2018). Some good practices and sustainability research already accumulated in this region could be transferred to other parts of the world that are seeking effective tools for implementation of the 17 SDGs.

It is essential to understand the combination of impacts from transformations in both the biophysical and human dimensions of Arctic systems, which are attributable to a set of regional and global drivers of change. The most important among them are: climate change, socio-economic dynamics, and institutional innovations at the regional, national and international levels. The changes in these systems have multiple impacts on future pathways and options for regional sustainability. There are tight links among the social, economic and environmental elements of sustainable development. The future challenge is to balance these priorities, and especially to devote adequate attention to the social dimensions of any sustainable development agenda for the Arctic.

The growing internationalization and globalization of the Arctic (mainly due to its integration into the world economy through increasing deliveries of natural resources) is driving the need to seek new thinking about the sustainability of Arctic ecosystems, the people who live there, and a more inclusive development of Arctic territories. The possible effects, both positive and negative, of these global factors and geopolitics over the next two decades are likely to ripple through the region in unexpected ways. New opportunities have been emerging for the use of economic, environmental, political and social benefits emerging from the internationalization process, and from implementation of regional cooperation regimes. These opportunities will be increasingly exploited up to 2030 and beyond.

The recent first shipments of LNG from the Russian natural gas producer Novatek[3] by two tankers—without ice-breaker support—via the Northern Sea Route from the Yamal-LNG development to the Chinese port Jiangsu Rudong is a fascinating illustration of the consequences of the growing interconnectedness between the Arctic and global transformative change (Blue, 2018).

At the same time, globalization may result in the further aggravation of risks of socio-economic imbalances in the Arctic for some local populations, economic sectors and northern territories, thus posing a serious challenge to their prospective sustainable development. Today, the region is witnessing dynamic economic development in the northern provinces of the eight Arctic states, particularly those that are rich in natural resources that can be extracted and exported profitably. The gross regional product (GRP) rates here are higher than in non-polar regions of these countries, while average economic growth has been almost twice as high (Arctic 2015). But the input of the Arctic regions into the world economy is almost five times higher than their share of the world's population. Various data points identify significant disproportions. For example, in the mid-

2010s the share of the Arctic in the global gross domestic product GDP accounted for 0.5 percent, but just 0.1 percent of the world population (The Economy 2017). In Russia, 10 percent of the country's GDP and 20 percent of exports derive from its Arctic regions, and their contribution to the national economy is expected to grow in the future. (However, only 1.6 - 1.7 percent of Russia's population constantly lives in the Russian Arctic[4].) Per capita GRP in a number of Russian Arctic regions is about 2.5 times higher than in non-polar regions,[5] but at the same time stratification in per-capita and per-household disposable income is growing. Most income flows derive from exports of natural resources. In Chukotka, for instance, recent modernization of gold mining facilities has led to a sharp increase in annual gold production by the middle of the current decade. Exports of gold concentrate have become the most valuable item in Chukotka's foreign trade balance, in formation of its GRP and inflows into the regional budget (Federal 2016). In almost all Russian northern provinces, sustainability challenges appear at the core of their 2030 regional agenda.

It is crucial for the regional agenda 2030 and beyond to identify effective multilevel governance systems for sustainable development in the Arctic that contain specific targets and roadmaps in order to mitigate potential risks to sustainability. Wise governance is among the core preconditions for future success in the implementation of the SDGs in the region: a variety of approaches and governance mechanisms and tools is possible. In this context, adaptive governance, which takes into account the consequences of changes in multiple systems and accelerating transformations, might provide a core strategy point (Nikitina 2018). Adaptation actions will be coordinated at various levels and performed by various stakeholders that are increasingly dependent on the sustainable development of the region and its natural resources. In perspective, breakthroughs are essential in the design of integrated polycentric regimes and frameworks for inclusive development in order to identify and apply innovative governance approaches to emerging and even unexpected challenges. Recently, there have been growing international debates regarding inclusiveness and possible options in constructing the Inclusive Development Index (IDI). This index combines a set of indicators for measuring development, economic growth, labor productivity, employment, poverty, accumulated wealth, household income distribution and stratification, state debt, per capita emissions, future generations sustainability, and other factors (The Inclusive 2018); it may be highly relevant to the Arctic. Its application might be useful for diagnostic approaches to the assessment of major sustainability risks and for the formulation of innovative sustainability governance options in the future. Also, further diversification and consolidation of regional cooperation, as well as new instruments for coordinating "state-business-northerners" partnerships, might be among the appealing tools available to ensure sustainability in the future (Nikitina 2018).

The Arctic Council through Sustainability Lenses

Within the Arctic Council (AC), sustainable development is a crosscutting theme relevant to the activities of all its working groups. AC input into problem-solving efforts pertaining to sustainability has been fundamental from the inception of this international forum, and especially since its Sustainable Development Working Group (SDWG) was established in 1998. Currently, the AC sustainability agenda is being consolidated into an integral component of its regional strategy up to 2030. As noted above, the key items and approaches of AC were presented and discussed at the global level within the UN Forum on Sustainable Development in July 2018.

However, there are a number of open questions for further discussion. Among them is the challenge of how to effectively consolidate the regional sustainability profile of the AC up to 2030 and beyond, and particularly its coordination functions regarding this issue. So far, it looks like the AC has not been entirely successful in outlining and integrating the overall spectrum of possible innovative approaches to one of the major problems within its competence: providing a lead in cooperation needed to achieve sustainable development in the region. Compared to the truly impressive outcomes related to addressing issues of sustainable development that have been presented by its other five working groups over the last 20 years,[6] the practical inputs from its specialized "sustainable development segment" focusing on socio-economic issues remain quite modest. So far, the results of the efforts of the SDWG on these issues have not lived up to the goals of its challenging and important mission. Interdisciplinary coordination of sustainability programs in the AC is facing certain gaps. Mechanisms and instruments for building crosscutting sustainability links between the natural and social science programs of the working groups are not sufficient. It might be useful under the AC umbrella to design innovative tools to address the implementation of the SDGs in the context of Arctic change, and, particularly, instruments integrating the three basic elements: social, economic, and environmental.

During NPAC 2018, many experts were engaged in interesting discussions regarding possible future roles for the AC in implementing the SDGs in the Arctic. One message that emerged (Young 2018; Zagorski 2018) was that, despite its soft-law status, the AC can provide guidelines, engage in periodic reviews, and more generally act to prevent the SDGs from fading from public attention. Specifically, the AC can: (a) translate global goals into regionally appropriate terms, (b) help to raise awareness regarding the significance of the SDGs, (c) assist member states in devising strategies to achieve the SDGs, (d) prepare periodic progress reports or report cards on efforts to implement the SDGs, and (e) generally promote the visibility of the SDGs as overarching objectives for actors at numerous levels. A useful first step might be to create a task force to conduct an assessment of what the AC has already done in this field and what opportunities exist for the future. The AC had successfully applied a similar stocktaking approach earlier, when its integrated assessment of adaptation actions to Arctic change (AACA) (AMAP 2017) was initiated in 2013 (Arctic Council 2013). Challenges that need to be solved in the future include the absence of adequate monitoring and reporting mechanisms, without which the Arctic Council cannot define its role or measure progress in implementing the SDGs. Member states and AC Observers should be encouraged to submit voluntary national reports on their implementation of the SDGs.

Experts concluded that the AC can play a number of significant roles in promoting the implementation of the SDGs in the Arctic in the coming years. These roles could become the focus of a strategic plan for the next phase of the council's work and might inform preparations for the Icelandic chairmanship in 2019-2021.

Russia – The key national approaches of Russia to interactions with other states in the Arctic are aimed at diversification and consolidation of international cooperation in the region as an important tool for enhancing its economic development and security, along with the well-being of Arctic residents. Russia supports the approach of aiming at sustainable development of the Arctic through international cooperation, with the major role played by the AC. Russia also underlines the importance of strengthening international cooperation in the future on the basis of recent regional agreements developed by the AC (Statement 2018).

The results of Russia's participation in the AC over the last two decades represent a successful example of the Russian Federation's (RF) stable and comfortable stance in this international forum, which is actively working within this fragile and volatile (from socio-economic, ecological and political standpoints) region of the planet. AC practices affirm the effectiveness of regional cooperation that includes Russian participation. This is particularly important in the context of recent geopolitical tensions and an international sanctions regime imposed by some states toward Russia. In this context, Russia's recent cooperation with other AC members and observers has expanded and acquired a new impetus, in contrast to some other international forums. In the Arctic, the positive example of international cooperation has been formed and tested.

Recently, Russia has been quite actively contributing to SDWG activities. For example, Russia outlined possible approaches to consolidating an emphasis on its economic agenda and to regional strategic planning efforts through sustainability goals. The RF identified a number of potential issues concerning energy and infrastructure development, economic monitoring, Arctic transport, and strengthening partnerships with the business community. In 2017, Russia presented the SDWG with a potential project entitled "schools for herders," which aims to provide education for children from Indigenous communities without taking them away from their families, and later securing support for them to enter local high schools. Russia participates in the EALLU project (EALLU is the Sámi word for "herd"), and also in an initiative to promote the recruitment of teachers to work in Arctic locales.

State Perspective on Sustainability in the Arctic

By now, all eight regional states have adopted national strategies for development of the Arctic in general, and within their polar territories in particular. Sustainability targets are among the plans' basic components, although the exact sets of responses and combinations vary depending on the local context. All of these strategies are aimed at supporting national Arctic interests and the consolidation of regional cooperation and sustainable development of the region, while taking into account the interface among environmental, social and economic priorities, adaptation to the consequences of Arctic changes, and development of innovative infrastructure and investments in their northern regions. All these plans envision protecting the interests of the local population and enhancing the living standards and quality of life in the Arctic. Many of them contain quite precise, and in some cases even populist goals, combined with concrete innovative projects aimed at socio-economic well-being and participation of the local population in their implementation.

Of course, the core questions inherent in every kind of future planning include: (a) to what extent the targets posed are fully and effectively implemented, (b) what kind of regular control mechanisms are installed to monitor and verify their implementation, and (c) to what extent they are adaptive enough to accommodate new innovative knowledge about sustainability and to be flexible enough to provide response options to new challenges (Nikitina 2013)? National strategies indicate that the role of the state will be critical in implementing the SDGs in the 2030 timeframe and beyond. However, the state at all levels cannot achieve this objective alone, and coordination and partnerships with multiple stakeholders is essential.

Russian Perspective: Sustainability Approaches in Strategic Planning

The process of the Arctic strategy development in Russia has been quite dynamic over the last decade. Significant institutional innovations have been introduced at the national level and in the northern regions, setting the context for sustainability planning for 2030 and beyond. Significant new aspects include: (a) combination of a strategic framework at the federal level with allocation of authorities/responsibilities for practical action to the regions of the North, and (b) coordination of implementing strategies with multiple stakeholders, different sectors and companies, funding sources, innovation centers and municipalities. Although local communities and northerners are already contributing to the process of socio-economic and environmental policy formulation and decision making, their roles and inputs could be increased in the future. Currently, federal laws concerning development of the Arctic are being reviewed and reconsidered, and it is expected that sustainability provisions will be an integral part of it.

While answering the question about Russia's position on the relevance of global SDGs to the Arctic, the recent general stance is that the state has incorporated core concepts of sustainability in its planning. The sustainability paradigm has emerged as a crosscutting theme throughout various national Arctic strategies and programs. The major vision for the future suggests that possible mechanisms to achieve SDGs in the Arctic are linked to promoting economic development as a core precondition of the region's sustainability. Strategic plans to build infrastructure, enlarge a set of services, and promote economic development in locales is expected to ensure the resilience of northern cities and settlements. Enhancing access of local communities to high quality education, professional training, and health care is at the core of action plans to meet the SDGs in the Arctic (Statement 2018).

Although Russia traditionally has placed primary emphasis on economic issues, recently there are signs of a shift toward a broader range of policy goals. The current national RF Arctic strategy contains a combination of socio-economic and environmental priorities, and it also identifies the major risks for sustainability in the region. It is important that not only security and economic risks are outlined, but major social risks are as well;[7] many of them are similar to those in other Arctic states' northern regions. Still, our core concerns include finding practical ways to balance social and environmental priorities while maintaining a focus on economic development. We are asking how possible social gaps and problems can be covered in the future, and to what extent an inclusive development profile can be ensured. The main notion of the state strategy envisions a specific, integrated future approach to socio-economic development. A set of 15 clusters of actions aimed at reducing social risks is planned to be performed through coordination mechanisms between federal and regional authorities and mobilization of funding by way of public-private partnerships.

The dynamics of the Arctic strategy planning and implementation in Russia illustrates the details of its sustainability perspective.

In 2008, Russia's national Arctic strategy had already been developed (Osnovy 2008), emphasizing the role of the region for future national development. The strategy identified core national interests in the Arctic:

1) The Russian Arctic is considered to be the strategic resource reserve for national socio-economic development.
2) The Arctic is a zone of peace and cooperation.
3) Activities in the Arctic are performed on the basis of protection and conservation of its ecosystems.
4) Development of the Northern Sea Route as a regular national shipping route is a priority.

In this strategy, natural resources are regarded as a basis for long-term national development and for enhancing Russia's competitiveness in world markets. The national Arctic state policy has been developed with a goal to coordinate actions of all state management bodies at various levels, as well as developing a package of concrete measures for its implementation in the future.

A new RF state program emerged in 2014, entitled, "*Socio-economic development of the Arctic zone of the RF for the period up to 2020*" (RF State 2014). It contains major targets for sustainable development in the north, and includes a detailed socio-economic perspective. In order to ensure investment flow and application of incentive mechanisms and tools, the legislation defining the land-based boundaries of the RF Arctic zone within the territory of its federation subjects and administrative regions in the North was enacted in 2014 and included Murmansk oblast, the Nenetsk, Yamalo-Nenetsk, and Chukotsky Autonomous Okrugs, territories of several municipalities of the northern federation subjects and islands in the Arctic Ocean (O sukhoputnyh 2014).

In 2016, a detailed investment program that targets projects in each region of the Russian north supplemented the 2014 plan. A portfolio of 145 priority Arctic projects with concrete timeframes for the period up to 2030 was selected through tender procedures. It is expected that funding for these priority projects would account for about 5 trillion rubles (~$74.4 billion), and 80 percent would be mobilized from non-budget sources. The structure of investments is as follows: 48 percent of total financing would be allocated for energy and mineral resources development; 16 percent to transport; seven percent to resource exploration; seven percent to continental shelf projects; six percent to agriculture and fisheries; five percent each to industry and energy; and two percent each to environmental protection, telecommunications, and tourism (Goskomissia 2016).

So, for the 2030 timeframe, there is a major emphasis on energy and mineral resources development; among 56 projects within this block, 36 have already begun or are planned for the near future in the Yamalo-Nenetsk Autonomous Okrug. This investment strategy can be considered as an innovation in the domestic governance system of the RF Arctic zone.

Today, the national Arctic strategy for socio-economic development is being implemented with a step-by-step approach, through a number of its concrete subprograms. In 2017, after finalizing the preparatory cycle, the next phase of the program for the period of 2018-2025 has been initiated.

It focuses on actions providing for: (a) environmental and national security, (b) energy and mineral resources development, (c) shipping and infrastructure, and (d) scientific research. The budget for implementation during the next three years (2018-2020) is expected to be 12 billion rubles (~$205 million); while financing of about 58 billion rubles (~$994 million) is envisaged for the 2021-2025 period (Oreshkin 2017). In total, 22 projects are to be performed within the program's three core clusters:

1) Establishment of eight "pillar-zones" for territorial development. These are supported by the introduction of special normative and regulatory framework, legislation, and science-technology innovations, including the launch of the floating observatory *Severny Polus* for research and environmental monitoring in the Arctic Ocean.
2) Development of Arctic shipping. This includes organizing an integrated network for information, services, infrastructure, and telecommunications for shipping in order to provide services for domestic and transit shipping routes.
3) Development of energy and mineral resources, including resources of the continental shelf, scheduled to begin in 2021.

Administrative Framework

By 2015 the institutional framework of governance and coordination for implementation of the Arctic national policies had been developed. The State Commission (*GosKomissia*) on development of the Arctic was established (Ob utverzdenii, 2015). The RF Ministry for economic development (*MinEkonomiki*) was assigned coordination functions for Arctic strategy implementation; 12 other bodies from the federal level are also taking part. This ministry is involved in SDWG activities of the AC, while the RF Foreign Ministry represents the government in the AC. Previously, Arctic issues were under ineffective coordination of the RF ministry for regional development—until its reorganization in 2014.

The role of science in meeting the SDGs in the Arctic up to 2030 and beyond is crucial for the success of this endeavor. Today, a number of knowledge gaps and scientific uncertainties exist regarding implementation of the sustainability agenda in the region, and additional efforts from the scientific community are urgently needed. Arctic changes, and especially the changing climate, influence short-term and long-term ecosystems structure and function. But, because the environmental variables are so deeply interconnected, it is often difficult to predict the status of future ecosystems. Some ongoing changes in the Arctic environment are clear and their consequences are predictable, but many others are more subtle and complex and may play out in unforeseen ways that affect future sustainability projects and plans. Even more complex uncertainties remain regarding the dynamic impacts of climate changes on human systems, and hence, societies' responses to them. In general, the human dimension of Arctic change is not sufficiently explored, and more systematic scientific efforts are essential in this area to avoid future surprises. Overall, the integrated assessment of different combinations of cumulative Arctic changes and consequences for sustainability of the North may be the core challenge until 2030—and beyond.

Notes

1. Acknowledgement: This chapter is a part of research undertaken under the *Blue Action: Arctic impact on weather and climate*, the EU Horizon 2020 Research and Innovation Programme, Grant Agreement No 727852
2. *The 2030 Agenda and the Arctic: Towards a sustainable and resilient Arctic through cooperation*. Arctic Council, Ministerial side event at the UN High-level Political Forum on Sustainable Development 2018, 17 July, 2018, NY.
3. The first LNG processing plant of Novatek was opened in December 2017, and the company is planning to increase its initial plans of LNG production up to 57-58 million tons by 2030; the CNPC share in this project accounts for 20%, Silk Road - 9.9%, Total – 20%.
4. http://www.arcticandnorth.ru/Encyclopedia_Arctic/Encyclopedia_Population.pdf ; https://www.econ.msu.ru/sys/raw.php?o=28355&p=attachment
5. Since 2000s, among the northern provinces of the eight Arctic states, the highest annual economic growth rates had been registered in four Russian regions – Chukotka, Khanty-Mansy, Yamalo-Nenets autonoumous districts and Archangelsk Oblast.
6. For example, AMAP's three recent regional assessment reports on perspectives of adaptation for a changing Arctic present important messages on synergy of changes, and sustainable response actions to impacts of multiple transformations

in the region (AMAP, 2017); in 2017 CAFF and PAME developed the protected areas index and contributed significantly to assessing trends in biodiversity conservation in marine and terrestrial polar regions, and to implementation of SDG-14 and SDG-15 in the Arctic (20.2% of terrestrial and 4.7% of marine areas in the Arctic have protected status) (CAFF and PAME, 2017)

7. Among them: negative demographic trends; gaps in professional education; imbalance in the structure of local labor force; inadequate level of public services; social security, healthcare and education; critical situation with municipal communal sector and housing; high dependence on imported food and other commodities supply via the "northern deliveries"; gaps in energy and water supply public networks; inadequately developed transport and telecommunications infrastructure.

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An International Perspective

Eeva R. Furman

Introduction to Agenda 2030

The 2030 UN Agenda for Sustainable Development (Agenda 2030) was adopted in 2015 after several years of negotiations, collaboration and co-creation by representatives from policy, civil society, business, and research. After that, implementation has taken place in various forms that include national, but also regional and local level strategy and implementation plans and activities. In this article, I will explore the following questions:

- What new does Agenda 2030 offer the world, which is already saturated with more than 500 UN policies and their translations, and to various groups interested in issues touched upon by the SDGs?
- How can we advance the implementation of the goals?
- What could Arctic peoples and the Arctic Council offer in this context?

The individual Sustainable Development Goals (SDGs) have their own regulatory frameworks, which are far more sophisticated than what Agenda 2030 can offer. The biodiversity convention, the Paris Agreement and the Universal Declaration of Human Rights are examples of these. The unique characteristics of Agenda 2030 place it in the forefront in fostering future well-being of people on this planet. I structure this discussion around the following seven issues and reflect on them in the Arctic context:

Cross-cutting Elements and Interactions (Governance for Flows)

Agenda 2030 is not about individual SDGs, but includes several crosscutting issues (here 2-7) that form the spirit of the Agenda, which is to ensure a just and ecologically sustainable world. The SDGs are interlinked and should be implemented with this in mind. The driving forces behind the challenges involved in the Agenda do not follow territorial boundaries but are connected with global flows of natural resources, people, lifestyles, money, and many other factors.

→ *These multiple forces are also present in the Arctic, where societal activities and the sensitivity of natural systems are strongly tied together.*

Universality and Integration (Every Nation is a Developing Country from a Sustainability Perspective)

Agenda 2030 asks every country to treat itself as a developing country from an SDG perspective and assess the SDGs from their own country's perspective, and act accordingly. This also invites countries to assess themselves as actors as part of larger regions, as actors in other parts of the world, and as global actors.

→ *For the Arctic, this raises special considerations, as all the Arctic countries administratively belong to the wealthiest countries of the world. But for many of these countries, their Arctic regions are not on the same level in many development aspects as the rest of their respective countries.*

→ *Arctic countries carry the responsibility of major spillovers (impacts beyond their own territories) to countries in other parts of the world. This includes the least developed countries, as well as their own countries or the region they belong to, as well as areas that are situated in the Arctic.*

→ *On the other hand, there are other parts of the world that have strong spillovers into the Arctic region as well.*

→ *This sets up special requirements for the Arctic region to collaborate internally, not only with countries whose territories are in the Arctic, but also with other regions of the world.*

No One is Left Behind (Partnerships)

There are countries, administration entities below and beyond country level (regions), as well as groups of individuals (communities), who find life more difficult than others. Agenda 2030 calls upon those better off to support and bring along those in greatest need to make progress in sustainable development. It also entails making sure that the pace (which should be fast due to the urgency of the challenges) takes into account the time needed for bringing everyone on board and for staying on sustainable pathways.

→ *The Arctic has a special setting with local communities and Indigenous communities that have specific needs for staying resilient and transformative. The longstanding collaboration among various actors in the Arctic provides a strong basis to continue the work under the umbrella of Agenda 2030; this will require, however, further collaboration with other parts of the world, including other countries and regions.*

Broad Interpretation of the Planet and Its Processes (the Planet and Its Ecosystems = Mother Earth)

Agenda 2030 draws together diverse information about life on Earth by accepting different worldviews and approaches.

→ *This invites bringing various approaches taken by Arctic governments, scientists, local people, and Indigenous communities to the same table, and to establish a broader conceptual framework of sustainable development in the Arctic.*

Define Means of Implementation, All Countries to Act (Ownership of Acting is Shared by All)

National implementation is requested, other implementation is recommended. It is important not only to develop strategies but also to consider implementation plans and other direct actions or means to promote those strategies.

→ *The Arctic has several institutional settings, with the Arctic Council being the overarching one. This provides an excellent basis for building the governance for implementing Agenda 2030 and the practical applications of its goals.*

Partnerships and Inclusiveness, All Actors to Have/Take Ownership and Act

There is no way that the public sector alone can (on national or global levels) meet the goals or initiate the major transformations necessary to implement Agenda 2030. All actors are urged not only to participate, but also to take ownership and join in. Public-private partnerships are important, but there are several options for how to get organized and decide who is to take the lead in the processes.

➙ *This is where the Arctic Council has much to showcase to other regions. Simultaneously, there is a need to continue developing the partnerships into stronger and more transparent collaborations, with equitably shared ownership. The flows take the partnerships far beyond the Arctic territory.*

Social and Economic Development Depends on Sustainable Management of Natural Resources

Agenda 2030 explicitly emphasizes that viable long-term social and economic long-term development requires sustainable management of natural resources. This calls for a just and ecologically sustainable governance of ecosystems´ goods and services locally, nationally, within regions, and globally.

➙ *This is very important in the Arctic, where local communities rely so heavily on ecosystem services, where nature is highly fragile and rich in biodiversity, and where there are huge hopes for economic prosperity due to newly created opportunities. Major challenges in the Arctic include finding ways to secure the biggest co-benefits, while also ensuring that, when there are tradeoffs, "losers" are supported so that they can find new modes to achieve well-being in their communities.*

Signals from the Forthcoming 2019 Global Sustainable Development Report

At the 2016 High-Level Political Forum meeting during the formulation of Agenda 2030, member countries decided that a scientific analysis of global sustainable development progress should be written every fourth year. The first report is due in 2019, and the UN-assigned group of 15 independent scientists (the IGS) has been writing the report since February 2017.

As part of the writing process, dialogue has been held with the science community as well as with other actors. There have been three scientific workshops: on transformation in general, on behavioral change, and on the role of science. Until now (October 2018) there have been three consultations with representatives from all interested member states at UN headquarters and three regional consultations with experts and stakeholders: in Africa, Latin America, the Caribbean, and in Southeast Asia. In addition, an open call for written input was posted on the UN website, which led to hundreds of contributions from all over the world addressing each question the group aims to highlight in its report. Finally, members of the group have held many dialogue sessions, one of them being my participation in the panel at the NPAC conference in Honolulu, August 2018.

The report is still in an early draft phase, but some clear messages are emerging.

In many respects, humanity has made major progress over the last 50 years around the world, clearly illustrated in the 2018 book by Hans Rosling (*Factfullness*, see also www.gapminder.org). Despite this, major challenges remain around the world, linked with poverty, inequality,

Source: O´Neill et al. 2018, Graphical Design & Copyright SYKE & Sitra. I have indicated the Arctic Council members and Observers and shaded an area where the Arctic regions could be expected potentially to score.

Figure V.1 *Not a Single Country has reached a High Level of Human Wellbeing in an Ecologically Sustainable Manner* environmental challenges, and injustice. In addition, we have regions where challenges on all SDGs tend to concentrate, such as Sub-Saharan Africa and many Southeast Asian areas. Unfortunately, not a single country has yet reached sustainable development (O´Neill et. al. 2018, see also Figure V.1).

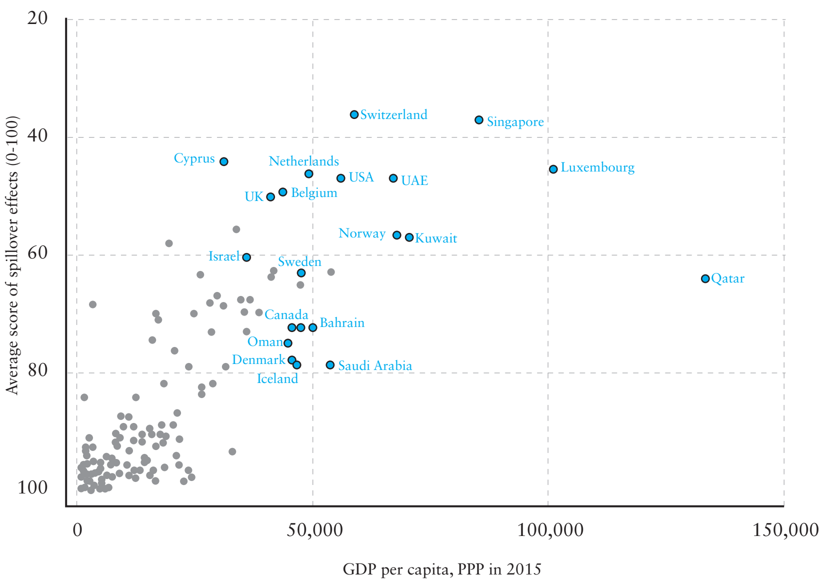
Below I present some of the issues that will most likely to be highlighted in the report.

Dealing with Interlinkages of the SDGs

It is very tempting and illustrative to deal with SDGs one by one. But it is also a very ineffective and costly approach. The meta-analyses made by the group suggest that there are far more positive interactions among SDGs than negative interactions. There is useful guidance on these (Nilsson M. et al. 2018; Future Earth 2018; Nilsson et al. 2017). We need governance that supports systemic transformations on all levels; we need monitoring and indicators that deal with inter-linkages; and we need to develop future scenarios that are based on holistic approaches.

Dealing with the Integration of Flows among Different Parts of the World

We need to better understand the various flows of goods, energy, people, lifestyles, and other factors that link various parts and regions of the world—even distantly apart from each other. Nations that are the world´s best at implementing the sustainable development goals, such as many in the Nordic region, have strong spillovers that make it possible for them to score so well but may hinder some other countries in reaching the goals. Are these countries any better than the African region in implementing Agenda 2030, when global SD-impacts are included? (Figure V.2) There is a need for a new type of flow governance, in which the business community plays a key role while the public sector carries its responsibility in ensuring that the long-term and systemic outputs toward sustainable development materialize and are not lost somewhere along the way. Other actors should also understand and implement their roles; communities should bring their knowledge and values as well as the science community to support the evaluation of experimentations and scenarios and analyze the best methods for a systemic transformation.



Note: Figure taken directly from the SDG Index and Dashboards Report 2017 for OECD by Bertelsmann Stiftung.

Figure V.2 Average Spillover Scores against Gross Domestic Product (GDP) per capita in Purchasing Power Parity (PPP)

Dealing with Integration of Sectors and Actors

Silos are important to be able to deal with single issues in an efficient way. However, challenges are becoming more and more complex and complicated and thus we need to work beyond "silo-think." There are good examples of cross-governmental collaboration in co-creating policy frameworks, including several European nations (e.g. Finland and Italy) and in Latin America and the Caribbean (e.g. the Dominican Republic). However, political will is needed and thus commitment by high-level policy makers such as presidents, prime ministers and ministers of finance, but also business leaders is crucial. Although there are some examples of this in different parts of the world, major leadership is still missing.

Building Alternative Pathways That Launch Societies Toward Sustainable Development

Societal activities in our regions and communities are difficult to manage, as they are so complex and interlinked with other activities and stretch out way beyond the region or context in question. Problematic pathways are linked with the management of food, energy, urbanization, and natural resources. There is a need to investigate the settings and processes, and from there to experiment and evaluate alternative solutions, which so often require a systemic approach. We do have seedlings for good examples of successfully managed pathways (e.g. food, energy). However, major challenges are still to come. The Arctic has much to offer but also much to learn.

Science, Policy, and Society in the Knowledge Value Chain, and Building Coherent Science-Policy-Society Linkages

Science is crucial to be able to implement the SDGs in an effective way. Science has already given us many answers, but science also needs to change. There is a specific need, on the one hand, for sustainability science, which helps to accelerate transformations and frame research in a more transdisciplinary manner. On the other hand, there is a need to focus on local, context-specific research processes, capacity, and activities. The two are interlinked and both also require changes in research infrastructure, networking, skills, training, communication, and sharing global resources for research in a more equitable manner.

Finally, this science-policy-society concept needs to evolve from the present. There is a need for better communication between scientists and policy makers, but this alone is not enough. The entire research value chain needs to evolve to include a far more collaborative identification of challenges and opportunities, collaborative goal setting, co-creation of knowledge, information, understanding, and collective interpretation of the results. This calls upon inclusive deliberative processes among scientists, decision makers (businesses, citizens, politicians, policy makers, funders), actors suffering from decisions (citizens and businesses), and additional knowledge holders (potential actors in all groups mentioned before). This iterative process would have much to contribute to finding paths toward sustainable development.

The UN High Level Political Forum (HLPF) for Sustainable Development 2018 Meeting

The HLPF holds its meeting on an annual basis. However, in 2019, two HLPF meetings are planned to be held, one in July on selected SDGs (each year a number of SDGs will be discussed in detail), and one in September, back-to-back with the UN Summit.

During each annual HLPF, four SDGs come under careful focus. In addition, goal 17 is discussed every year. In 2018, HLPF discussed specifically, in addition to partnerships (17), goals 6, 7, 11 and 12, giving them special focus in the plenary as well as in the form of seminars, workshops, and side events. There is a clear link from all of the 2018 focus SDGs to the Arctic region. SDG 17 envisions partnerships not only within the Arctic, but also cross-regional and global partnerships.

Table V.1 The Sustainable Development Goals in Focus at HLPF 2018

Goal 6.	Ensure availability and sustainable management of water and sanitation for all
Goal 7.	Ensure access to affordable, reliable, sustainable and modern energy for all
Goal 11.	Make cities and human settlements inclusive, safe, resilient and sustainable
Goal 12.	Ensure sustainable consumption and production patterns
Goal 15.	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
Goal 17.	Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development, that will be considered each year (annual focus)

The Arctic Event at the HLPF 2018

The Arctic Council organized a side event: *Towards a sustainable and resilient Arctic through cooperation* (https://arctic-council.org/index.php/en/our-work2/8-news-and-events/490-arctic-at-hlpf-sd). It was structured around keynote speeches from ministers and other high-level representatives from the Arctic states and one from a non-Arctic state, followed by a panel discussion. The event brought up two major issues: first, the suggestion to use the Arctic region as a model of cooperation around sustainability among governments, Indigenous Peoples and the scientific community, utilizing 20 years of experience with Arctic cooperation; and secondly, the potential of Agenda 2030 to provide new momentum to the Arctic Council´s future work.

From Global to Local: What Is the Role of the Regional Level?

As stated in Agenda 2030, its signatories, and thus also those responsible for implementing the SDGs, are the countries themselves. Therefore, the HLPF is also organized to support countries to do this. The voluntary national reviews (VNRs) have become highly popular. While during the 2016 HLPF, only 22 countries presented their open VNR; this year 46 countries did so.

However, Agenda 2030 calls all actors on this planet to act and take ownership of implementation in their own specific context. This has been enthusiastically taken up all over the world at the local level, especially by cities, with many delivering strategies and action plans but also building partnerships across the world. Habitat III, which took place in Quito 2016 and led to the New Urban Agenda (http://habitat3.org/the-new-urban-agenda/), gave a further impetus to this approach. The Paris Agreement on Climate Change (https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement), which entered into force in September 2016, further built trust regarding the potential of mobilizing governments and other actors around a common future. In some countries, regional and local officials have also taken an active role, described in detail in the recent report I mentioned earlier (Localizing the SDGs: Regional governments paving the way - NRG4SD).

The supra-national regions have not yet organized themselves in building partnerships. Regionally, there is substantial variation about what kind of actions have been taken, both between regions and within regions themselves. The Arctic region (https://arctic-council.org/index.php/en/about-us/working-groups/sdwg) has all the elements to act as a flagship example of both multi-national and multi-regional cooperation.

Regions in Action

The Arctic region could be defined as the region that is farthest along in the process of implementing the SDGs as a policy framework. This builds on the work done in the Arctic Council and the preceding AEPS over the past 25 years. The unique setting is framed around: 1) having a joint agenda between governments and Indigenous groups, with 2) a strong contribution from NGOs and the science community, 3) organized strategies regarding prioritized challenges specific to the Arctic, with 4) clear action plans and working programmes, and 5) a continuous future orientation that takes into account human well-being and the sensitivity of natural systems. The Arctic Environmental Protection Strategy (AEPS) and the Arctic Council (AC), which like Agenda 2030 are soft law regimes, have proven to be effective forms to agree internationally on issues that would otherwise be very difficult, slow or impossible to achieve with legally binding agreements, both during their development as well as in their implementation (Young 1998). The high political innovativeness and will that gave the initial kickstart to Arctic circumpolar collaboration is irreplaceable (Furman 2016.)

African Union (AU)

The African Union hosts the African Agenda 2063 https://au.int/en/Agenda2063/popular_version.

The AU was initiated in 1999, with 55 member states, which only includes governments. The African Agenda 2063 was initiated in 2015 and is based on a framework for 2014-2063 (50 years). https://au.int/.

The International Group of Scientists (IGS), when writing the GSDR2019, organized a consultation in Africa. The GSDR 2019 Africa consultation synthesis report encapsulated key messages that emerged from the event: (https://sustainabledevelopment.un.org/content/documents/19931GSDR_Consultation_Africa.pdf).

Caribbean Community (CariCom)

The Caribbean Community is built of 15 member governments and five associate member governments, all rated as developing countries, working toward stronger integration and resilience. Environmental protection and sustainable development are among the topics that CariCom deals with, but there is no clear strategy or action plan for moving forward. https://caricom.org/our-work/environment

The Baltic Marine Environment Protection Commission (Helcom)

Helcom is an intergovernmental organization of nine member states and the European Union. It has published processes and outcomes for

Helcom's contribution to the implementation of the SDGs relevant to their focus (marine environment) http://www.helcom.fi/news/Pages/How-is-the-Baltic-Sea-Region-Doing-in-Implementing-the-Sustainable-Development-Goals0406-2202.aspx. Helcom commits to work toward the goals in partnership with relevant actors regionally and globally.

European Union (EU)

The EU has committed to implement the SDGs both in its internal and in its external policies. Its report, published in 2016, draws together the policy framework. (https://ec.europa.eu/europeaid/sites/devco/files/communication-next-steps-sustainable-europe-20161122_en.pdf). The role of Agenda 2030 in the EU's new Research, Development, and Innovation (RDI) framework for 2021-2027 has been raised in various discussions, but it remains to be seen just how strong the link will be. The spirit of the EU on sustainable development was also brought to the EU-Arctic High-Level Meeting in Oulu, Finland in 2017 (Furman 2017 and see more below). The EU has formed a multi-stakeholder platform, which has a high political leadership and representation from a broad range of actor groups in the EU. The group supports the EU on streamlining its implementation of the SDGs. In Europe, public administrators and other experts dealing with SD strategies are organized under the European Sustainable Development Network (ESDN), which meets on a regular basis. A sister network is the European Environment and Sustainable Development Advisory Councils (EEAC), which is a network of advisory bodies established by national or regional governments. EEAC members offer independent advice to their respective national or regional governments and parliaments related to the environment and sustainable development. Fourteen advisory bodies from 11 European countries and regions are members of the EEAC Network. With representatives from academia, civil society, the private sector, and public bodies, the EEAC network brings together experts with years of experience producing independent advice. They have connections to high-level leaders in the EC and also bring forth input from the science community.

Arctic Council Taking a Role in Arctic Actions for Agenda 2030: What Does Finland´s Chairmanship Offer?

During the 2017-2019 Finnish chairmanship of the Arctic council (https://arctic-council.org/images/PDF_attachments/FIN_Chairmanship/Finnish_Chairmanship_Program_Arctic_Council_2017-2019.pdf), Agenda 2030, side by side with the UN Paris Agreement, has been highlighted as a major global milestone, and also one for the Arctic. While the Finnish priorities during its chairmanship do not explicitly mention sustainable development (the priorities are environmental protection, connectivity, meteorological cooperation, education, and emphasis on the work programme), the chairmanship priorities are built around environment and climate, the seas, people, and strengthening Arctic cooperation. In all of this, the implementation of Agenda 2030 is considered as an overarching issue. By highlighting Agenda 2030, Finland proposes that the Arctic Council explores how the Agenda 2030 framework can be used to foster increased Arctic cooperation for the benefit of humans and nature alike.

Finland has brought to the negotiation table the question of an Arctic strategy for sustainable development, but also touched upon the potential option of developing an action plan to implement it. While some actors are supporting the idea of an action plan for the Arctic Agenda 2030, others refer to the fact that the UN Agenda 2030 considers only national actions as mandatory—and that the Arctic should be dealt with through the eight AC member states.

Two alternative approaches to the SDGs framework have been proposed. One of them is to deal with the entire framework from the start and examine the interlinkages that already exist. The other approach prioritizes the SDGs and suggests a focus on some of them to start with—for example, economic issues—and only later to move to the entire SDG framework. The latter model is contradictory to the findings and key recommendations that come out of GSDR 2019, which concluded that working with interlinkages should be a key to creating major transformations. However, the report also notes that there are several pathways toward sustainable development, and thus another option is prioritization. In this case, however, interlinkages are still crucial to the prioritized SDGs, and thus may require looking at economic development hand-in-hand with environmental factors, in addition to issues around equality.

Finland has during its chairmanship been systematically endeavoring to explore how the Arctic Council could place itself within the framework of Agenda 2030. Background work is being done within the Working Group on Sustainable Development, as well as in the chairmanship lead. Many of the official steps have been discussed through meetings and conferences. Finland has organized events under the umbrella of sustainable development goals on various fronts:

- The Rovaniemi process (Rovaniemi Arctic Spirit) in 2017 had sustainable development on the agenda.
- The University of the Arctic conference in September 2018, in Oulu and Helsinki, included a component on sustainable development.
- In the official Arctic Council annual meeting in 2018 in Oulu, sustainable development was clearly on the agenda.

An additional dimension to these collaborative activities and events has been the work done with the European Union. Finland organized the first EU high-level Arctic event: "A sustainable Arctic—Innovative Approaches," which took place in Oulu, June 2017. The EU was represented by high officials, including High Representative Federica Mogherini and Commissioner Karmenu Vella. Their presence was promising in and of itself, but so were their strong messages about the potential of the Arctic to turn into a gateway, and how the Arctic could become a broader source of sustainable innovation, with responsible eco-politics as well as for the creation of jobs and business. Both the business community and the Indigenous community seconded the idea. However, some participants pushed the idea of continuing the exploitation of the area and only later, after economic growth, return to sustainability issues, but these were shot down by the Commissioner. The EU representatives in general emphasized handling the interlinkages of SDGs, where economic issues cannot walk at a different pace and on different paths as the other SDGs. (Furman 2017)

Discussion

Since Agenda 2030 was adopted in 2015, world politics have changed and the focus is now two-fold: with reference to enhancing global and regional governmental collaboration, there seems to be increased attention to nation-focused approaches that emphasize national gains and prefer bilateral collaboration to regional and global alliances. Thus, it is debatable whether Agenda 2030 would be adopted today. However, the rolling ball of implementation is already on its way and is difficult to stop, especially outside of national governments. The business community, as well as cities and smaller communities, have taken ownership across continents. Still, the support from national policies is crucial for the sustainable development movement to take off in a way that leads to major mainstreaming in various societies. The positive energy and power of the business community and especially cities and communities should not, however, be underestimated, either globally or in the Arctic.

The Arctic, and especially the Arctic Council, is considering a stronger orientation toward sustainable development. It is seen both within the Arctic as well as outside the Arctic, such as in the EU, that the Arctic could become a laboratory or role model as a sustainable region that transcends national boundaries. This, however, means that the model needs to look into the mirror: all AC members are wealthy countries with heavy loads of negative spillovers into the Arctic region, and moreover, to the rest of the world. This issue needs to be brought to the table before the Arctic is able to be showcased as a trusted model. It is not enough that the structures and processes are in place if the impacts are high and out of control.

However, sustainable development is not a sprint competition with winners and losers but rather a marathon where everyone runs towards a better future. There are several pathways to take. The key is to gradually build capacity toward those paths that are viable from a sustainable development perspective. In the Arctic, this means: a) translating the goals into the Arctic context, and b) including sustainable development into early childhood-, grade school-, and higher-education curricula, as well as into community-based processes of joint learning. It means bringing various actors that include businesses, communities, and management organizations to research and co-design systemic solutions that bring wellbeing, in a broad sense, to the region. And it means political leadership and will.

Regions are not expected to report on their progress on SDGs to the UN, and the AC does not have any legal power to force its members to act. However, this is the best that exists. We can see that the SDG framework is a great driver to bring everyone on board, voluntarily. It requires realizing the potential of everything that Agenda 2030 and the AC have to offer to ensure the wellbeing of the Arctic region and the world at large.

Conclusion

Agenda 2030, and especially the focus on SDG 17, invites the Arctic region to take ownership and play an active role in the implementation of the SDGs. It asks the Arctic and the Arctic Council to further expand its sustainability discussions to include other regions and global actors. Although much is happening in the Arctic, it would be beneficial to share experiences in a broader context. The event at the HLPF and the collaboration with the EU are useful milestones here. Analyses of alternative pathways toward sustainable development could open up discussions and joint learning with regions that are not initially on the list of obvious suspects to help advance this agenda.

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A Non-Arctic State Perspective

Jong Deog Kim and Jeehye Kim

Discussions are currently underway within and outside the Arctic Council, led by the Finnish Chairmanship, about how the Arctic can be sustainably developed and what the UN's Sustainable Development Goals (SDGs) mean for the Arctic. Much of the discussion on Arctic sustainable development so far has remained within the Arctic. But given the significance of the Arctic as a key global climate regulator, and with growing domestic and external interests in developing the region, it is important that the Arctic sustainable development issue becomes widely discussed beyond the Arctic as well.

The sustainable development of the Arctic is intrinsically linked to the sustainable development of other regions, as the world is increasingly interconnected. In particular, whereas processes of climate change in the Arctic can be largely attributed to greenhouse gas emissions from outside the Arctic region, the non-Arctic region is also affected by what happens in the Arctic. For example, scientific analyses indicate that the accelerated warming observed in the Arctic is one of the major reasons for extreme heat waves experienced across the sub-Arctic region in the summer of 2018.[1] In addition, as receding Arctic sea ice facilitates better access to resources and shipping routes, outside influences are likely to have a growing impact on Arctic development.

This article seeks to examine in what ways non-Arctic States are linked to the sustainable development of the Arctic, and what role non-Arctic States could play in promoting sustainable development in the Arctic. We will first examine Korea's Arctic policy as a case study. We will evaluate the policies and achievements over the past five years in light of the SDGs, to assess how much the principle of sustainable development has already been incorporated into Korean policy, and how these policies may contribute to supporting the implementation of the SDGs in the Arctic. This will provide the basis for discussion on how non-Arctic States could play a role in achieving sustainable development of the Arctic.

Progress in Mainstreaming Sustainable Development Principles within Korea

Within Korea, as part of the effort to adapt global SDGs into the local context, the development of Korean-SDGs (K-SDGs) has begun and is currently underway. To "Koreanize" the UN SDGs, 14 working groups[2] composed of more than 200 people from the public, private, and academic sectors have been set up. While all 17 SDGs will be included in the K-SDGs, their targets and indicators are being readjusted based on their sense of representativeness, urgency, and the need for domestic implementation. Accordingly, every one of the 232 UN SDG indicators and existing national indicators are being examined to determine whether they should be: a) adopted, b) changed, or c) redeveloped for K-SDGs. In order to ensure broad public participation by engaging citizens and stakeholders in the development process, the K-SDGs have included the Major Groups and other Stakeholders (MGoS) mechanism used during the development of SDGs at the UN. According to an interim progress report on the development of the K-SDGs, so far there are a total of 17 goals, 147 targets and 265 indicators. In comparison to the UN SDGs, 45 existing targets were eliminated and 23 new targets added, and 59 existing indicators were eliminated while 92 new indicators were added. Major issues considered important for the nation's sustainable development have been identified and are being reflect in the K-SDG targets and indicators, which include a low birth rate and an aging society, particulate pollution, low economic growth, income inequality, plastic waste, youth unemployment, and military confrontation on the Korean Peninsula. An example of a target that was newly created to fit the Korean context is K-SDG 16.12: Promote cooperation between North and Korea for peace and prosperity on the Korean Peninsula. The final set of K-SDGs is expected to be released by the end of this year.

Sustainable Development Principles in Korea's Arctic Policy

Korea became an Arctic Council Observer in May 2013, and by December of that same year had developed and adopted the nation's first five-year Arctic Policy Master Plan. The Plan came before the 2030 Agenda for Sustainable Development and the 17 Sustainable Development Goals adopted at the United Nations in 2015. Nevertheless, it is worth noting that elements of the sustainable development concept are already reflected in the policy, most visibly in the policy vision, where Korea seeks to "become a leading Polar nation that ensures a *sustainable* Arctic future." To implement that vision, three policy goals, four implementation strategies, and 12 implementation tasks have been put forward, relating most directly to UN Sustainable Development Goals 4, 9, 13, 14, 15 and 17.

Table V.2 Korea's Arctic Policy Master Plan (2013-2017)

Vision	Become a leading nation-partner that ensures a sustainable Arctic future
Policy goals	① Build an Arctic partnership in order to contribute to international society
	② Strengthen scientific cooperation in order to contribute to addressing common challenges faced by humanity
	③ Create new Arctic businesses by participating in the Arctic economy
Implementation strategy	**Implementation tasks**
Strengthen International Cooperation	• Enhance Arctic Council-related activities
	• Strengthen cooperation with Arctic-related international organizations
	• Promote cooperation with private entities
Strengthen Scientific Survey and Research Activities	• Increase scientific research activities
	• Develop infrastructure for scientific activities
	• Emphasize research on climate change
	• Build spatial information on the Arctic and Arctic Ocean
Create and Pursue Business in the Arctic	• Cooperate in developing Arctic sea routes
	• Cooperate in development of resources and offshore and shipbuilding technologies
	• Cooperate on fisheries resources management
Ensure Institutional Platform	• Adopt a legal basis for implementing polar policies
	• Establish a center for polar information

SDG 17: Partnerships for the Goals

Korea's Arctic Policy is based on establishing strong partnerships with various Arctic entities, as embodied in SDG 17, to "strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development." Aside from the fourth implementation strategy of "ensuring an institutional platform," global partnership is emphasized in all three other implementation strategies and their implementation tasks. In order to contribute to sustainable development in the Arctic, it is necessary for non-Arctic states to understand the challenges and opportunities of the region. One way of acquiring that knowledge is through partnerships. Accordingly, over the past five years, Korea has sought to forge bilateral and multilateral relations for cooperation with various Arctic stakeholders.

At the governmental level, these relations take the form of attending bilateral and multilateral Arctic meetings and international Arctic conferences, such as the Arctic Circle Assembly, as well as participating in Arctic governance arrangements, like the Arctic Council. Government-affiliated research institutes, such as the Korea Maritime Institute (KMI) and Korea Polar Research Institute (KOPRI), and universities have also been active in fostering partnerships through cooperation projects with various stakeholders in diverse areas, from education to science. Private entities, such as shipping companies, and even subnational actors have also sought to cooperate as well. These partnerships enable Korea to build capacity in terms of remedying the lack of knowledge on the Arctic. For instance, Korea could contribute in areas where the Arctic could use assistance, in fields like building scientific capacity and knowledge, funding, and technology. These partnerships can help to achieve other aspects of the SDGs as well.

SDG 4: Quality Education

Capacity building through education is a key to sustainable development. In particular, student mobility programs help students establish networks and expand horizons, which help them find innovative solutions and partnerships and increase resiliency to face a range of challenges. Korea offers several student mobility programs, provided under the nation's Arctic policy. For example, through cooperation with the biggest education network, the University of the Arctic, the Korea Maritime Institute co-hosts the Korea Arctic Academy, where students from Arctic and Korean universities are invited to attend a ten-day intensive educational program on the Arctic in Korea. Through the program, students are provided with an education that promotes sustainable development, global citizenship, and lifelong friendship.

Korea lacks expertise and capacity in certain Arctic-related areas, and through partnerships in education, it helps Korea to be become a "sustainable" user of the Arctic. For example, the Polar Code requires that officers on ships operating in polar waters complete specialized training. The Korea Institute of Maritime and Fisheries Technology has been partnering with the Admiral Makarov State University of Maritime and Inland Shipping (SUMIS) in Russia to provide Korean sailors an education of sufficient quality to face the specific challenges inherent in Arctic operations.

SDG 9: Industry, Innovation and Infrastructure

Korea's ways of contributing to "building resilient infrastructure, promoting inclusive and sustainable industrialization and fostering innovation" in the Arctic have mainly been in relation to the development of the Northern Sea Route (NSR). In particular, Korea's advanced shipbuilding know-how has been vital in supporting Russia's plans to build 15 additional icebreakers to be utilized along the NSR. The Prompt Port Facility (PPF) is also an innovation that could help provide a stable source of energy and infrastructure if applied to remote communities in the Arctic, thereby spurring industries and economic growth, even in the most remote regions.

SDG13: Climate Action

The Arctic region is the smallest contributor to climate change, yet it is the most affected region. Korea is joining the global effort to fight climate change by reducing the emission of greenhouse gases and expanding the use of cleaner energy. Having ratified the Paris Agreement, the country has pledged to reduce GHG emissions by 37 percent relative to business-as-usual emissions by 2030.

Studying climate change processes in the Arctic is important for Korea, as sub-Arctic regions are also greatly affected by climatic processes in the Arctic (e.g. the weakening of the Arctic vortex). Korea has been active in conducting scientific studies in the Arctic since 1992, and is making important contributions to the accumulation of knowledge on climate change processes in the Arctic and their impacts around the globe. The Korean Arctic policy also specifically includes increased climate change research.

SDG 14: Life below Water

One fundamental way to "conserve and sustainably use the oceans, seas and marine resources for sustainable development" is to increase knowledge about those oceans. The Arctic Ocean is one of the least studied and understood oceans. Under the Korean Arctic policy, Korea has sought to contribute to building up that knowledge by conducting ocean surveys in the Arctic using its icebreaker, the *Araon*, and participating in the development and implementation of international regimes such as the Polar Code and the Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean. As a major maritime nation, Korea is also interested in safe shipping, and is closely cooperating with the Arctic Council's Working Group on the Protection of the Arctic Marine Environment (PAME), especially its Shipping Experts Group. Korea is also promoting closer cooperative relations with the Aleut International Association, through participation in activities such as the Arctic Marine Indigenous Use Mapping project, since the geographic proximity of the Korean peninsula to the Aleutian Islands calls for cooperation to conserve and sustainably manage this stretch of ocean in particular.

SDG 15: Life on Land

Korea is a party to the Convention on Biological Diversity, and seeks to promote biological diversity in the Arctic through participation in the Arctic Migratory Bird Initiative (AMBI) of the Arctic Council's Working Group on the Conservation of Arctic Flora and Fauna (CAFF). Some migratory birds are important food sources for Arctic Indigenous Peoples, so it is important to forge cooperation with non-Arctic states to ensure the conservation and security of these bird species' breeding and staging habitats outside the Arctic region. Korea has been working with CAFF, particularly regarding the East Asian-Australasian Flyway, part of which includes some important breeding and staging sites located in Korea. While the AMBI project contributes to SDG 15, it also helps secure food security for Arctic Indigenous populations, which is part of SDG 2.

Conclusion

Without a doubt, sustainable development actions taken outside the Arctic are linked to sustainable development in the Arctic. As examined here, some elements of Korea's Arctic policy can support the achievement of the SDGs in the Arctic directly. However, there are many more indirect ways in which countries outside the Arctic can contribute to achieving the SDGs in the Arctic. Actions to reduce greenhouse gas emissions, reducing the consumption of plastic waste, and decisions that influence prices of oil, gas, and other mineral resources are important ways that non-Arctic regions have an influence on the Arctic. Thus, in discussions about Arctic sustainable development, it is also important to include discussions of how non-Arctic states are working toward sustainable development and how they can contribute to the sustainable development of the Arctic as well. At the Arctic Council level, one way Observers can think about sustainable development in the Arctic is to communicate clearly how the activities they document in their Observer Reports relate to the UN SDGs.

Notes

1. D. Coumou, et al., 'The influence of Arctic amplification on mid-latitude summer circulation', Nature Communications 9, Article number: 2959 (2018)
2. While a working group was established for each of the 17 goals, certain goals with high relevancy to one another have been combined into one working group. Thus, for 6 of the goals, that is, SDG 1 (poverty) and 10 (inequality), SDG 8 (economic growth, employment) and SDG 9 (infrastructure), and SDG 7 (energy) and 13 (climate change) have been paired to create 3 working groups, resulting in 14 working groups in total.

An Indigenous Perspective

Dalee Sambo Dorough

Introduction

How Do Indigenous Peoples Think about Sustainability, Especially over the Long Term?

In its most elementary definition, the term "sustainable" means something "able to be maintained at a certain rate or level," or—in the context of the environment—"Conserving an ecological balance by avoiding depletion of natural resources."

Indigenous Peoples have understood and lived by the concept of "sustainable development" long before the term was coined by the World Commission on Environment and Development [1987] and its first use in international law in the *Rio Declaration on Environment and Development*.

Indigenous knowledge has sustained our communities for centuries. Many of the standards, guidelines, protocols, and values, ranging from so-called "management" of our resources to seasonal interactions to our spirituality, pivot upon concepts of sustainable development. Sustainable development concepts are embedded in our languages as well as our protocols, customs, values, practices, and institutions.

Like human rights, such concepts are interrelated, interdependent, indivisible and interconnected with who we are on the land and with our place and status on the land, which is manifested through our profound relationship with our environment. We are a species, like the whale is a species.

This world view and way of life must be recognized and respected if we are to achieve the "objectives" of the Sustainable Development Goals. The life ways of Indigenous Peoples are inextricably linked with what are now referred to as sustainable development goals. Indeed, it is largely due to a lack of respect for and recognition of Indigenous human rights that our cultural integrity is threatened by the values of the non-Indigenous, or Western world.

The UN resolution, *The future we want* (and specifically paragraph 49) states:

> We stress the importance of the participation of indigenous peoples in the achievement of sustainable development. We also recognize the importance of the United Nations Declaration on the Rights of Indigenous Peoples in the context of global, regional, national and subnational implementation of sustainable development strategies.[1]

The 2030 Agenda for Sustainable Development[2] makes specific references to Indigenous Peoples, ranging from recognition of their "vulnerable" status, to education about ending hunger through secure access to land, to making contributions at the national level. In regard to the agenda's indicators,[3] Indigenous Peoples are referenced in relation to agricultural productivity and its linkage to land and equal access to education. Though there is limited explicit reference to Indigenous Peoples in the General Assembly resolutions, as will be discussed below, various treaty bodies are making important linkages between the conditions facing Indigenous Peoples and the realization of the SDGs.

The SDGs can be generally categorized as follows:

- poverty, food, health, education, water and sanitation
- energy, environment, resources and climate policies
- work, economic growth, industry, innovation, infrastructure, inequalities
- institutions of governance, access to justice

To realize the SDGs in the Arctic, member states must recall their commitments at the national and international level. Such commitments include the fiduciary obligations that they unilaterally designed through the process of colonization and related subjugation, domination and exploitation. By this, I mean the guardian/ward relationship as reflected in numerous federal Indian law doctrines. More important, however, is the need to respect and recognize the distinct status and rights of Indigenous Peoples.

These are necessary elements to realize the ambitious SDGs throughout the Arctic, if not across the Indigenous world. Such a framework would dramatically and positively contribute to the ultimate desire of Indigenous Peoples: cultural integrity and overall security of Arctic Indigenous Peoples as distinct peoples, with the right to be different and to be respected as such.

International Human Rights Norms Specific to Indigenous Peoples

To achieve such security, it is safe to say that the "indicators" have been established with the 2007 adoption of the *UN Declaration on the Rights of Indigenous Peoples (UNDRIP)*. These norms were influenced and informed by the firsthand expressions and stories of Indigenous Peoples at the international level, including by Inuit from throughout the circumpolar region. The SDGs speak of poverty and discrimination. The *UNDRIP* preamble states that:

> Indigenous peoples, in the exercise of their rights, should be *free from discrimination* of any kind (italicized emphasis mine throughout)
>
> Indigenous peoples have suffered from historic injustices as a result of, inter alia, their colonization and dispossession of their lands, territories and resources, thus preventing them from exercising, in particular, their *right to development in accordance with their own needs and interests*
>
> Respect for Indigenous knowledge, cultures and traditional practices contributes to *sustainable and equitable development* and proper management of the environment
>
> The Charter of the United Nations, the International Covenant on Economic, Social and Cultural Rights and the International Covenant on Civil and Political Rights, as well as the Vienna Declaration and Programme of Action, *affirm the fundamental importance of the right to self-determination of all peoples, by virtue of which they freely determine their political status and freely pursue their economic, social and cultural development*

Significantly, the operative paragraphs of the *UNDRIP* establish the unique cultural context of Indigenous Peoples by affirming that:

> *Article 3*
> Indigenous peoples have the right to self-determination. By virtue of that right they freely determine their political status and freely pursue their *economic, social and cultural development*.

> *Article 20*
> 1. Indigenous peoples have the *right to maintain and develop their political, economic and social systems or institutions*, to be secure in the enjoyment of their own means of *subsistence and development*, and to engage freely in all their traditional and other *economic activities*.
>
> *Article 23*
> Indigenous peoples have the right to determine and develop priorities and strategies for exercising their *right to development*.
>
> *Article 32*
> 1. Indigenous peoples have the right to determine and develop priorities and strategies for the *development or use of their lands or territories and other resources*.
> 2. States shall consult and cooperate in good faith with the indigenous peoples concerned through their own representative institutions in order to obtain their *free and informed consent* prior to the approval of any project affecting their lands or territories and other resources, particularly in connection with the development, utilization or exploitation of mineral, water or other resources.

The *ILO Indigenous and Tribal Peoples Convention 169 of 1989* also makes explicit reference to development in *Article 7*:

> 1. The peoples concerned shall have the right to decide their own priorities for the process of development as it affects their lives, beliefs, institutions and spiritual well-being and the lands they occupy or otherwise use, and to exercise control, to the extent possible, over their own economic, social and cultural development. In addition, they shall participate in the formulation, implementation and evaluation of plans and programmes for national and regional development which may affect them directly.

Based on the above, it is clear that Indigenous Peoples have not only a right to development,[4] but significantly, Indigenous Peoples have a *right to sustainable development*.

"*Recognizing* that respect for indigenous knowledge, cultures

> and traditional practices contributes to *sustainable and equitable development* and proper management of the environment”[5]

In addition, *ILO Convention 169*, article 23 provides that:

> 1. Handicrafts, rural and community-based industries, and subsistence economy and traditional activities of the peoples concerned, such as hunting, fishing, trapping and gathering, shall be recognised as important factors in the maintenance of their cultures and in their economic self-reliance and development. Governments shall, with the participation of these people and whenever appropriate, ensure that these activities are strengthened and promoted.
>
> 2. Upon the request of the peoples concerned, appropriate technical and financial assistance shall be provided wherever possible, taking into account the traditional technologies and cultural characteristics of these peoples, as well as *the importance of sustainable and equitable development*.

Within the regional intergovernmental Organization of American States, it is important to draw attention to the 2016 *American Declaration on the Rights of Indigenous Peoples*, art. XIX:

> 1. Indigenous peoples have the right to live in harmony with nature and to a *healthy, safe, and sustainable environment*, essential conditions for the full enjoyment of the rights to life and to their spirituality, cosmovision, and collective well-being.
>
> 2. Indigenous peoples have the right to conserve, restore, and protect the environment and to manage their lands, territories and resources *in a sustainable way*.

Furthermore, States have a corresponding obligation relating to ensuring sustainable development. Specifically, the *Convention on Biological Diversity (CBD)*, preamble states:

> *Reaffirming also* that States are responsible for conserving their biological diversity and for using their biological resources in a

sustainable manner.

And Article. 10c of the *CBD* provides that:

> Each Contracting Party shall, as far as possible and as appropriate: … (c) Protect and encourage customary use of biological resources in accordance with traditional cultural practices that are compatible with conservation or sustainable use requirements.

It will be important to monitor the synergy between the 2030 Agenda and how it may further inform "sustainable development" and "sustainability" in the *Nagoya Protocol* and the *CBD*.

Though member states actively and consistently participated in the drafting of and heavily influenced the outcome of each of these international human rights instruments, many of them have aggressively worked to undermine these standards, thus adversely impacting the sustainable development of Indigenous Peoples and Indigenous lands, territories and resources. Unfortunately, most Indigenous Peoples across the globe, including those in the Arctic, continue to experience the forces of colonization through the denial of their fundamental human rights. Indeed, the SDGs represent new obligations and commitments that have diverse legal effects.

Therefore, Indigenous Peoples, but more significantly, the treaty bodies of the UN human rights regime (again established by member states within their various inter-governmental organizations) have begun to invoke the SDGs to gain measures for recourse, reparations and redress of what are seen as human rights violations or impediments to achieving the SDGs. Indeed, it is ironic that such measures must be taken by Indigenous Peoples to achieve the "future we want" and to be sure that we are not "left behind."

International Norms and Corresponding Jurisprudence

More specifically, the jurisprudence that has arisen through the human rights treaty bodies of the UN, ILO and at the regional level illustrate the linkage between sustainable development and the collective rights of Indigenous peoples, especially those seeking to protect the sustainability of their lives and conditions. UN human rights treaty bodies are applying the 2030 Agenda to States suggesting that they are in fact obligations.

These distinct references invoke the importance of the SDGs in relation to Indigenous Peoples. Within the United Nations alone, the following affirmations have been made by specific organs and agencies of the United Nations.

The Human Rights Council underscored that:

> The *2030 Agenda is unequivocally anchored in human rights*. It is explicitly grounded in the Charter of the United Nations, the Universal Declaration of Human Rights, international human rights treaties and other instruments, including the Declaration on the Right to Development. It states that the Sustainable Development Goals *aim to realize the human rights of all, and emphasizes the responsibilities of all States to respect, protect and promote human rights and fundamental freedoms for all, without distinction of any kind* as to race, colour, sex, language, religion, political or other opinion, national or social origin, property, birth, disability or other status.[6]

UN Women aims to integrate the SDGs within the System-Wide Action Plan agreed to by UN member states as a result of the high level plenary meeting known as the World Conference on Indigenous Peoples in 2014. The representative from UN Women raised the SWAP—System-Wide Action Plan—which also highlighted the 2030 Agenda and sustainable development regarding Indigenous Peoples and States at the UN PFII Expert Group Meeting on the SDGs this past January.[7]

Importantly, the Report of the Working Group on the issue of human rights and transnational corporations and other business enterprises on the Asia Forum on Business and Human Rights has affirmed that:

“Sustainable development is only possible with human rights at the core…”

The Sub-Commission on the Promotion and Protection of Human Rights in their *Note by the Secretariat: The legal nature of the right to development and enhancement of its binding nature*[8] noted that:

> … poverty eradication is one of some of the most important objectives of the *right to sustainable development*. But poverty eradication alone

> may not be sufficient in creating social justice, equality and dignity for all. Equally important is the challenge of narrowing the gaps of inequalities that manifest along regions of the world and in terms of race, gender, class and other forms of social differentiation.

Due to systemic and institutionalized racism, the Committee on the Elimination of Racial Discrimination (CERD) is the treaty body most often engaged by Indigenous Peoples. In 2015, the CERD issued its *Concluding observations of the Committee on the Elimination of Racial Discrimination* in relation to Colombia by:

> Recalling its general recommendation No. 23 (1997) on the rights of indigenous peoples, the Committee calls upon the State party to: … (c) Avoid statements criticizing or stigmatizing the efforts of indigenous and Afro-Colombian peoples to exercise their fundamental right to free, prior and informed consent and their *right to sustainable development*.[9]

The Committee on the Rights of the Child in the preparation of their *Concluding observations: New Zealand*, UN Doc. CRC/C/NZL/CO/5, (21 October 2016) made direct linkage of specific targets of the SDGs, including:

> 23. In the light of its general comment No. 13 (2011) on the right of the child to freedom from all forms of violence, and taking note of *target 16.2 of the Sustainable Development Goals* on ending abuse, exploitation, trafficking and all forms of violence against and torture of children, and recalling its previous recommendation (CRC/C/NZL/CO/3-4, para. 35), the Committee urges the State party:
> …
> (c) To develop a comprehensive strategy to combat abuse and neglect encompassing all children in all settings, with particular attention to Maori and Pasifika children and children with disabilities;
> …
> (g) To further strengthen awareness-raising and education programmes, including campaigns, to prevent and combat child abuse, with the involvement of children, with particular attention to Maori and Pasifika children and children with disabilities.
> 24. While welcoming the development of a child sex offender register,

the Committee recalls its previous recommendation (CRC/C/NZL/CO/3-4, para. 52), draws attention to *target 5.2 of the Sustainable Development Goals* on eliminating all forms of violence against all women and girls in the public and private sphere, including sexual and other types of exploitation, and recommends that the State party:

(a) Intensify its efforts to combat sexual abuse of children and establish mechanisms, procedures and guidelines to ensure mandatory reporting of cases of child sexual abuse, with particular attention to ethnicity, gender and disability;
…

31. Recalling its previous recommendation (CRC/C/NZL/CO/3-4, para. 38), and in the light of its general comment No. 15 (2013) on the right of the child to the enjoyment of the highest attainable standard of health, and taking note of *target 3.2 of the Sustainable Development Goals* to end preventable deaths of newborns and children under 5 years of age, the Committee recommends that the State party:

(a) Promptly take the necessary measures to ensure adequate access to health services to all children, including age-appropriate mental health services, with particular attention to Maori and Pasifika children;

(b) Take immediate action to reduce the prevalence of preventable and infectious diseases, including by improving housing conditions, especially for Maori, Pasifika and children living in poverty;
…

34. The Committee is concerned about the harmful impact of climate change on children's health, especially for Maori and Pasifika children and children living in low-income settings. The Committee draws attention *to target 13.5 of the Sustainable Development Goals* on promoting mechanisms for raising capacity for effective climate change-related planning and management and recommends that the State party:

(a) Ensure that the special vulnerabilities and needs of children, and their views, are taken into account in developing policies or programmes addressing the issues of climate change and disaster risk management, with special attention to groups of children most likely to be affected by climate change, including Maori and Pasifika children and children living in low-income settings;

(b) Routinely undertake health impact assessments, with particular attention to children, to inform legislation and policies related to climate change.

…

36. The Committee draws attention to *target 1.3 of the Sustainable Development Goals* on implementing nationally appropriate social protection systems and measures for all, and target 11.1, to ensure access to adequate, safe and affordable housing for all, and urges the State party:

(a) To introduce a systemic approach to addressing child poverty, in particular Maori and Pasifika children, including establishing a national definition of poverty;

…

37. Taking note of *target 4.a of the Sustainable Development Goals* on building and upgrading education facilities that are child, disability and gender sensitive and providing safe, non-violent, inclusive and effective learning environments for all, and recalling its previous recommendation (CRC/C/NZL/CO/3-4, para. 46), the Committee recommends that the State party:

(a) Ensure that the ongoing review of the Education Act 1989 complies with the provisions and principles of the Convention and is made in consultation with children;

38. Taking note of *target 4.2 of the Sustainable Development Goals* on ensuring that all girls and boys have access to quality early childhood development, care and pre-primary education, the Committee recommends that the State party:

(a) Take the measures necessary to ensure that children from low socioeconomic backgrounds, Maori and Pasifika children have effective access to early childhood care and education;

(b) Further invest in the availability and quality of early childhood care and education ensuring that, at a minimum, is free for children from low socioeconomic backgrounds, and that care personnel is adequately trained, including on Maori and Pasifika cultures.

The Committee on the Rights of Persons with Disabilities in relation to their *Concluding Observations: Chile*, UN Doc. CRPD/C/CHL/CO/1 (13 April 2016) specified the following:

20. The Committee recommends that the State party adopt a general accessibility plan that takes into account the Committee's general comment No. 2 on accessibility (art. 9 of the Convention) and covers the accessibility of transportation, public buildings and facilities, information and communication, in both urban and rural areas. The plan should provide for specific time frames, penalties for non-compliance and the involvement of organizations of persons with disabilities at all stages of its implementation, particularly the monitoring of compliance. The Committee also recommends that the *State party bear in mind the linkages between article 9 of the Convention and Sustainable Development Goal 11, especially targets 11.2 and 11.7.*

50. The Committee recommends that the State party:

(a) Implement a plan for transitioning towards inclusive education at all levels up to higher education, which provides for the training of teachers, the roll-out of comprehensive awareness-raising campaigns and the promotion of a culture of diversity;

(b) Provide personalized instruction and the necessary support and resources, such as Braille and sign language, to foster inclusion, in particular of students with intellectual or psychosocial disabilities;

(c) Ensure the accessibility of higher education institutions, including by facilitating reasonable accommodations in the admissions process and all other aspects of higher education;

(d) Bear in mind *the linkages between article 24 of the Convention and Sustainable Development Goal 4, in particular targets 4.5 and 4.8*.

58. The Committee recommends that the State party hasten the adoption of legislation on the inclusion of persons with disabilities in the labour market and adopt a wide-ranging strategy in that domain which contains specific indicators and time frames and includes women and young people with disabilities. The Committee further recommends that the State party bear in mind the *linkages between article 27 of the Convention and target 8.5 of the Sustainable Development Goals* and ensure that all persons, including persons with disabilities, obtain productive and decent employment, in keeping with the principle of equal pay for work of equal value.

64. The Committee recommends that the State party collect and update data and statistics on persons with disabilities using a rights-based model. The data should be disaggregated by age, sex, type of impairment, ethnicity and geographical location and include the type of residence or institution and cases of discrimination or violence against those persons. These processes should be undertaken in consultation with organizations of persons with disabilities. The Committee also recommends that the State party bear in mind *the linkages between article 31 of the Convention and Sustainable Development Goal 17, especially target 17.18*.

And, the Human Rights Council received the *Report of the Working Group on the issue of human rights and transnational corporations and other business enterprises on the Asia Forum on Business and Human Rights*, UN Doc. A/HRC/32/45/Add.2 (30 May 2016) wherein they addressed:

82. The discussions at the Asia Forum help inform the Working Group's efforts to fulfill its mandate and promote effective implementation of the Guiding Principles worldwide. Based on the inputs from participants, the *Working Group would like to make the following overall observations and recommendations:*

> …
> (c) Strengthening the human and social aspects of economic development is critical. *Sustainable development is only possible with human rights at the core*, which will require a rebalancing of the economic and social pillars.

Which of the SDGs Seem Most Important from the Perspective of the Arctic's Indigenous Peoples?

One of the essential elements of human rights is that they are interrelated, interdependent and indivisible. As the International Law Association Committee on the Rights of Indigenous Peoples has underscored in the context of the significance of a cluster of articles that reflect customary international law:

> The relevant areas of indigenous peoples' rights with respect to which the discourse on customary international law arises are self-determination, autonomy or self-government, cultural rights and identity, land rights as well as reparation, redress and remedies. However, it would be inappropriate to deal with these areas separately, for the reason that—in light of the holistic vision of life of indigenous peoples—the rights just listed are all strictly interrelated with each other as building blocks of the unique Circle of Life representing the heart of indigenous peoples' identity, to the extent that "the change of one of its elements affects the whole." To provide just an example of this complex reality, the rights to self-determination and autonomy cannot fully flourish without the right to cultural identity being granted.

Therefore, rather than articulating a set of SDGs as central to Arctic Indigenous peoples, it may be more useful to address them in relation to the *three pillars* of the SDGs. The realization of the sustainable development goals in favour of Arctic Indigenous Peoples and their communities, within SOCIETY, the right to determine their own priorities for development is essential and it is intimately tied to their collective right to self-determination. There must be an emphasis upon decentralization of decision making, moving away from State control and State prescriptive or unilateral control over development, including economic, social, cultural, spiritual and political development. Self-determination must be done by the "self" as defined by the Indigenous Peoples concerned. Development must not be imposed on Indigenous Peoples.

A key dimension of the right to self-determination is the right to free, prior and informed consent, especially as it relates to "development" presently largely defined by western standards. Furthermore, to achieve the SDGs, decision making must fully accommodate Indigenous values and concerns.

As to the realm of ECONOMY and the realization of the SDGs within Arctic Indigenous communities, there must be equality of opportunity and direct, equitable share in benefits, including fair and equitable distribution of benefits. Each of these elements must be determined in a manner acceptable to Indigenous Peoples, consistent with their own decision-making institutions.

Development initiatives by Indigenous Peoples themselves should be encouraged by ensuring significant and accessible opportunities, including government support, cooperation, and assistance. Furthermore, any such development should only take place at a rate and pace compatible with Indigenous peoples' communities. Not surprisingly, culturally appropriate technologies should be used. Again, equitable development must mean equal opportunity, equal access and the removal of any inequalities or disparities that may exist. In fact, this is one of the key contextual features of the SDGs overall—to remove discrimination, inequalities and disparities.

In relation to the ENVIRONMENT, it is crucial to recall the "distinctive spiritual relationship with their traditionally owned or otherwise occupied and used lands, territories, waters and coastal seas and other resources and to uphold their responsibilities to future generations in this regard," which has always underpinned the Indigenous understanding of "sustainable development."

In many parts of the world, State development agendas have dramatically and adversely impacted the productive capacity of the lands, territories and resources, becoming the pivotal element of the need for Indigenous human rights defenders to act. So, if the SDGs are to be achieved in Arctic Indigenous communities, the focus must be upon enhancing and improving the productive capacity of Indigenous lands, territories and resources, including those that they have traditionally owned, occupied or otherwise used.

Furthermore, developments in or affecting Indigenous lands, territories and resources must not undermine, but rather enhance the economic, social, cultural and political development of Indigenous societies. And, again, the intergenerational nature of development requires that development "meets the needs of the present without compromising the ability of future generations to meet their own needs, as formulated by the World Commission on Environment and Development.

There is no question as to the linkages among discrimination, colonization and oppression and their adverse impacts upon Indigenous Peoples. In this regard, the SDGs that speak to the elimination of poverty, food security, health conditions, water and sanitation, inequalities, access to justice, and governance are all critical for Arctic Indigenous Peoples and essential not only for gaining the future we want, but also for ensuring our basic survival.

Is There a Distinct Role for Indigenous Knowledge in Efforts to Fulfill the SDGS?

As noted above, there is no doubt that Indigenous Peoples incorporated sustainable development concepts as an essential element of their overall knowledge and development well before all others. Indigenous Knowledge is central to the maintenance and integrity of Arctic Indigenous Peoples as well as the fulfillment of the SDGs.

In relation to the SDGs addressing poverty, food, and health, it is instructive to introduce the substantive work of the Inuit Circumpolar Council (ICC) in relation to food security and the interrelated, interdependent and indivisible nature of Indigenous human rights. The ICC has defined food security as:

> Alaskan Inuit food security is the natural right of all Inuit to be part of the ecosystem, to access food and to care-take, protect and respect all of life, land, water and air. It allows for all Inuit to obtain, process, store and consume sufficient amounts of healthy and nutritious preferred food—foods physically and spiritually craved and needed from the land, air and water, which provide for families and future generations through the practice of Inuit customs and spirituality, languages, knowledge, policies, management practices and self-governance. It includes the responsibility and ability to pass on knowledge to younger

> generations, the taste of traditional foods rooted in place and season, knowledge of how to safely obtain and prepare traditional foods for medicinal use, clothing, housing, nutrients and, overall, how to be within one's environment. It means understanding that food is a lifeline and a connection between the past and today's self and cultural identity. Inuit food security is characterized by environmental health and is made up of six interconnecting dimensions: 1) Availability, 2) Inuit Culture, 3) Decision-Making Power and Management, 4) Health and Wellness, 5) Stability, and 6) Accessibility. This definition holds the understanding that without food sovereignty, food security will not exist.

Indigenous Knowledge has been recognized as a central norm related to the overall cultural integrity of Indigenous Peoples in each of the three Indigenous specific international human rights instruments.[10] Significantly, in relation to Indigenous Knowledge, the preamble of the *Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity*, notes:

> the interrelationship between genetic resources and traditional knowledge, their inseparable nature for indigenous and local communities, the importance of the traditional knowledge for the conservation of biological diversity and the sustainable use of its components, and for the *sustainable livelihoods of these communities*.

Conclusion

The SDGs have broad, diverse legal effects. In my view, if the SDGs are to be achieved in the Arctic in a way that is consistent with UN member State commitments, engagement and partnership with Arctic Indigenous Peoples is crucial. Arctic Rim nation-states cannot realize the SDGs without working in good faith and in lock step with Arctic Indigenous leaders and peoples. If we achieve healthy, viable, sustainable Indigenous communities, that are practicing sustainable and equitable development, we would ultimately decrease the expense of governance for Arctic-Rim states.

More important, we would erase the very real indicators that illustrate the discrimination, marginalization and disparities that presently and undeniably exist in health, housing, food security, and so forth. Real achievement of the SDGs in the Arctic would help states to behave and comply with their solemn commitments to promote and protect the human rights of Arctic Indigenous Peoples and others. Ultimately, this must be the real intent of the SDGs.

Notes

1. A/RES/66/288* The future we want, Resolution adopted by the General Assembly on 27 July 2012.
2. A/70/1 Transforming our world: the 2030 Agenda for Sustainable Development, Resolution adopted by the General Assembly on 25 September 2015.
3. A/RES/71/313 and E/CN.3/2018/2, Global indicator framework for the Sustainable Development Goals and targets of the 2030 Agenda for Sustainable Development.
4. *UN Declaration*, arts. 3, 20, 23 and 32(1); *International Covenant on Civil and Political Rights* and *International Covenant on Economic, Social and Cultural Rights*, identical art. 1; and *Indigenous and Tribal Peoples Convention, 1989*, art. 7(1).
5. *UN Declaration*, 11th preambular paragraph
6. *Question of the realization in all countries of economic, social and cultural rights: Report of the Secretary-General*, UN Doc. A/HRC/34/25 (14 December 2016)
7. 23-25 January 2018, Conference Room 5, United Nations Headquarters, New York, Sustainable development in territories of indigenous peoples (Article 4 of the UN Declaration on the Rights of Indigenous Peoples).
8. UN Doc. E/CN.4/Sub.2/2004/16 (1 June 2004), para. 30
9. UN Doc. CERD/C/COL/CO/15-16 (25 September 2015), para. 22.
10. *UN Declaration* preamble *Recognizing* that respect for indigenous knowledge, cultures and traditional practices contributes to sustainable and equitable development and proper management of the environment, Article 31 1. Indigenous peoples have the right to maintain, control, protect and develop their cultural heritage, traditional knowledge and traditional cultural expressions, as well as the manifestations of their sciences, technologies and cultures, including human and genetic resources, seeds, medicines, knowledge of the properties of fauna and flora, oral traditions, literatures, designs, sports

and traditional games and visual and performing arts. They also have the right to maintain, control, protect and develop their intellectual property over such cultural heritage, traditional knowledge, and traditional cultural expressions. 2. In conjunction with indigenous peoples, States shall take effective measures to recognize and protect the exercise of these rights.; *ILO C169*, article 27; and the *American Declaration*, preamble and articles 13, 14, 15, and 28.

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