2012 North Pacific Arctic Conference Proceedings

The Arctic in World Affairs

A North Pacific Dialogue on Arctic Marine Issues

Edited by

Oran R. Young, Jong Deog Kim,
Yoon Hyung Kim

KMI KOREA MARITIME INSTITUTE

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The Arctic in World Affairs: A North Pacific Dialogue on Arctic Marine Issues addresses five major themes relating to the maritime Arctic: potential Arctic shipping, Arctic marine environmental protection, Arctic marine living resources, potential Arctic oil and gas development, and informal Arctic governance mechanisms. Bringing together prominent Arctic experts from the three North Pacific Arctic coastal states (Canada, Russia, and the US) and three leading North Pacific non-Arctic states (China, Japan, and Korea), the book goes beyond generalities; it addresses the details of major concerns in an effort to identify practical solutions to Arctic marine issues and move them from paper to practice.

On commercial shipping, the book explores key issues relating to uses of the Northern Sea Route, including the Russian regulatory framework, the permitting process, technical requirements for ships, and icebreaker support, providing in the process a good grasp of the technical, organizational, economic, and environmental aspects of navigation in the Arctic. On Arctic marine environmental protection, the book reviews the tangled web of IMO conventions and guidelines relevant to Arctic shipping and explores the challenges confronting the governance of Arctic shipping. On Arctic marine living resources, the book addresses the management of existing fisheries in the marginal seas and the prospects for future Arctic fisheries. It asks whether it would be timely to create a Regional Fisheries Management Organization for the Arctic Ocean proper to prepare for the prospect of commercial fishing in the future.

On Arctic oil and gas development, the book explores the outlook for the development of Arctic energy resources in Norway and Russia and the key factors determining development pathways, including the resource base, the interests and strategies of the owners of the resources, the cost of developing and delivering the resources to markets, and the merits of Arctic supplies compared with supplies from other regions. On informal Arctic governance mechanisms, the book discusses the policies articulated by the five Arctic coastal states and more recently the Arctic Council with regard to Arctic Ocean issues and the reasons why the interests of non-Arctic states will require consideration in this context. The emphasis is on exploring options for informal consultation among North Pacific Rim states and mechanisms for constructive interactions with the Arctic Council and other international bodies addressing Arctic issues.

The book contributes by filling gaps in knowledge regarding the maritime Arctic, identifying remaining uncertainties, and developing policy innovations that can promote peaceful and sustainable uses of Arctic resources in the future.

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The first book in the series, edited from the 2012 North Pacific Arctic Conference proceedings, is entitled:

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Preface

The Arctic is undergoing comprehensive change. This Arctic transformation is driven by two major forces: climate change and economic globalization. On the one hand, the reduction in sea ice in the Arctic Ocean is opening new shipping routes. Shipping access in the Arctic Ocean is not only enabling new maritime trade routes but also accelerating resource exploitation. On the other hand, the increase in Arctic activities is being driven by the global demand for resources and logistical efficiency.

Recent commercial agreements highlight linkages between the Russian Arctic and the global economy. The Northern Sea Route (NSR) shows considerable potential as a commercial artery not only for enabling new trade routes between Asia and Europe but also for accelerating Arctic resource development and tourism. Yet the growth of ship traffic along the NSR also has the potential to increase pollution in the Arctic and heighten the risks of spills. There are substantial uncertainties and knowledge gaps regarding the nature of environmental change, the geological potential of the Arctic, and methods for dealing with the risks associated with significant Arctic industrial activities. A matter now rising rapidly on the Arctic policy agenda focuses on finding ways to take into account the concerns and contributions of non-Arctic states that have legitimate interests in Arctic developments, without impinging on the role of the Arctic states or distorting the cooperative efforts of existing arrangements like the Arctic Council.

To identify key uncertainties, reduce knowledge gaps, and explore innovative policy options relating to Arctic marine issues, the Korea Maritime Institute and the East-West Center organized a conference entitled "A North Pacific Dialogue on Arctic Marine Issues" held in Honolulu, Hawai'i in August 2012. The conference facilitated informal dialogue among exceptionally knowledgeable individuals from the three major North Pacific Arctic coastal states (Canada, Russia, and the United States) and the three leading North Pacific states interested in using Arctic resources (China, Japan, and Korea) on issues of Arctic marine shipping and resource development. The conference also explored appropriate and constructive mechanisms for introducing the concerns of the North Pacific Rim states into the deliberations of the Arctic Council and other international bodies addressing Arctic issues. Participants took note of the seriousness of potential impacts of commercial shipping and Arctic resource development on indigenous peoples' communities and ways of life.

The chapters and commentaries included in this book are based on presentations made at the conference. The opening chapter by the editors seeks to capture the main themes and to set the entire discussion in a broader context. We would like to take this opportunity to thank Dr. Oran R. Young, research professor at the University of California, Santa Barbara, Dr. Jong Deog Kim, Research Fellow at the Korea Maritime Institute, and Dr. Yoon Hyung Kim, emeritus professor at the Hankuk Univeristy of Foreign Studies and senior fellow at the East-West Center for coordinating the conference and preparing the papers and commentaries for publication. We also wish to thank the paper writers, commentators, and others involved in contributing to the success of this conference. Our sincere gratitude goes to Eugene Alexander of the East-West Center for his expert management of the conference logistics.

Hak-So Kim	Charles E. Morrison
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1. Introduction and overview

Yoon Hyung Kim, Oran R. Young, and Jong Deog Kim

THE ARCTIC EMERGENT

The Arctic is experiencing transformative change. A remote region once often thought of as a theater of operations for strategic military forces, the Arctic is emerging as a more accessible region endowed with resources of interest to key players in the global economy. The shrinking of the Arctic's sea ice cover increases environmental fragility and threatens human security, especially for the Arctic's indigenous peoples. But melting ice also facilitates the use of the Arctic for shipping and increases access to untapped natural resources. Global demand for Arctic resources and Russia's intention to treat its vast Arctic domain as a "strategic resource base" will drive the growth of interest in the use of the Northern Sea Route (NSR) for commercial shipping and in the extraction of Arctic resources.

Recent commercial agreements highlight linkages between the Russian Arctic and the global economy. In June 2009, Lukoil and China Petroleum & Chemical Corporation (Sinopec) signed an agreement to transport 3 million tons of oil from the Varandey terminal in the Pechora Sea to China. In September 2010, Russia and Norway signed a treaty concerning "Maritime Delimitation and Cooperation in the Barents Sea and the Arctic Ocean," thereby ending 40 years of disagreement and establishing a stable and secure Arctic boundary. In November 2010, Sovcomflot and the China National Petroleum Company (CNPC) agreed to cooperate in using the NSR to ship Arctic oil and gas from Russia to China. In August 2011, ExxonMobil and the Russian oil giant Rosneft agreed to begin joint operations on Russia's Arctic sea shelf. Subsequently, in April 2012, Rosneft and ExxonMobil established a partnership to develop the Arctic's untapped oil and gas reserves. Shortly thereafter, Rosneft signed additional Arctic agreements with Italy's Eni and Norway's Statoil to explore offshore resources. Together, these deals provide a clear indication of Rosneft's global ambitions.

The NSR shows considerable potential as a commercial artery. During the summers of 2009 through 2011, large tankers and bulk carriers sailed the NSR to investigate prospects for carrying natural resources from Russia and northern Norway to Northeast Asia. During August and September 2009, two German heavy-lift ships, operated by Beluga, transported heavy plant modules from Ulsan, Korea to the Ob River in Siberia. In summer 2010, SCF Baltica completed an historic NSR voyage carrying 70,000 tons of gas condensate from Murmansk to Ningbo, China in 22 days, approximately half the time required to navigate the traditional shipping route through the Suez Canal. In September 2010, Tschudi Shipping Company organized a demonstration project to explore the feasibility of shipping iron ore from Kirkenes, Norway to Lianyungang, China via the NSR. This marked the first time a non-Russian bulk carrier used the NSR as a transit route departing from a non-Russian port and arriving at a non-Russian port. During August and September 2011, the Japanese bulk carrier Sanko Odyssey delivered 66,500 tons of iron ore from Murmansk, Russia to Xingang, China. The summer of 2011 also brought a test in which the first supertanker (the 160,000 ton Suezmax-class Vladimir Tikhonov) used the most difficult part of the high-latitude route from Europe to Asia through the Arctic. It carried a commercial cargo of over 120,000 tons of gas condensate from Cape Desire in the Kara Sea to Cape Dezhnev in the Bering Strait. This successful voyage opened up the prospect for further development of economically viable and sustainable routes for transporting hydrocarbons along the NSR.

Advanced ice-capable ships are able to operate in the waters of the Russian Arctic. But the economic and operational aspects of the NSR have not yet been fully explored. The NSR has apparent distance and time advantages compared to the route through the Suez Canal for the shipment of containerized freight between Northeast Asia and Northwest Europe. But the economic competitiveness of the NSR depends on the development of needed infrastructure, the progressive alleviation of technical constraints limiting navigation, and the setting of appropriate Russian tariff policies. Changes in the legal framework and fee structure along with climate change may make the NSR more competitive.

Increasing ship traffic along the NSR has the potential to increase pollution in the Arctic and heighten the risk of spills. There is a need for effective international regulatory arrangements to enhance marine safety and protect the environment. Arctic conditions will remain challenging and often unpredictable. Impacts of black carbon emissions on ice, ship strikes on whales and other marine mammals, and potential effects of noise from ships and other marine activities on marine mammals are all serious concerns. Facilitating the safe use of the Arctic Ocean while protecting the peoples of the Arctic and the marine environment will be a growing challenge during the 21st century. The Arctic Council has already begun to address these challenges in its Arctic Marine Shipping Assessment (AMSA) released in 2009 as well as the agreement on search and rescue negotiated under the council's auspices and signed in 2011. The International Maritime Organization (IMO) provides an appropriate venue for addressing a number of these concerns. Taking the recommendatory guidelines applying to Arctic shipping adopted in 2002 as a point of departure, the IMO has commenced work on the development of a mandatory Polar Code for ships operating in polar waters. Negotiations on the provisions of the Polar Code are currently underway with the expectation of reaching agreement on the terms of the code during the next two to three years.

Commercial fishers are also watching the disappearance of Arctic sea ice with interest. Receding Arctic ice is already creating conditions favorable to commercial fishing in some areas. Two of the world's richest fisheries, in the Bering and Barents Seas, are located in areas involving extensive commercial shipping. Spills in these regions could have major economic, cultural, social, and environmental impacts. Other Arctic waters of interest to shipping, such as the Kara Gate in the Russian Arctic, the Bering Strait, the Hudson Strait and Lancaster Sound in the Canadian Arctic, and the Pechora Sea in the southeastern reaches of the Barents Sea, are ecologically significant and geographically restricted. Until a few years ago, these parts of the Arctic Ocean were locked in ice for most of the year. But now they are becoming seasonably accessible. In 2007, when sea ice cover in the Arctic reached a record low, 40% of the central Arctic Basin was open water.[1] A growing number of scientists, government officials, and conservationists are calling for international agreements to ensure that this transition is handled in an effective and responsible way. They advocate a moratorium on commercial fishing in the Arctic until conditions are better understood together with the creation of an Arctic Regional Fisheries Management Organization to manage future fishing on a sustainable basis. Others point to the apparent success of some existing regional fisheries management regimes and believe they have the potential to address Arctic issues.

With increased accessibility, Arctic oil and natural gas resources have become a focus of growing interest. There has been talk of a race for Arctic oil and natural gas resources and potential conflicts triggered by petroleum activities in the Arctic Ocean. The Arctic holds great potential for oil and gas development but is also characterized by significant legal and regulatory challenges. According to a U.S. Geological Survey assessment published in 2008, the Arctic including onshore areas may hold 13% of the world's undiscovered conventional oil resources and 30% of its undiscovered conventional natural gas resources. Gas deposits in the Russian Arctic together with oil deposits in the North American Arctic are of particular interest. Two Arctic states are already exploiting hydrocarbon reserves on their northern frontiers. Norway has developed the Snøhvit gas field in the Barents Sea 140 kilometers from shore with a liquefaction plant located near the fishing community-turned-industrial-port of Hammerfest and is shipping liquefied natural gas (LNG) from this field to North America and Europe. Russia has developed plans for an LNG project on the Yamal Peninsula for shipment in an easterly as well as westerly direction and started shipping oil from an offshore terminal in the Pechora Sea to Murmansk and beyond. To develop the huge potential of oil and gas in Eastern Siberia and the Russian Far East, the Putin government is preparing broad development programs. Moreover, Russia's ambitions in the Far East, as exemplified by the decision to hold the 2012 APEC summit in Vladivostok, also involve a rebalancing of Russian oil and gas activities between Europe and the Asia-Pacific region. These shifts in Russia's energy policies may contribute to a substantial increase in Russia's hydrocarbon production in the Far East, thereby adding to global supplies of oil and gas. The availability of Russian Arctic oil and gas could provide North Pacific countries with alternative sources of these fuels, thereby increasing their energy security.

Current increases in the production of natural gas in other areas may make Arctic gas development especially challenging. The Arctic is rich in natural gas, but the costs of producing and shipping Arctic gas are high. Natural gas consumers live far from the Arctic, and transportation costs of natural gas are higher than those for oil and natural gas liquids. Along with economic challenges, environmental stewardship and regulatory concerns may affect timelines for exploration and production of Arctic resources. Environmental issues include the preservation of animal and plant species unique to the Arctic, particularly tundra vegetation, caribou, polar bears, seals, whales, and other sea life. Questions regarding the adequacy of existing technology to manage offshore oil spills in an Arctic environment constitute another unique challenge. Spills among ice floes can be much more difficult to contain and clean up than spills in open waters.

There are substantial uncertainties and knowledge gaps regarding the nature of environmental change, the geological potential of the Arctic, environmental baselines, and methods for dealing with the risks associated with significant Arctic industrial activities. Governments, research institutes, indigenous peoples' organizations, non-governmental organizations, and businesses can all contribute to closing these gaps, helping to reduce risks and ensuring that development takes place within sensible, well-defined, and ecologically appropriate limits. The environmental consequences of disasters in the Arctic are likely to be worse than in other regions. The challenges of Arctic development demand coordinated responses that are transparent and accord with best practices across the North. These frameworks need to be in place to enable sustainable development to occur and to protect the public interest. If the maritime Arctic is to be developed safely, greater attention to detail is needed. International cooperation, better science, and knowledge of the local environment together with investment in appropriate infrastructure will be essential.

A matter now rising rapidly on the Arctic policy agenda focuses on finding ways to take into account the concerns and contributions of non-Arctic states that have a legitimate interest in Arctic developments, without impinging on the role of the Arctic states or distorting the cooperative efforts of existing arrangements like the Arctic Council. The essential puzzle here is easy to identify but difficult to solve. The key Arctic states—acting either as members of the Arctic Council or as members of the group of five Arctic coastal states—wish to maintain a position of preeminence when it comes to dealing with matters of Arctic Ocean governance. For their part, major non-Arctic states (e.g. Brazil, China, India, Japan, and Korea as well as a number of European states) and intergovernmental bodies (e.g. the European Union) have growing interests in the maritime Arctic relating to activities like commercial shipping, oil and gas development, fishing, and ship-based tourism; they believe that they have a legitimate claim to be consulted when it comes to addressing matters relating to the governance of such activities. The trick is to find a way forward that satisfies the interests of both groups. The transformative changes now occurring in the Arctic lend an air of urgency to this matter. Issues of governance relating to the maritime Arctic are evolving rapidly. It is not sufficient simply to adopt a watching brief regarding this matter with the idea that there will be ample opportunity to come to terms with the substance of these issues at some later time.

This volume addresses five major themes relating to the maritime Arctic: potential Arctic shipping, Arctic marine environmental protection, Arctic marine living resources, potential Arctic oil and gas development, and informal governance mechanisms. The individual chapters highlight the environmental and social aspects of developments occurring in the Arctic. They focus on identifying uncertainties, closing gaps in knowledge, and exploring policy innovations relating to Arctic marine issues. The thrust of the volume is to explore options for promoting informal consultation among North Pacific Rim states and mechanisms for communicating ideas to the Arctic Council and other international bodies addressing Arctic issues. Bringing together prominent Arctic experts from the three North Pacific Arctic countries (Canada, Russia, and the US) and three leading North Pacific non-Arctic countries (China, Japan, and Korea), the volume goes beyond generalities and gets down to the details of major concerns in an effort to identify practical solutions to Arctic issues and move them from paper to practice.

Part I contains a chapter and seven comments on potential Arctic shipping. Part II consists of a chapter and four commentaries on Arctic marine environmental protection and the role of the IMO in promoting international cooperation in this realm. The chapter and four commentaries in Part III deal with Arctic marine living resources. The chapter and four commentaries in Part IV address potential Arctic oil and gas development. Part V consists of a chapter and six commentaries on the issue of providing a voice for non-Arctic states in Arctic Ocean governance, while acknowledging the primacy of the Arctic states in this realm.

PART I. POTENTIAL ARCTIC SHIPPING

In Chapter 2 entitled "Potential Arctic shipping: change, benefit, risk and cooperation," Sung-Woo Lee begins with an assessment of the competitiveness of the Northern Sea Route (NSR) compared with the Suez Canal Route (SCR) and the Trans-Siberian Route (TSR). Based on a quantitative study carried out by the Korea Maritime Institute, he reports that transporting goods from Busan, Korea to Berlin, Germany takes 16 days via the TSR. It takes 18 days via the NSR and 26 days via the SCR to ship goods between Busan and Bremerhaven, Germany. Comparing the NSR with transcontinental rail, the author notes that rail is the shortest route to connect Europe and Asia, at least for container cargoes. He points out that the competitiveness of the TSR is sensitive to rail fare increases and that for many reasons the capacity of the TSR will remain low.

Chapter 2 argues that the TSR's over-land route could complement the NSR because the service areas of the railway do not overlap with those of the NSR. Moreover, the TSR presently faces a capacity limitation estimated at 1 million twenty-foot equivalent units (TEUs) annually. The NSR offers a saving in distance of approximately 40%—and thus potentially also in time and expenses—in comparison to the route through the Suez Canal in shipping containerized freight between Northeast Asia and Northwest Europe. But its economic competitiveness depends on Russian tariff policies and on the progressive lifting of technical constraints on navigation.

Turning to the main obstacles and risks associated with the use of the NSR as a global trade route, the chapter identifies six concerns: the fee system for icebreaking, cargo imbalances between East Asia and the European Union, lack of necessary infrastructure, the need for an NSR information database, the importance of unified rules and regulations, and the challenge of developing adequate environmental and safety measures.

The author addresses ways to alleviate these obstacles to commercializing the NSR. He starts by arguing that China, Japan, Korea, and Russia should discuss and decide on an appropriate fee structure for the use of the NSR. To mitigate the imbalance between eastbound and westbound cargoes traveling between East Asia and the EU, he explores the potential of cargoes including iron, steel, organic chemicals, and oil and gas in the Russian Arctic and the development of industrial parks in undeveloped regions like the Russian Far East, nearby the NSR.

To enhance safety in sailing the NSR, which covers 2,200~2,900 nautical miles through dangerous waters, the author discusses the need for supporting services. These include mid-point fueling and maintenance and repair services. In addition, there is a need to solve the problem of unbalanced shipping trade flow resulting from loading and unloading frequently in relay ports. To solve this problem, Lee argues that Russia should construct new relay ports at the mid-point, while improving and maintaining current facilities. He stresses that a modern shipping management system dealing with weather forecasts, navigation information, waterway status reports, and port operations and supporting information is essential for safe and efficient shipping operations. In this connection, the Arctic coastal states should be prepared to respond to maritime emergencies ranging from search and rescue to accidents at sea causing oil spills. Lee observes that an agreement between Russia and the US on traffic separation and monitoring in the Bering Strait will be an important step in addressing matters of safety and security in the Arctic.

Due to variation in the rules developed by Arctic states and key non-Arctic states, Lee argues that the use of the NSR will require multilateral cooperation. An unofficial forum like that provided by the annual North Pacific Arctic Conference (NPAC) may play a role in facilitating informal consultation on such matters. The next step will involve creating a governmental framework to discuss sensitive political issues. Lee proposes that an NSR information platform should be launched through cooperation among North Pacific countries. He concludes by offering some suggestions to facilitate the opening of the NSR; he proposes starting with an increase in intra-Arctic traffic followed by the growth of destinational traffic and eventually the development of through traffic using the NSR.

In his commentary on Chapter 2, Lawson W. Brigham raises questions about the economic viability of the NSR compared with the SCR. He says that a fundamental question is whether the NSR can compete successfully for container traffic if it is usable only on a seasonal basis. If icebreakers must escort large container ships through thick ice for more than 2000 nautical miles, he wonders whether the resulting ship speeds would be high enough to make up for the savings in distance compared with the Suez Canal Route. He believes that more robust economic analyses of the NSR's viability are necessary, taking into consideration a complex of variables such as ice conditions, ship speeds, navigation season lengths, ice-class ship requirements, insurance requirements, operational fees for icebreaking, and ice pilotage among others.

Brigham foresees a role for the NSR in coming years in facilitating the transport of natural resources out of the Russian Arctic during extended summer navigation seasons. He expects that the Russian government will focus NSR infrastructure investments primarily on ensuring the flow of natural resources from the Russian Arctic to global markets. The government will then attempt to capitalize on any container traffic for return voyages from the Pacific to Russia and Northern Europe.

Brigham congratulates the author of Chapter 2 on detailed analysis of the six main obstacles and risks associated with the use of the NSR. As practical challenges to the use of the NSR, he points to the ongoing work of the IMO on developing mandatory regulatory measures that would include three key elements: polar ship construction standards, polar marine safety equipment, and ice navigator training requirements and enhanced polar expertise in the pilothouse. He supports Lee's recommendation regarding enhancing international cooperation to meet these challenges. In particular, bilateral cooperation will be timely for the Bering Strait region where the US and Russia have contiguous Exclusive Economic Zones (EEZs).

In her commentary on potential Arctic shipping, Udloriak Hanson emphasizes that the Inuit are Arctic sea-oriented indigenous people. Some 160,000 Inuit live in the Arctic spread across Greenland, Canada, Alaska (USA), and Chukotka (Russia). The sea ice is a natural highway for Inuit. Life in the Arctic is dependent on movement, and sea ice provides the means for movement. Hanson identifies eight issues that Canadian Inuit will consider in thinking about the expansion of Arctic shipping. The first is that what happens in Arctic marine shipping will happen in their backyard. The second is that the Inuit have not been demographically displaced and constitute a large majority of the permanent population in much of the Arctic. The Inuit continue to sustain and safeguard the condition of their ancestral homeland. The third is that the Inuit have fundamental rights under international law in relation to the authorization of resource development and other commercial activities occurring in traditional indigenous homelands. The fourth is that the rights of Canadian Inuit are rooted in Canadian constitutional law. The fifth is that acknowledgement of the status of indigenous peoples' organizations as permanent participants in the Arctic Council constitutes a positive development. The sixth is that Inuit participation in developing logistics for Arctic shipping is essential to avoid barriers to the growth of commercial shipping. The seventh is that the Inuit seek a balanced, responsible, and diversified approach to increased shipping in the Arctic. The Inuit want negative impacts reduced and potential benefits maximized. The eighth consideration is that an optimistic scenario for Arctic development depends on forging a creative and in-depth partnership between the Inuit and other stakeholders.

Commenting on Chapter 2, Vladimir Mikhaylichenko presents data pertaining to current shipping along the NSR and provides interesting information regarding adjustments in Russian policies toward a more favorable fee structure associated with icebreaking and other services. This is an indication that Russia intends to develop the NSR in the near future. He treats Arctic navigation in 2011 as a preparatory phase for commercialization of the Northern Sea Route. Based on data from the NSR Administration, he estimates the total amount of cargo shipped along the NSR in 2011 to be more than 3 million tons, compared with about 2 million tons in 2010. In 2010, 10 ships transited the NSR, a number that jumped to 41 in 2011. The amount of transit cargo also grew dramatically, rising from 145 thousand tons in 2010 to 835 thousand tons in 2011, the largest amount in the history of transit shipping on the NSR. In 2011, the largest tanker in NSR history, Vladimir Tikhonov, transited the entire sea route. In summer 2011, the tanker Palva transited the NSR in 6.5 days, the shortest time ever. Thus, 2011 produced a breakthrough from the previous occasional and experimental shipping to stable commercial operation of the NSR.

Regarding the economic comparison between the NSR and the SCR for shipping Russian natural resource cargoes from the Russian Arctic to East Asian destinations, Mikhaylichenko estimates that the 10 day time saving resulting from using the NSR may reduce the ship owners' expenses by $250,000-$900,000 per voyage. A serious problem affecting the economic attraction of the NSR, however, lies in the lack of return cargoes from East Asia to the Russian Arctic or Europe. To prove the economic effectiveness of the NSR, Russia has been searching for return cargoes, such as exports from the Red Dog Mine in Alaska.

Mikhaylichenko provides insightful information regarding Russian initiatives designed to insure that the NSR is economically competitive with the SCR by adjusting fees for icebreaking and other services. This is an indication that Russia intends to develop the NSR in the near future. Russia has already taken major decisions to modernize the NSR infrastructure to reduce safety risks, to simplify administrative procedures, and to streamline the tariffs for services on the NSR. Mikhaylichenko reports that currently there are nine icebreakers working on the NSR, among them five are nuclear-powered and four are diesel-electric. To replace two decommissioned nuclear icebreakers and to meet the demand for icebreaker escorts on the NSR, Russia will build three new nuclear icebreakers. The first new generation nuclear-powered icebreaker is expected to enter into service in 2017; two sister ships are scheduled for delivery by 2020.

Russia is now updating the law on navigation along the NSR; the state Duma has completed the first reading of the new law. The adoption of the new law will establish central government management of the NSR in order to assure conditions for safe navigation and to provide equal access to the NSR to all carriers including foreign carriers. The Administration of the Northern Sea Route will be located within the Ministry of Transportation, a federal government agency, which will replace the existing Department of Rosmorrechflot and significantly raise the status of the administration. The new law on the NSR will also make rules governing navigation simple and understandable to all ship owners including foreigners. Starting from this year, an application for permission to sail in the NSR will be simplified by posting the application form on the website of the Russian Agency of Sea and River Transport. According to Mikhaylichenko, Russia is also streamlining the tariffs for services on the NSR. In June 2012, unified limits on tariffs for icebreaker escorts were introduced. To assure the economic competitiveness of the NSR, Russia is seeking to keep the tariff for icebreaker services on the NSR equal to or even 10~15% below the tariff for using the SCR.

In his commentary on Chapter 2, Jerome Verny argues that the shortest distance between the industrial clusters in Northeast Asia and the European consumer market is by intermodal transportation using the NSR and the TSR. He finds that the cost for shipping one TEU between Shanghai and Rotterdam is more expensive via the NSR than the SCR. According to Verny, the NSR will become economically competitive compared to the SCR if it is linked to geography. The new geography of freight flows depends on the relocation of industrial clusters toward Central and Eastern Europe and toward Western China. This new economic geography can explain the renewal of interest in the NSR and the TSR. Verny argues that the development of the NSR could depend on the viability of the TSR; the prospective link between the NSR and the TSR requires further analysis. Verny proposes an intermodal transportation system including links between the NSR and the TSR at two Russian Arctic ports, Murmansk and Indigirka.

Commenting on Chapter 2, Xu Hua provides a quantitative model for traffic on the NSR, indicating that timing is the critical factor with regard to container traffic. For the foreseeable future, a very short Arctic shipping season from late summer until early fall is likely. If everything is lined up—ice is in the right place and ships are available for breaking the ice—we might see some progress. He notes three major determinants: icebreaking fees, sea ice extent, and bunker fuel price. He uses these to evaluate different strategies under three distinct conditions. He describes his cost model and compares the SCR and the NSR using this model.

He develops a route optimization model with equations. Then, he finds minimum August through October costs for the NSR and the SCR. Because of the seasonal fluctuation of the sea ice extent, the distance of the ice legs can vary substantially. The bunker fuel price and the ice breaking fee also influence the result. If the ice breaking fee is higher, a ship is more likely to remain on the SCR. However, the effect of the price of bunker fuel is less important.

In his commentary on Chapter 2, Ryuichi Shibasaki reports that the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) of Japan organized an internal Arctic study meeting on August 3, 2012 including representatives from the Maritime Bureau, the Ports and Harbors Bureau, the Hokkaido Bureau, the Coast Guard, and the Meteorological Agency. According to Shibasaki, the meeting concluded that since Japan is located at the eastern extremity of the Far East, the NSR would reduce distances from Japan to northern Europe; there is also potential for a Japanese port to serve as a gateway for Arctic shipping.

In commenting on Chapter 2, Seo Hang Lee argues that Korea is one of the key stakeholders in Arctic shipping. Korea is interested in the NSR as an efficient potential maritime transportation route because Korea depends on commercial shipping for the vast majority of its exports and imports. Furthermore, as one of the world's leading shipbuilders, Korea is interested in building icebreakers, drill ships, and other vessels which can operate safely in the exploration and development of Arctic resources. Lee argues that the most urgent task facing all those interested in facilitating the commercialization of Arctic shipping is how to cope with a number of obstacles and challenges outlined in Chapter 2. He suggests that all stakeholders, including not only Arctic but also non-Arctic states and relevant international organizations, should be included in efforts to address these issues.

PART II. THE IMO AND ARCTIC MARINE ENVIRONMENTAL PROTECTION

In Chapter 3, entitled "The IMO and Arctic marine environmental protection: tangled currents, sea of challenges," David VanderZwaag reflects on existing IMO standards and guidelines and explores options for the future. He begins by highlighting many shortcomings regarding Arctic matters. First, VanderZwaag argues that the existing array of IMO standards and guidelines applicable to the Arctic has failed to keep pace with protective measures for the Antarctic. Second, he indicates that the existing IMO standards and guidelines are weak regarding matters of sewage discharges from cruise ships and polar seafarer training. For example, MARPOL Annex IV sets weak discharge standards for sewage. This annex allows raw sewage to be discharged at a distance of more than 12 nautical miles from the nearest land and does not cover grey water from showers, laundries, and galleys. Third, there is no designation of Emission Control Areas for air pollution in the Arctic. Fourth, no Particularly Sensitive Sea Areas (PSSAs) have been designated in the Arctic. Fifth, VanderZwaag notes that vessel-routing is very limited in Arctic waters. Finally, he points out that the existing Polar Shipping Guidelines focus almost entirely on maritime safety rather than environmental protection.

On the positive side regarding IMO standards and guidelines, VanderZwaag mentions that a strengthening of environmental standards has occurred involving amendments to Annex IV adopted in July 2011 (entry into force to occur on January 1, 2013) and Annex V on discharges of garbage adopted in 2011 (entry into force to occur on January 1 2013). The drafting of a mandatory Polar Code for shipping is continuing, albeit with some uncertainties.

Turning to the "Sea of challenges," Chapter 3 explores ten challenges confronting the governance of Arctic shipping. The first challenge is to reach agreement on a mandatory Polar Code. All sections of the draft code are still under discussion and numerous issues remain to be resolved including the best way to "legalize" the code. The second challenge is to decide whether to ban the use or carriage of heavy fuel oil (HFO) on ships operating in the Arctic. The third challenge is to address black carbon and greenhouse gas (GHG) emissions from ships. Black carbon emitted from ships as a result of incomplete combustion of diesel fuel is a growing concern because of its climate warming potential (estimated to cause some 680 times more warming than the same amount of CO_2 over 100 years).

The fourth challenge is to deal with noise associated with commercial shipping. Addressing noise from commercial shipping and its adverse impacts on marine life is a work in progress within the IMO. The fifth challenge is to ensure full ratification of all relevant IMO agreements. The sixth challenge is to promote effective implementation of negotiated commitments under IMO, with special attention to the implementation of the Ballast Water Convention. VanderZwaag regards this task as one of the biggest looming challenges. He argues that the phase-in of ballast water management systems (BWMS) by 2016 on various ships seems especially problematic with key constraints including costs, limited shipyard capacity, and insufficient manufacturing capabilities on BWMS installations. The seventh challenge is to sort out the roles of IMO and the Arctic coastal states in protecting the marine environment from shipping impacts.

The eighth challenge is to identify and take protective measures covering ecologically and culturally sensitive areas. The ninth challenge is to improve Arctic infrastructure in support of safe and environmentally friendly shipping. Since infrastructure improvements in such areas as navigational charts, aids to navigation, communication systems, port services, and waste reception facilities are primarily coastal state responsibilities, a looming challenge is to understand and track national initiatives to strengthen shipping infrastructure. VanderZwaag notes that part of the infrastructure challenge involves the need to develop clear national policies regarding future Arctic shipping and related infrastructure. The tenth challenge is to understand and address the interests/impacts of the actions of non-Arctic states on future Arctic shipping.

In commenting on "Arctic Marine Environmental Protection" from a scientific perspective, Thomas Laughlin focuses on the impacts of shipping on social/culture uses of the Bering Strait region. Based on the outcomes of the Arctic Marine Ecosystem-Based Management Project, he identifies Saint Lawrence Island, the Bering Strait, and Wrangel Island as "Super" Ecologically or Biologically Significant Areas (EBSAs). He discusses measures to protect EBSAs, such as communications/outreach measures, designation of Particularly Sensitive Sea Areas (PSSAs) by IMO, bilateral approaches featuring American and Russian actions in the Bering Strait, and the development of the mandatory Polar Code. Laughlin concludes his commentary with a suggestion regarding contributions by the North Pacific states. To ensure a safe and environmentally sound Arctic marine transportation system, he suggests that the North Pacific states strongly support development and adoption of the mandatory Polar Code, support designation of protected areas through international instruments, contribute to the installation of search and rescue and navigation services, and explore appropriate cost-sharing arrangements to fund ice breaking vessels with firefighting and spill response capacity.

Udloriak Hanson presents an Inuit perspective on Arctic environmental protection. When Arctic governments and international Arctic bodies pursue collaboration on the contents of the Polar Code, Hanson advocates the development of a creative partnership with indigenous peoples. The negotiations can benefit from indigenous peoples' traditional knowledge and skills. Hanson urges those who are working on Arctic marine issues to acknowledge the value of the indigenous "Resource Development Declaration" not only as a careful, balanced, and equitable contribution to the building of a positive international order in the Arctic, but also as an appropriate benchmark of contemporary Inuit positions and expectations. This declaration addresses seven broad areas: Inuit as Partners in Policy Making and Decision Making; Global Environmental Security; Healthy Communities in a Healthy Environment; Economic Self-Sufficiency and the Sustainable Development of Resources in Inuit Nunaat; Impact Assessment and Mitigation; Improving Inuit Living Standards and Expanding Inuit Governance, and Promoting and Accommodating a Dynamic Inuit Culture.

Commenting on VanderZwaag's chapter, Toshiyuki Kano points out that if the research and monitoring data on Arctic environmental protection are available to Arctic stakeholders, they can close the knowledge gap regarding Arctic environmental protection. He adds that non-Arctic countries such as China, Japan, and Korea should play a role in ensuring Arctic environmental protection because they are major potential users of Arctic marine resources. Kano argues that the comparative advantage of the NSR versus the SCR should be evaluated not only from the perspective of distance and time savings but also from an environmental conservation perspective. Drawing on previous Japanese research results, he shows that the energy efficiency of an ice-capable ship is inferior to that of conventional ships in the open sea as well as in Arctic waters. Therefore, decreases in GHG emissions resulting from the time and distance saving should be compared with increases in GHG emissions due to the lower energy efficiency of ice- capable ships. Kano then mentions Japanese concerns about the environmental safety of nuclear icebreakers in the Northern Sea Route arising from the traumatic experience of the Fukushima nuclear disaster. He concludes his commentary by introducing the IMO E-navigation system developed to achieve increased safety in navigation along the Northern Sea Route, thereby enhancing Arctic environmental protection.

Hyun-Kyo Seo provides the Korean perspective on "Tangled Currents, Sea of Challenges." Seo recommends that the Korean government and industry recognize the importance of sustainability in the polar regions by supporting the Polar Code. He adds that Korea fully complies with international standards in the operation of its infrastructure. Regarding the issue of heavy fuel oil (HFO), he observes that Araon, Korea's icebreaking research vessel, and the King Sejong station, Korea's research station in Antarctica, are presently using marine gas oil (MGO). Korea supports the Search and Rescue (SAR) agreement in the Arctic. Seo reports that Araon was involved in SAR activities in the Antarctic, rescuing 31 crew members from the Sparta, a Russian fishing vessel trapped in thick sea ice in the Ross Sea in December 2011. To strengthen environmental protection in the Arctic, Seo proposes promoting international cooperation in scientific research on the part of Arctic and non-Arctic countries.

PART III. ARCTIC MARINE LIVING RESOURCES

In Chapter 4, David Fluharty focuses on "Arctic marine living resources." He considers the use and management of living marine resources in the Arctic at present and in the future. He raises issues concerning human uses of species and ecosystems under conditions of significant climate change. In the process, he discusses the roles of the Arctic coastal states and other interested parties in managing living marine resources.

Fluharty begins with an account of existing Arctic fisheries and management regimes. As documented by the Arctic Climate Impact Assessment (ACIA), large-scale commercial fisheries exist in four Arctic continental shelf ecosystems: the Northeast Atlantic (Barents and Norwegian Seas), the Central North Atlantic (Iceland and East Greenland), Northeast Canada (Newfoundland and Labrador Seas), and the North Pacific (the Bering Sea). Fluharty notes that the Central Arctic Ocean currently has no commercial fisheries. But this area sustains significant subsistence fisheries and could become an area of interest to commercial fishers in the future. He adds that there are smaller, non-commercial subsistence fisheries in Canada, Greenland, Norway, Russia, and the United States that are important to indigenous communities in the Arctic.

Fluharty then reviews how existing Arctic fisheries are managed. Indigenous peoples currently manage the subsistence fisheries on a relatively independent basis. The coastal states manage the fishery resources located within their EEZs in accord with the provisions of the UN Convention on the Law of the Sea, the UN Food and Agriculture Organization's code of conduct, and various regional regimes (e.g. the Norwegian-Russian bilateral regime for the Barents Sea). In the North Atlantic, according to Fluharty, management arrangements include the FAO's National Aquaculture Sector Overview (NASO), the Northeast Atlantic Fisheries Commission (NEAFC), the Northwest Atlantic Fisheries Organization (NAFO), and the North Atlantic Salmon Conservation Organization (NASCO). The International Council for Exploration of the Seas (ICES) conducts scientific research pertaining to the NEAFC area and provides scientific advice to the North Atlantic governments. In the North Pacific, the Bering Sea ecosystem includes resources located within the jurisdiction of the United States and Russia as well as in international waters in the Central Bering Sea. A six-nation agreement signed in 1994 establishes a regime for the Pollock stocks of this so-called "donut hole" area.

Fluharty reviews and assesses management arrangements for living marine resources, including seabirds, marine mammals, and marine biodiversity. Seabirds are an important component of Arctic and sub-Arctic ecosystems. Because of the extreme seasonality of the Arctic, most seabirds migrate northward in the spring and southward in the fall, so managing seabirds requires measures applicable to vast flyways. Although seabirds are managed by nations within their own jurisdictions, some bilateral and multilateral treaties deal with migratory birds. Now, the Convention on Biological Diversity provides a global overarching framework for migratory bird management. In North America, Canada, Mexico, and the United States cooperate in managing the entire Pacific Flyway. There are bilateral agreements between Japan and Russia, Russia and Korea, the US and Japan, and the US and Korea covering the Asia-Pacific Flyway.

Arctic marine mammals include seals (three species year round and four seasonal), whales (three species year round and five seasonal), and polar bears. National governments are responsible for the management of seals. Whales are managed under the provisions of the International Convention on the Regulation of Whaling. The governments of the Arctic coastal states manage polar bears under the 1973 Agreement on the Conservation of Polar Bears. Polar bears are also subject to bilateral agreements between the United States and Canada and the United States and Russia. Regarding marine ecosystem biodiversity, Fluharty reports that the Arctic will be gaining species, and ecosystems will be adjusting to these new circumstances in contrast to the projected losses of biodiversity in most other regional systems. Finally, Fluharty reviews the prospects for international cooperation to protect potential fisheries from possible negative externalities generated by shipping, oil and gas development, and tourism. He suggests that scientific cooperation may be the most effective way forward. With respect to the development of scientific understanding, North Pacific rim states have invested significant resources in efforts to understand changes in the abundance of walleye Pollock in the "donut hole" area in the central Bering Sea. North Pacific rim nations are also members of the North Pacific Marine Science Organization (PICES). Fluharty remarks that the formation of PICES led to a significant focus on North Pacific ecosystem research. Joint efforts among PICES scientists and their ICES counterparts have led to a growth in attention devoted to Arctic systems.

In his commentary on Chapter 4, Alf Håkon Hoel reviews the status of fisheries in the Arctic. Commercial fisheries are concentrated in the Subarctic seas surrounding the Arctic Ocean, including the Bering Sea and the Aleutian Islands, the Northwest Atlantic between Canada and Greenland, the waters around Greenland and Iceland, the Norwegian Sea, and the Barents Sea. There are virtually no commercial fisheries in the Central Arctic Ocean. Some of the world's largest commercial fisheries (e.g. Alaska walleye Pollock, North Atlantic cod, and Norwegian Sea herring fisheries) are located in these seas. Other important species include redfish, saithe, haddock, crab, shrimp, and shellfish as well as a number of marine mammal species. Aquaculture in Norway produces more fish than capture fisheries.

Hoel then points out that the Subarctic commercial fisheries are well managed through a regime complex including global, regional, and national components. At the global level, the legal foundation for fisheries management is the 1982 United Nations Convention on the Law of the Sea supplemented by the 1995 UN Fish Stocks Agreement, global instruments on fishery management adopted by the UN Food and Agriculture Organization, and the 2009 Port State Agreement. Arctic coastal states (Russia, the US, Canada, Denmark/Greenland/Faroe Islands, Iceland, and Norway) implement these arrangements, except in relatively small high seas areas. The transboundary fisheries shared by two or three countries are managed through bilateral or trilateral arrangements, such as the Norway-Russia bilateral fisheries commission.

Hoel explains that fisheries located in the high seas are regulated by regional fisheries management organizations, such as the Northeast Atlantic Fisheries Commission, the North Atlantic Salmon Conservation Organization (NASCO), the North Atlantic Marine Mammals Commission (NAMMCO), the Northwest Atlantic Fisheries Organization (NAFO), and the agreement covering the "donut hole" in the Bering Sea. He argues that further development of management regimes requires adoption of an ecosystem approach to living marine resources in the Central Arctic Ocean. The International Council for the Exploration of the Seas (ICES) and other scientific fora such as the North Pacific Marine Science Organization (PICES) will play critical roles in the future of Arctic living marine resources management. He also conjectures that the growing importance of aquaculture and marine bio-prospecting will characterize the future of Arctic living marine resources management. He concludes that the success of fisheries management involves three functions—research, regulation, and enforcement—and that these functions are well institutionalized in the Arctic coastal states.

In the Arctic, marine ecosystems are subject to large natural variability and the impacts of anthropogenic actions affecting plankton, fish, and marine mammals. In his commentary on Chapter 4, Trevor Taylor uses the case of the Bering Sea "donut hole" to remind us of the effects of unregulated fishing in international waters. The 1994 agreement was signed by the two coastal states (Russia and the US) and the four distant-water fishing states (China, Japan, Korea, and Poland) to ensure the long-term sustainability of the Pollock fishery only after the occurrence of severe stock depletions. Taylor argues that unless a solution is found for potential Arctic fisheries at this stage, a similar pattern of overfishing and stock depletions is likely to occur. The first step is to gather the information required to determine if and under what circumstances commercial fisheries in Arctic waters are possible. The next step is to establish an appropriate Arctic fisheries management regime. The engagement of Inuit in Arctic fisheries management should be acknowledged as an important principle.

Commenting on Chapter 4, Zhou Ying Qi makes the point that the destruction of any ring of the ecosystem may lead to a collapse of the entire system. Zhou supports the adoption of a precautionary approach for the Central Arctic Ocean, including a moratorium on commercial fisheries until we have a better understanding of the relevant ecosystems. He supports the establishment of a new Regional Fisheries Management Organization (RFMO) for the Arctic Ocean. He remarks that lessons we have learned from the Bering Sea "donut hole" include the need to establish a strong regulatory framework before commercial fisheries get underway.

Zhou reports that in July 2010, the Chinese scientific research icebreaker Xue Long conducted her fourth Arctic survey and research expedition focusing on the effects of rapid changes in the Arctic.[2] Based on the scientific results of this expedition, Zhou argues that noise produced by ships and engineering activities have already caused a certain degree of harm to marine animals and aquatic organisms, including fish, whales and other marine mammals, in the Arctic. He adds that noise might drive fish stocks away from their normal migration routes or habitats. He suggests that additional research on Arctic marine living resources should be conducted on the basis of international cooperation.

In his commentary on Chapter 4, Jong Deog Kim observes that the three Northeast Asian countries have major interests in Arctic fisheries and a substantial capacity to engage in research in this field. China, Japan, and Korea have conducted scientific research and exchanged data on the Pollock resources of the Bering Sea. Beyond this, Chinese and Korean icebreakers have the capacity to conduct scientific research in the Arctic. The Korean government is interested in facilitating greater cooperation in managing the living resources of the Arctic. Kim notes that Arctic fisheries could become important for Korea's seafood security in the future.

PART IV. POTENTIAL ARCTIC OIL AND GAS DEVELOPMENT

In Chapter 5, entitled "Potential Arctic oil and gas development: what are realistic expectations," Arild Moe explores the outlook for development of Arctic energy resources in Norway and Russia.[4] He considers the key factors determining development pathways, including the resource base, the cost of developing and delivering the resources to markets, the interests and strategies of the owners of the resources, and the merits (both economic and political) of Arctic supplies compared with supplies from other regions. He then turns to public policy responses to these considerations; he addresses the potential for interstate conflicts over offshore energy resources and concludes that there is little to worry about in this regard.

Moe starts by reviewing the Arctic oil and gas resource base. According US Geological Survey estimates published in 2008, the Arctic holds about 30% of the world's undiscovered gas and 13% of the world's undiscovered oil. The largest deposits are located off the coast of Russia. Moe remarks that USGS figures are often misused or misunderstood. The resources referenced are only probabilities, not proven recoverable reserves. Although the estimates are based on scientific principles, the actual location of the resources is not known. Some areas are more probable than others. For oil, the area north of Alaska is most probable. For gas, the Barents and Kara Seas are most likely. But most of the offshore Arctic has not been drilled. Thus, while the hydrocarbon resource base in the offshore Arctic is expected to be huge, the resources remain undiscovered. This means that extensive exploration must be carried out to determine exactly where these resources are located and to calculate the cost of developing them. This is a process that will take many years and involve sizable investments.

Moe then notes that Arctic offshore energy resources are expected to be located on the continental shelves of the Arctic coastal states in areas under their jurisdiction. There are just a few jurisdictional disputes in the Arctic, and they are not likely to cause serious conflict. Although the settlement of outer boundaries of jurisdiction over the continental shelves is controversial, this issue has little significance for resource exploitation. Most oil and gas deposits are not located in disputed areas, and disagreements regarding outer continental shelf boundary delimitation can be contained without conflict.

Turning to the cost of developing and delivering resources to markets, Moe stresses that development of Arctic oil and gas will be costly and time consuming. Even if the resource base is large, there are still questions regarding how much of it is exploitable. Development costs and market prices are key factors. As long as market prices remain high, the development of Arctic gas will be feasible. Moe notes that the world market price for oil has been high enough to justify Arctic oil development. But world liquid fuel supplies are quite large, and the market price for oil depends on what happens in the world economy. Gas markets have changed within the past few years due to the shale gas revolution, and this has raised doubts about the prospects for Arctic gas development. Moe points out that dramatic improvements in the efficiency of Arctic gas projects will be critical to the development of these resources.

Moe discusses the national strategies of Russia and Norway regarding offshore oil and gas development in the Arctic. Russia is the most important player with the largest continental shelf and the largest potential gas reserves. Moe explains the importance of issues pertaining to the Shtokman gas field. Although this field is one of the largest offshore gas fields in the world, with reserves of 3,800 billion cubic meters (bcm), the final decision to develop the field has been delayed several times due to declining international gas prices. In parallel with Shtokman, the Yamal project, a new Russian LNG project, is expected to begin production in 2016 and increase to 16 million tons per year. A final investment decision is expected at the end of 2012. The production of Yamal natural gas may be of interest to North Pacific consumers. Part of the development plan for Yamal gas envisions shipping LNG both westward and eastward using the Northern Sea Route in order to reach the most favourable markets. Still, the economics of transportation using the Northern Sea Route to reach Asian markets remain uncertain.

Moe asserts that actual oil and gas development in the Russian Arctic has failed to match declared policies. Recently, the government has supported the initiatives of Russian companies to enter into cooperative agreements with foreign companies. In April 2012, following the agreement between Russia and Norway regarding their maritime boundary, Rosneft and ExxonMobil established a partnership to develop the untapped oil and gas reserves of the Russian Arctic. Shortly thereafter, Rosneft signed Arctic agreements with Italy's Eni and Norway's Statoil to explore offshore resources. Despite the major breakthroughs in 2012, Moe believes it is still too early to tell whether the Russian Arctic continental shelf will become a major arena for the international energy industry in the next ten years. On other hand, Moe remarks that oil from the Norwegian and Russian Arctic is likely to be sold freely on the international market. If the use of the Northern Sea Route to transport oil becomes economically feasible, this route is likely to emerge as a new supply corridor to the North Pacific. Recently, several tankers carrying gas condensate have sailed from west to east along the NSR.

Moe emphasizes that onshore oil and gas production in the Russian Arctic is another matter. Some 12-15 million tons are shipped westward each year from the terminal near Varandey in the northeastern part of European Russia. If prices are favourable, these resources could be shipped eastward as well. He also notes that oil from the huge Vankor field in Northeast Siberia, which was originally intended for shipment by sea, has been connected to the trunk pipeline system instead. This field is the primary source of Russian oil exported to China and will contribute to filling up the Eastern Siberia-Pacific Oil Pipeline (ESPO). The development of this pipeline is itself a reflection of the growing importance of production in Eastern Siberia and the resultant determination to reach Asian markets.

Moe also discusses the demand side of Arctic oil and gas development.

China, Japan, and Korea are large consumers of energy and want to diversify their sources of supply. This makes the Arctic attractive. But other sources of LNG for these countries are emerging, including Australia and North America, making supply options look better than a few years ago. The Russian Far East outside the Arctic also has potential, and Russia is eager to develop this area. In the longer term, transportation is a key issue. Stability will be essential to make the NSR an attractive option. The shipment of Russian LNG to North Pacific markets is possible, though the economics remain uncertain. Meanwhile, other sources of supply for consumers in the North Pacific are emerging.

Finally, Moe notes that the Asia-Pacific region is becoming more important in Russia's energy strategy both as a means of diversifying export markets and as a means to support domestic regional development. Major development projects in the Russian Far East are underway with the hope of fulfilling these goals. The additional value for Russia of exports from the Arctic will be marginal since energy from fields in the Far East can serve these markets just as well as Arctic oil and gas. Nevertheless, the Russian goal of maintaining and developing the NSR provides an argument in favour of Arctic projects.

Nodari Simoniya focuses his comments on the implications of Russian oil and gas development in the Arctic, Eastern Siberia, and the Far East for the energy security of Northeast Asia. Simoniya confirms that Russia is concerned about its dependence on western markets for its oil and gas. President Putin has sought to develop markets in China and other Asian countries. Simoniya explains that oil exports from Russia since the opening of the Eastern Siberia-Pacific Oil (ESPO) pipeline have changed the structure of oil supply to the Asia-Pacific region. The second component of ESPO will come on stream by the end of 2012, giving the pipeline an annual capacity of 80 million tons. In 2011, moreover, the Sakhalin-2 project produced exports of 14.5 bcm of gas to the East Asian countries. President Putin has decided to accelerate construction of the Sakhalin-1-Khabarovsk-Vladivostok gas pipeline as well as work on the Kirin Block of the Sakhalin-3 project. Simoniya also notes Russia's efforts to extend the Sakhalin-1-Khabarovsk-Vladivostok pipeline to connect to the Trans-Korean gas pipeline.

Simoniya describes Putin's efforts to develop Eastern Siberian and Far Eastern energy resources and, more generally, to modernize Russia's oil and gas industry as a matter of priority. In 2010, Putin (then Prime Minister of Russia) established the "Far East and Baikal Region Development Fund." He created a "private-state partnership" to replace the system of "bureaucratic capitalism" in an effort to modernize the Russian oil and gas industry. In November 2011, he set up an "Autonomous State Corporation" to develop Eastern Siberia and the Far

East. In May 2012, the Ministry for the Development of the Russian Far East was formed as a federal executive body, responsible for the economic and social development of the Russian Far East. Rosneft has signed a cooperation agreement with this new ministry with the goals of developing infrastructure in the Far East Federal District of Russia, tackling economic and social challenges, and improving the investment climate.

To promote the role of foreign corporations in developing the Russian Arctic shelf, President-elect Putin signed a financial agreement on April 16, 2012 that will eliminate export duties and lower mineral taxes for a minimum of 15 years. Simoniya regards this as a fundamental step in the modernization of the Russian oil and gas industry. ExxonMobil and Rosneft signed an agreement in April 2012 covering Pechora Sea exploration. Shortly thereafter, Rosneft signed Arctic agreements with Italy's Eni and Norway's Statoil to explore offshore resources.

In a second commentary on Chapter 5, Kang Wu outlines the Chinese perspective on Arctic oil and gas development. Wu remarks that China, as the world's largest consumer of energy, faces a huge gap in the supply of oil and gas. Net energy imports have reached unprecedented levels. Wu points out that China has been aggressive in overseas oil and gas acquisitions. As existing overseas investment options are running out, China is looking to the Arctic for new supplies of oil and gas resources. This is one reason why China has taken a growing interest in Arctic affairs.

Wu explains that while Chinese thinking about the Arctic is still evolving, China is pursuing bilateral relationships with individual Arctic countries (e.g. Denmark/Greenland, Iceland). China seeks permanent observer status in the Arctic Council. China has purchased an icebreaker and is building a second of its own. China has established a research station at Ny-Ålesund on Svalbard. China's national oil corporations have been working with Russia's Rosneft.

Yugi Tagki begins his commentary on Chapter 5 by outlining Japan's challenge to innovate following the March 11, 2011 Fukushima disaster. The energy challenge continues to attract the greatest national concern. Japan now faces power shortages. The need is to increase energy supplies, while taking steps to reduce demand. In the long term, the biggest problem stems from likely cuts in nuclear energy. The latest version of the government's Basic Energy Plan addresses the future of nuclear energy, the promotion of renewable energy, the enhancement of energy efficiency, and the development of the best energy mix. Current thinking is to reduce dependence on nuclear power to a level between zero and 25% of the total, below the level of 30% prior to the Fukushima disaster.

Tagaki highlights Japan's dependence on the Middle Eastern oil and gas. The countries of the Persian Gulf are especially crucial because nearly 90% of Japan's crude oil supply comes from these countries. If Japan takes steps to reduce its dependence on nuclear energy, relations with the Persian Gulf countries will become even more important. Last year's earthquake and the recent exchange rate appreciation of the yen have had a large impact on the economy, leading in 2011 to the first trade deficit since 1980. Tagaki then argues that Japan must diversify its energy sources. Australia and Sakhalin in Russia are attractive as stable sources of energy. Whether Arctic oil and gas will become important for Japan is a function of their speed of development and their economic competitiveness. But the allure of the Arctic is strong at a time when Asian powers are eager to diversify energy sources and to find secure sources of oil and gas.

Tagaki concludes that Arctic oil and gas will have to compete with other sources, including LNG from America, Eastern Siberia, or newly discovered sources as well as renewable energy or unconventional sources like wave power. From both a commercial and a geopolitical viewpoint, Arctic oil and gas has major hurdles to overcome to compete effectively with all these other potential sources. Technological developments will play a key role in this realm. The history of energy has been teaching us for decades that the development and application of new technologies play critical roles in shaping global energy markets.

In his commentary on Chapter 5, Yoon Hyung Kim presents the Korean perspective on Arctic oil and gas as a mid-term solution to energy needs. He suggests that we adopt a medium thirty-year time horizon. It takes ten years of preparatory work to bring new fields on stream and twenty years of production to recover development costs. During this time, technological breakthroughs affecting the production and shipping of Arctic oil and gas may occur.

Kim then describes Korea's involvement in Arctic activities. Korea is the world's second largest importer of LNG. The shale gas revolution in the US has been transforming the global primary energy scene. The hydrocarbon era will be extended. The global security of energy supplies will improve. The shale gas revolution makes nuclear and renewable energy for electricity production uncompetitive. The Korean government perceives the sequencing of unconventional gas development as follows: shale gas first followed by coal-bed gas and tight gas and then Arctic gas. Arctic gas now looks more like one of several options rather than the major source of gas. In addition to diversification of supplies, the Arctic may also have another attraction for China, Japan, and Korea: large volumes and long term commitments.

Kim reports that President Lee Myung-bak and Russian President

Dmitry Medvedev agreed in November 2011 to work closely together to push the development of a pipeline to send Russian gas to South Korea via North Korea. Subsequently, a tentative agreement between Kogas and Russia's Gazprom called for construction of a pipeline through North Korea to start in 2013 to be able to supply pipelined natural gas (PNG) of 7.5 mtpa to South Korea in 2017. But a South Korean government source indicated in October 2012 that talks have dragged on because North Korea is demanding a transit fee that is two to three times the normal international rate.

Korea has been active in the Arctic in a number of ways. The Korea Polar Research Institute (KOPRI) opened the DASAN station in Ny-Ålesund in 2002. Korea obtained ad hoc observer status in the Arctic Council in 2008 and constructed its first research icebreaker Araon in 2009. In May 2012, Korea's icebreaker explored Canada's Arctic Ocean to check the seafloor for gas hydrate reserves. In February 2011, Kogas acquired a 20% stake in the Canadian Umiak gas reserve owned by Calgary-based MGM Energy. This investment by Kogas is significant as it is the first Arctic resource investment by a South Korean firm; it may serve as a bridgehead to enable additional investments.

PART V. INFORMAL ARCTIC GOVERNANCE MECHANISMS

In Chapter 6, Oran Young addresses the theme of "Listening to the voices of non-Arctic states in Arctic ocean governance." He focuses on finding ways forward that allow non-Arctic states to have a voice in Arctic affairs, supporting rather than interfering with the work of the Arctic Council. He starts by outlining what he describes as the new Arctic policy agenda arising from the transformative changes now occurring in the circumpolar Arctic. Young then explores two distinct but not mutually exclusive ways to move forward under these new conditions. One strategy centers on the roles that issue-specific international fora (e.g. the International Maritime Organization, the International Arctic Science Committee) can play in addressing specific matters relating to Arctic Ocean governance. The other emphasizes the value of informal mechanisms that can provide a means for effective communication without running into the political difficulties that afflict efforts to devise more formal solutions. Young proposes practical steps that all parties concerned may want to pursue in the near future.

The Arctic has become a focus of global attention as a result of the impacts of climate change and the prospect of new economic activities resulting from increasing accessibility. Marine issues have taken center stage, producing socioeconomic changes of direct interest to the five Arctic coastal states (Canada, Finland, Norway, Russia, and the United States) and indirect interest to the other Arctic states (Iceland, Finland, and Sweden). Many non-Arctic nations (e.g., Brazil, China, India, Japan, Korea, and several European states) as well as the European Union have become interested in the prospect of commercial shipping in the Arctic and in the development of the region's natural resources. Young argues that managed development is now overshadowing sustainable development in the region. Some of the issues arising in the Arctic can be resolved through bilateral agreements (e.g. the Norway-Russia treaty delimiting the Barents Sea boundary between the two nations) and multilateral agreements pertaining to specific areas (e.g. the Barents Euro-Arctic Region). But some issues (e.g. the regulation of commercial shipping) will require broader international agreements involving bodies like the IMO, a United Nations specialized agency responsible for the safety of shipping and the prevention of marine pollution resulting from shipping.

Young argues that Arctic issues are becoming matters of high politics. The Arctic states have issued new Arctic policies; the European Union is in the process of articulating an Arctic policy for its members. A number of high-level conferences have focused on Arctic issues, ranging from the NATO-sponsored Conference on Environmental Security in the Arctic Ocean (2010) to the Newly Emerging Arctic Security Environment gathering (2010) organized at the request of the Canadian Defense & Foreign Affairs Institute. As a result, issues of Arctic governance have become hot topics.

The stance the Arctic states have adopted in response to these developments is not tenable. The view of the five Arctic coastal states, articulated most clearly in the May 2008 Ilulissat Declaration, is that they can be trusted to handle Arctic policy matters in a manner that proves beneficial to the Arctic Ocean as well as to all those interested in the use of Arctic resources. Others should therefore acknowledge their preeminence and leave issues pertaining to Arctic Ocean governance to them. Nevertheless, non-Arctic states have rights and legitimate interests in the Arctic under the terms of the UN Convention on the Law of the Sea (UNCLOS). They also have responsibilities in the Arctic both as sources of environmental change and as signatories to international agreements. Above all, geopolitical shifts make it hard to ignore the concerns of countries like Brazil, China, India, Mexico, and South Africa in the future of the Arctic region.

Membership in the Arctic Council is not negotiable. Many non-Arctic states have applied to become permanent observers in the council. But the benefits of this status are limited. As those states that are already permanent observers (e.g. France, Germany, the UK) regularly make clear, the status of permanent observer in the Arctic Council is highly unsatisfactory from their perspective. Their role in Arctic Council meetings is marginal. Clearly, something else is needed to address the concerns of the non-Arctic states.

Young then turns to potential solutions to the resultant puzzle. He first explores the idea of developing what is known as a "regime complex" for the Arctic Ocean or, in other words, a collection of issue-specific but related arrangements. Regime complexes are collections of non-hierarchically related governance arrangements that deal with various aspects of a recognized issue domain or spatially-defined area, such as international trade, climate change, or Antarctica. In the Arctic, such a complex might include arrangements like the Polar Code for commercial shipping, an Arctic Regional Fisheries Management Organization, procedures designed to minimize the dangers of oil spills arising from offshore energy production, a code of conduct for those engaged in ship-based tourism, and so forth. The Arctic Council could play a central role in such a complex, acting to integrate the elements of the complex on the basis of a framework featuring ecosystem-based management and the idea of stewardship.

A complementary strategy for enhancing Arctic governance focuses on the development of an "informal consultative mechanism" to allow non-Arctic voices to be heard without undermining or detracting from the work of the Arctic Council. Although there is no blueprint for such an arrangement, it is possible to seek guidance from the experiences of: (a) the Working Group on Arctic International Relations, (b) the Standing Committee of Parliamentarians of the Arctic Region, (c) the Commission on Security and Cooperation in Europe, (d) the North Sea Conferences operating within the ambit of the OSPAR Convention, (e) the World Economic Forum and the World Social Forum, and (f) issue-specific caucuses operating on the margins of broader fora like the G20.

As a basis for further discussion, Young proposes the creation of an unofficial Arctic Ocean Forum (AOF). He notes that Arctic Ocean development, including commercial shipping, the extraction of oil and gas, industrial fishing, and ship-based tourism, will move forward in the coming years whether we like it or not. The involvement of non-Arctic states and multinational corporations in this process is essential. The Northern Forum, a body that operates concurrently with the Arctic Council, provides a mechanism for articulating the concerns of subnational units of government (e.g. states, counties, territories, oblasts) and for allowing representatives of these units to interact both with one another and with representatives of national governments. The mission of the AOF would be to serve as an arena in which representatives of Arctic states and non-Arctic states could engage in regular interactions designed to identify emerging issues of mutual concern, frame these issues in a manner conducive to effective policymaking, canvass innovative responses to the issues, and explore the prospects for resolving them in a cooperative manner. The issues considered should involve not only the interests of non-Arctic states in the development of Arctic resources (e.g. the rules governing commercial navigation in the Arctic, the regulations pertaining to oil spill prevention, preparedness, and response) but also the responsibilities of non-Arctic states for actions affecting the well-being of Arctic communities (e.g. the EU ban on the importation of seal products, emissions of black carbon soot).

The North Pacific Arctic Conferences (NPAC) taking place at the East-West Center in Honolulu may offer a way forward in this connection. The 2012 NPAC included thoughtful and well-connected individuals from Canada, Norway, Russia, and the United States and from China, France, Japan, and Korea who engaged in a substantial dialogue in their personal capacities over two days regarding a range of Arctic issues. The East-West Center, formally an American organization, is dedicated to "... bringing people together to exchange views, build expertise, and develop policy options." The center has a particular interest in cross-cultural communication. While it is premature to make any predictions regarding the effectiveness of this informal venue, there is much to be said for proceeding in this realm on a highly informal basis.

Robert Corell, offering the first commentary on this chapter, believes that the Arctic Council has the potential to serve the interests of all Arctic and non-Arctic nations. He suggests that greater pressures should be brought to bear on the Arctic Council to serve these broad interests. Subject to adequate Terms of Reference, adjustments might include raising the status of non-Arctic nations (e.g., Associate Arctic Nation status) to a level adequate to enable these nations to participate directly in policy development. Observer status should be redefined so that there is differentiation among the various types of observers from the scientific and technical to NGOs. All have profoundly important roles to play in the deliberations of the Arctic Council and in the development of Arctic policy.

Corell argues that science and knowledge broadly defined constitute a fundamental foundation for the development of Arctic policies, particularly Arctic Ocean policies. A far-reaching action by the Arctic Council would be to establish the International Arctic Science Committee (IASC), the International Arctic Social Sciences Association (IASSA), and possibly others with appropriate expertise as official scientific advisors to the Arctic Council. Corell suggests a variety of options for pursuing this goal, ranging from a special category of science advisors to the Arctic Council to making these bodies Associate Working Groups of the council with responsibilities that parallel the council's current Working Groups, while augmenting the contributions of the existing Working Groups. The objective is to strengthen the direct input of science from responsible bodies into the Arctic policy development process.

Corell suggests that governance in the Arctic will be well served, at least for now, by honoring, implementing, and enhancing existing treaties among nation states, such as UNCLOS, the United Nations Framework Convention on Climate Change (UNFCCC), and other intergovernmental agreements, treaties, and customary law arrangements. He argues that since science has played an important role in the development of Arctic policy, there is a clear need to establish a closer relationship between science and policy to ensure that research agendas focus on issues of clear relevance to policy and that scientific findings are conveyed to policymakers.

Corell moves on to recommend that there are prudent reasons to establish regulatory mechanisms in anticipation of economic development and industrial activities in the Arctic along with the emergence of new issues of environmental protection. There are increasingly clear needs for mechanisms to promote interactions among individuals interested in the Arctic in off-the-record and relaxed settings to build trust among a wide range of actors, to facilitate knowledge exchange, to encourage innovative thinking, and to stimulate learning among those concerned with Arctic issues. The goal would be to enrich the efforts of bodies like the Arctic Council rather than to dilute or detract from their efforts.

Commenting on "Listening to the Voices of Non-Arctic States in Arctic Ocean Governance," Bernard Funston outlines a different perspective on ways for the Arctic Council to accommodate non-Arctic state voices. Funston argues that non-Arctic states have had some voice in Arctic governance through an existing Arctic Ocean regime complex. As members of international agreements, they already have played a significant role in establishing the legal foundation for international governance in the Arctic. Funston observes that non-Arctic states play ongoing roles in implementing and regulating trade, commercial shipping, oil and gas development, transboundary pollution, industrial fishing, ship-based tourism, climate change, and environmental protection under existing conventions such as UNCLOS, UNFCCC, and so forth.

Turning to the establishment of an AOF, Funston argues that the author's proposal appears to be oriented toward providing civil society with a voice in Arctic governance. Young suggests that participants act in their personal capacities and observe Chatham House rules. Presumably, Arctic or non-Arctic government officials who attend would not be representing state interests. Funston argues that this proposal for an Arctic Ocean Forum begs several questions. Would states really want to send their officials to participate in their personal capacities? Would such a forum have any influence among policymakers in Arctic or non-Arctic states? Would representatives of NGOs, businesses, and indigenous peoples' groups also appear in their personal capacities or would they be expected to represent their organizations' interests?

The process of creating an AOF as an informal mechanism including key non-Arctic countries could raise the same sorts of time-consuming issues that the Arctic Council faced during its founding process. Who is allowed in; what would be the rules of procedure; how would the forum speak on complex issues where there is no consensus; who will organize and pay for the meetings; how will the forum conduct its intersessional work; would there be a role for Permanent Participants from non-Arctic states? Would the Arctic states want to participate in both the Arctic Council and a new AOF? Funston wonders whether an AOF could be the solution to the puzzle posited in Chapter 6.

As an alternative to an AOF, Funston suggests the creation of "trans-regional mechanisms" within the Arctic Council, which is an existing forum for high-level policy discussion on Arctic issues, to foster greater scientific cooperation among Arctic and non-Arctic interests as a means to enhance the contributions of observers, particularly non-Arctic states, within the Council. He believes that scientific cooperation can advance policy-relevant dialogue between the Arctic states and the international community just as it has done among the Arctic states themselves.

Finally Funston observes that the Arctic is not a closed system. The Arctic should be viewed as a barometer that is highly responsive to global processes. The solutions to some Arctic problems cannot be achieved through actions in the Arctic. On the other hand, Funston notes that non-Arctic regions may be unable to address some of their pressing problems without giving due attention to the Arctic. He emphasizes that what happens in the Arctic does not stay in the Arctic, and vice versa. The Arctic will not be saved by building a wall around it or by focusing only on governance within the region. He remarks that the Arctic is a region that helps open a dialogue on how we govern outside the Arctic. For this to occur, the voices of non-Arctic states must be heard.

Arild Moe, in his commentary on Chapter 6, notes that "what are really the Arctic issues" is a better question for effective governance of the Arctic Ocean than "who should be regarded as the legitimate players." Moe suggests that we should distinguish between issues that are pan-Arctic and issues that are sub-regional. Different issues engage different stakeholders. Moreover, there are issues that have stronger links to processes outside the Arctic than to other processes in the Arctic. Moe remarks that while climate change is a global issue and should be handled through global processes, regional fisheries occurring within exclusive economic zones in the Arctic represent the other extreme. Shipping is a global industry, and the IMO plays a crucial role. But there is also a need for a Polar Code. The issue of search and rescue falls squarely in the sphere of responsibility of the Arctic states. Moe also suggests the importance of rethinking the role of the Arctic Council within a broader regime complex. An obvious risk relying on a diversified and specialized institutional architecture is the fragmentation Young mentions. Regarding the establishment of a high-level informal consultative mechanism including key non-Arctic states, Moe recommends that the Arctic states take the initiative to organize such meetings. To become an effective channel for communication, an AOF would need to have a concrete agenda. This would mean that participation might vary from meeting to meeting. The goal must be not only to include relevant states, but also relevant authorities and knowledge holders from these states. Finally, Moe observes that a framework featuring an informal consultative caucus under the G20 would exclude the smaller Arctic States and thus represent another extreme in Arctic governance. It is easy to predict the position of European Arctic states to such a proposal: Non-starter!

Peiqing Guo focuses his comments on the new criteria for admitting permanent observers in the Arctic Council as set forth in the 2011 report of the Senior Arctic Officials to the Arctic Council ministerial meeting. Guo interprets the new requirement of recognizing the “sovereignty, sovereign rights, and jurisdiction of the Arctic countries” as unprecedented. According to Guo, non-Arctic states will find it problematic to recognize Arctic states’ sovereignty, including territorial land, internal waters, territorial waters, and territorial air. He comments on the advantages and disadvantages of observer status and concludes that permanent observer status in the Arctic Council is not an optimal choice for non-Arctic states under current conditions. For now, one practical alternative may be to apply for ad hoc observer status on a meeting-by-meeting basis.

In his commentary on Chapter 6, Fujio Ohnishi considers how best to realize the idea of an AOF. He proposes that the North Pacific Arctic Conference (NPAC) should take initiative in organizing a start-up meeting and inviting the governments of non-Arctic states to discuss the idea of an AOF. Alternatively, the country serving as chair of the Arctic Council could take on this innovative task of organizing an AOF as an efficient mechanism for informal dialogue between Arctic and non-Arctic countries. He warns that if the AOF turns out to be an ineffective mechanism for dialogue, this failure may lead to the establishment of a non-Arctic council. As the second vital point for realizing the AOF idea, Ohnishi recommends that the range of appropriate issues for AOF consideration should be agreed upon at a start-up meeting.

In his commentary on Chapter 6, Sung-jin Kim points out that since the Arctic Council is likely to lose momentum as a result of internal conflicts regarding the claims of member states to jurisdiction over marine resources under UNCLOS, it would be more efficient for the non-Arctic countries to promote cooperation with each of the Arctic coastal states rather than joining the Arctic Council. Kim also argues that non-Arctic countries should pursue observer status so that they can participate in the general discussion at the Arctic Council. Kim believes that Young's suggestions on ways forward, featuring an Arctic Ocean regime complex and an informal consultative mechanism, offer the most practical and realistic alternative for non-Arctic states within the current Arctic Council framework. Regarding participation in the AOF, Kim suggests that the membership should be comprehensive, including not only the non-coastal and EU countries but also natives, scientists, and policy experts as well as representatives from business and international organizations. To develop concrete terms of reference for the AOF, he proposes to set up a small technical group within the North Pacific Arctic Conference.

CONCLUSION

In the opening section of this chapter, we identified five major issues that will shape the future of the maritime Arctic. The 2012 North Pacific Arctic Conference (NPAC 2012) examined these issues through a series of major presentations, briefer commentaries, and open discussions. The body of this book is divided into sections that cover each of the five issues in depth. Here, we comment briefly on the major findings emerging from these deliberations, highlight some critical determinants of future developments in each case, and single out some themes for consideration in future sessions of the North Pacific Arctic Conference.

Commercial shipping in the Arctic is feasible but likely to develop in several stages starting with an increase in intra-regional traffic, followed by a growth in destinational traffic, and leading eventually to some through transit traffic using the NSR as an artery for international commerce. Russian policies are adjusting to produce a more favorable fee structure for icebreaking and other services. This is an indication that Russia intends to develop the NSR in the near future. On the other hand, there is a lack of ports and other infrastructure in the

Arctic. Alleviating the resultant problems will be a critical determinant of the future of commercial shipping in the region. Destinational traffic may include shipments not only of oil and gas but also of hard-rock minerals, fish products, and even fresh water. In each case, the willingness of investors to provide the resources needed to build infrastructure will determine the timing and extent of expanded commercial shipping in the region. It is difficult to determine the extent to which states will sponsor development to attract people and industries to the Arctic or the growth of human activities in the Arctic will provide the impetus for the mobilization of resources needed to invest in infrastructure.

With regard to maritime safety and environmental protection, the completion and implementation of a mandatory Polar Code is essential to protect Arctic peoples and ecosystems. While the need has existed for some time, international, harmonized, and legally-binding rules and regulations covering the design, construction, and operation of ships operating in the Arctic are urgently required today. The IMO, which includes both the Arctic states and key non-Arctic states as members, is the proper forum for the development of the Polar Code. The Arctic and non-Arctic states need to cooperate in this endeavor to achieve success in the development of the code in a timely manner. Working together, they can provide commercial shipping interests with a level playing field that will treat all segments of the industry equally and equitably. Other tools at the disposal of the IMO include the designation of specific areas (e.g. the Bering Strait Region) as Particularly Sensitive Sea Areas (PSSAs). A system of well-defined PSSAs and designated sea lanes would complement the provisions of the Polar Code in providing proper protection for the human communities and ecosystems of the Arctic

There is a long history of aboriginal subsistence harvesting of fish and marine mammals in the Arctic. Commercial fisheries are currently limited to the marginal seas (e.g. the Norwegian, Barents, and Bering Seas); there are no commercial fisheries in the Arctic Ocean as such. Existing fisheries are generally well-managed either by individual coastal states within their EEZs or by regional arrangements such as the Norwegian-Russian regime for the fisheries of the Barents Sea. Yet challenges for the future lie in the facts that commercially significant fish stocks may move northward into the Arctic Ocean, climate change may trigger processes that are disruptive to marine ecosystems, and migratory species (e.g. grey whales) require international cooperation—sometimes extending to non-Arctic countries—to ensure that human activities affecting them are managed sustainably. Illegal, unregulated, and unreported (IUU) fishing may emerge as a serious concern in the Arctic. Bioprospecting is another potential issue that could generate a need for governance. Experience suggests that it is useful to anticipate trends in human uses of living resources and to put in place management arrangements before activities begin on a large scale and interests become fixed. From this perspective, the creation of a Regional Fisheries Management Organization (RFMO) for the Arctic Ocean or even for the western portion of this ocean is an idea worthy of serious consideration in the coming years Although the offshore oil and gas resources of the Arctic are thought to be large, most of these resources have yet to be discovered, much less proven to be profitable to produce and transport to relevant markets. Russia is the most important player in Arctic energy development with the largest continental shelf by far and the most favourable prospects especially for natural gas. The Russian government is determined to accelerate the development of hydrocarbons in Eastern Siberia and the Far East and to engage foreign companies in offshore development projects. The Arctic may thus become a source of natural gas for consumers in Asia; one project on the Yamal Peninsula already includes shipment eastward as part of its business plan. China, Japan, and Korea are all potential consumers of Arctic hydrocarbons. What is important in this connection, however, is not only the size of resource base but also market accessibility and the attractiveness of alternative sources. The prospects for shipping oil and liquid natural gas through the NSR will be an important consideration. The shale gas revolution, especially in the United States, is another important factor affecting the economic attractiveness of Arctic hydrocarbons. Still, the need for long-term secure contracts for natural gas is likely to favour Arctic sources of supply in the coming decades. Commercial development of Arctic oil and gas on an ongoing basis must include indigenous peoples in the decisionmaking process.

Finally, we need to look forward rather than backward in finding ways to include the concerns of non-Arctic states in the deliberations of the Arctic Council and in other governance arrangements for the Arctic. There is a need for innovation to address this issue. Representatives of non-Arctic states have engaged in the activities of some of the council's working groups, and there may be opportunities to build on this experience to devise constructive procedures for addressing trans regional issues that reflect the interests of all parties concerned. The implications of recent developments regarding matters like the treatment of applications for permanent observer status in the Arctic Council, however, are more complex. The issue of permanent observership has become highly politicized in the deliberations of the council. Even those non-Arctic states that have the status of permanent observer (e.g. Britain, France, Germany) find that this role offers limited opportunity to voice their concerns in a meaningful fashion. Although non-Arctic states will continue to submit applications, the mechanism of permanent observership seems unlikely to provide a satisfactory solution to the challenge of listening to the voices of non-Arctic states in Arctic affairs.

The speed of change affecting the Arctic and the rise of global interest in this region have taken many participants in settings like the Arctic Council by surprise. The council has made some efforts to adapt to these changing conditions, but its ability to address the concerns of non-Arctic states is limited. What is missing is a mechanism that allows the non-Arctic states to voice their concerns in an effective manner, while acknowledging the primacy of the interests of the Arctic states in what happens in this region. One way forward could be the development of an Arctic Ocean Forum understood as an informal and inclusive consultative mechanism that would operate with a minimum of procedural arrangements. The forum should encourage innovative thinking about emerging Arctic issues rather than seeking a more formal role in decision-making. It would complement the work of the Arctic Council rather than trespassing on the council's turf. In this way, the forum would emphasize the development of intellectual capital and the establishment of organized channels of communication between the Arctic states and the rest of the world. The North Pacific Arctic Conferences might well serve as a kind of informal launching pad for the creation of an Arctic Ocean Forum.

To conclude, NPAC 2012 uncovered a number of topics that could be taken up at the 2013 North Pacific Arctic Conference. One idea is to promote North Pacific/North Atlantic dialogue in order to identify common concerns and to explore ways to ensure that they are considered in Arctic policymaking. Finding ways to move the Polar Code toward completion and to encourage serious consideration of the responsibilities of non-Arctic states for emerging challenges in the Arctic as well as the rights of these states to benefit from the extraction of Arctic resources are also important topics. Looking further into the future, there are issues relating to the impact of global environmental change in generating a role for the Arctic in providing for global food security and the accommodation of large numbers of environmental refugees. Two major forces are driving the transformation occurring in the Arctic: climate change and economic globalization. In an important sense, commercial shipping is an enabler of cutting-edge developments in the Arctic, including the growth of trade, the extraction of natural resources, and the expansion of tourism. These developments in turn produce a set of issues involving pollution control, stemming the loss of biological diversity, the protection of indigenous rights, and governance more generally that can only be addressed through international cooperation. Together, these themes present a rich agenda for consideration at NPAC 2013.

Notes

1. Sea ice in the Arctic Basin reached a new record low in August-September 2012.
2. In 2012, the XueLong made a complete transit of the NSR from East to West.

PART I

Potential Arctic Shipping

2. Potential Arctic Shipping: Change, Benefit, Risk

Sung-Woo Lee

INTRODUCTION

The 1970s saw the worldwide spread of the concepts of globalization and regionalization boost world trade, while revolutionizing transportation through containerization and intermodalism. Following decades of adaptation and diffusion since the emergence of containerization, the global maritime container-shipping network has become a reality this century (Frémont 2007, Rodrigue and Notteboom 2010). Notably, the area of shipping has grown remarkably, now handling more than 90% of global trade. Due to the continuous dependence of world trade on shipping, the functions of ports and their logistics facilities have dramatically changed (Lee and Ducruet 2008:163). However, major commercial shipping routes have remained intact as no major geo-political change that would impact control of maritime resources has been made since the twentieth century.

At the beginning of the second decade of the twenty-first century, global warming directly affects our livelihood and environment. Climate change and global warming have brought new issues to the Arctic, including a large-scale ice meltdown, but they also present a new opportunity, namely a new shipping route through the Arctic which may replace the current international commercial shipping routes built around the Suez and Panama Canals. For example, the Northern Sea Route (NSR) connecting the North Atlantic and the northern Pacific through the Arctic Sea is emerging as one of the most expedient international shipping routes. The number and frequency of ships passing through the NSR have recently increased and more vessels are expected to use the route in the near future,[1] generating tremendous benefits. If the NSR becomes commercialized, it could allow shippers to bypass nearly 5,000 nautical miles and save on weekly shipping time in comparison to the existing routes via the Suez Canal. According to Lee et al. (2011), East Asian countries will enjoy immense economic benefits if they use the NSR in their commercial trade with northern Europe without paying Russian ice breaking fees[2] and countries in northeast Asia in particular, such as Korea, China, and Japan, will reap larger benefits from the NSR than other Asian countries. Within this context, some questions arise: how can this route be used cooperatively by Arctic states, especially Russia, and by non-Arctic states? How can the inevitable risks of shipping through this route be mitigated to reduce environmental impact? First, we need to clarify whether the NSR is, in fact, logistically superior to other land transport modes including the Trans Siberian Railway. It is also important to estimate the amount of cargo that will be transported through the NSR. Answering these questions requires analysis of the economic potential of using the NSR based on real data and consideration of the main obstacles and risks of operating the route.

This chapter aims to clarify the main obstacles in operating the NSR and suggests means for its commercial operation, crucially through cooperation between Russia and the East Asian states. The discussion presented here first analyzes previous studies to ascertain the logistical viability of the NSR compared to other logistics routes to the North Pacific, demonstrating reasons for East Asian states to use the route and outlining obstacles in their commercialization of the route. Based on these analyses, the study seeks ways to eliminate those obstacles and mitiagte risks, especially through multilateral cooperation among East Asian countries. By presenting the future system of port competition in East Asia, the conclusion offers suggestions on addressing the obstacles progressively through bilateral and multilateral cooperation between, Russia, Korea, other East Asian countries, and among Arctic and non-Arctic states.

THE COMPETITIVENESS OF THE NSR AND RAILWAY

Lee (2011) compared the Suez Canal Route (SCR) and the Northern Sea Route (NSR) by calculating time and cost saving effects between Europe and East Asia. However, the relative competitiveness of the NSR and the region's railways has not yet been examined. The comprehensive commercial railway system of the region includes the Baikal Amur Mainline (BAM), the Trans Siberian Railway (TSR), the Trans Manzhouli Railway (TMR), the Trans Mongolia Railway (TMGR) and the Trans China Railway (TCR), presented on the map below (see Figure 2.1). The BAM is linked to the commercial seaport of Vanino with Taishet by 4,300 km of rail and each of the BAM, TMR, TMGR and TCR railways are able to make use of the TSR to connect to Europe via Taishet, Zabaikalsk, Naushki and Omsk. With 9,289 km of electrified double track line linking Vladivostok to Moscow, the TSR is the key railway route connecting the Asia-Pacific region and Europe.

The rail gauge of BAM, TSR and TMGR is 1,520 mm, which is also used in the former Soviet Republics that now comprise the Commonwealth of Independent States (CIS), in the Baltic states, and in Finland. However, the TMR and TMGR use the standard gauge of 1,435 mm. Cargo shipped on the TMR must be reloaded in Zabaykalsk and transferred to the TCR in Dostyk. This off-loading and transfer,

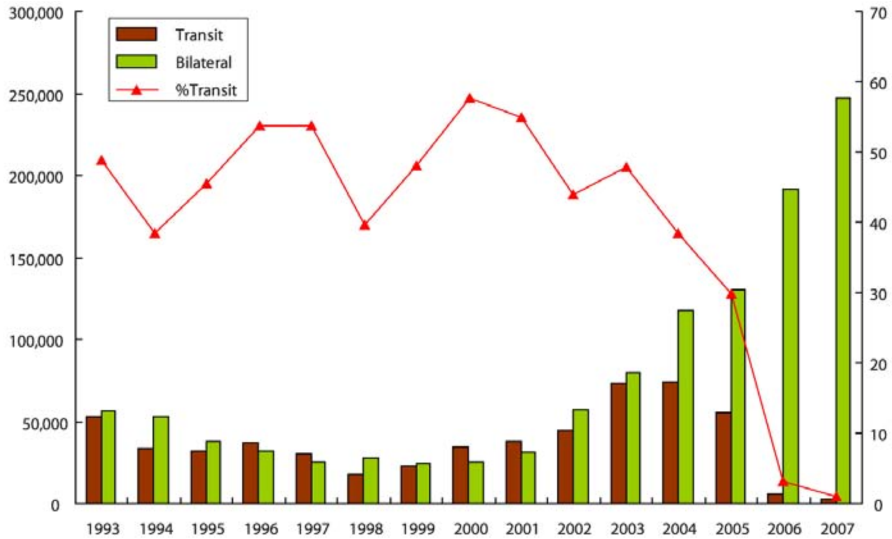
Economic Research Institute for Northeast Asia, Niigata, Japan, 2007

Figure 2.1. Trans-Siberian Land Bridge Network

combined with customs requirements at border crossing points, introduces potentially major problems for freight transportation across the region.

Though the railway is the shortest route to connect Europe and Asia, when block trains (those comprised entirely of cargo container cars) were operated, the journey time was even further decreased. It currently takes 14.5 days to transport goods from Vostochny in the Far East to Berlin in Germany. This duration is much shorter than using the SCR for 25.7 days and using the NSR for 17.9 days from Busan to Brehemen, even while considering the 1.5 days necessary for good to travel from Busan to Vostochny. After 1998, the transit volume of the TSR increased consistently before declining due to a rail fuel increase in 2005 and a further sharp decline in 2008 caused by the global financial crisis. That volume, however, has been recovered. International transport of containers on the TSR in quarters 1 through 3 of 2010 was at 280,271 TEU up over 48% from same period of 2009, including transit volume 18,058 TEU at more than 70% (see Figure 2.2).

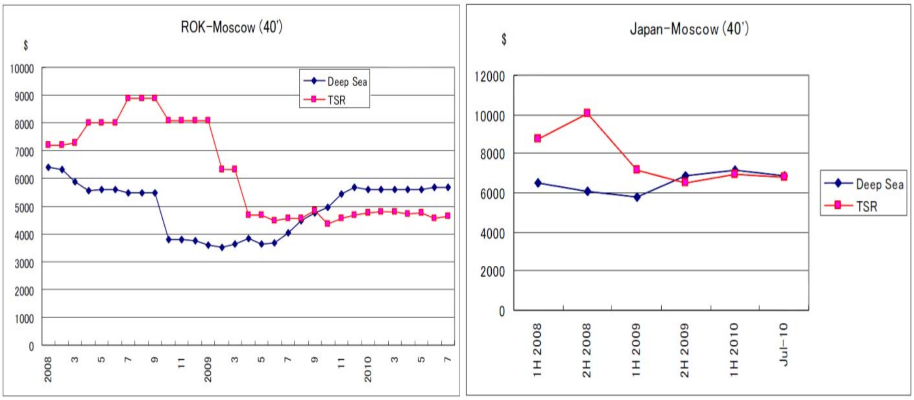
Economic competitiveness is the factor that has so far most recommended the TSR for commercial transport. Sea rates between East Asia and Europe dropped sharply in autumn of 2008 while TSR charges remained high. The Russian Railways held optimistic views that customers would not leave even if rail fees were raised since market demand would be strong. While Russian



Source: Hisako Tsuji (2008)

Figure 2.2. Transit vs. Bilateral volume of TSR

agents were flustered, the TSR rate was reduced by 42% during the period of January to April 2009. In 2010 TSR charges stayed relatively low and sea rates increased gradually. The TSR rate continues to be lower than that of the sea route in 2010 but has fluctuated more than the rates of sea routes(see Figure 2.3).



Source: Hisako Tsuji (2010)

Figure 2.3. Comparison of charges of TSR vs. sea route from ROK and Japan

Block trains service is mainly diversified from the Far East to Russia and Uzbekistan, between Europe and the Commonwealth of Independent States and so on. However, a block train from Europe is small scaled and cargo traffic is unstable. A block train between the Baltic and the CIS is more stable. Table 2.1 shows that block train service does not connect Europe and Asia, excepting Vostochny-Moscow.

Table 2.1. Block Train on TSR (2007)

Name	Route	Countries
Ost Wind	Berlin–Warsaw–Minsk –Moscow–Kazakhstan	German, Poland, Belarus, Russia, Kazakhstan
West Wind	Malaszewicze–Berlin	Poland, German
Czardas	Budapest–Moscow	Hungary, Russia
Mongolian Vector	Brest–Ulaanbaatar /Hohot–Duisburg	Belarus, Mongol, German
Baltic Transit	Baltic countries–Kazakhstan	Baltic, Kazakhstan
Northern Lights	Finland–Moscow	Finland, Moscow
Mercury	Kaliningrad/Klaidpeda–Moscow	Russia, Lithuania
Viking	Scandinavia–Lithuania–Ukraine	Scandinavia, Lithuania, Ukraine
Kazakhstan Vector	Brest–Almaty–Tashkent	Belarus, Kazakhstan
	Vostochny–Buslovskaya	Russia
	Vostochny–Lokot–Almaty	Russia, Kazakhstan
	Vostochny–Taganrog	Russia
	Vostochny–Brest–Malasevice	Russia, Belarus, Poland
	Vostochny–Moscow	Russia

Source: KRRI (2007)

Currently, the TSR is capable of shipping 130 million tons of cargo per year, including about 500,000-600,000 TEU of import/export cargo and 250,000-300,000 TEU of international transit cargo. Once the modernization of the TSR is complete, and if the BAM railway is used, this figure may increase to 1 million TEU per annum. Russia has released A Strategy of Developing the Railways of the Russian Federation Up to 2030 to meet the demand of the country for an adequate transport system. A new 20,550 km line will be built and the total investment will be 13,747.0 billion rub including 5,929 billion rub from JSC Russian Railways. Demands on the TSR have fluctuated and the line's service is restricted to a relatively small area that does not cover the entire route from Europe to East Asia with a capacity of just 1 million TEU, less than the capacity of the sea route.

THE COMPETITIVENESS OF THE NSR BETWEEN EAST ASIA AND THE EUROPEAN UNION

According to Lee's report (2011)[3], transport costs and transit times were significantly affected or reduced when cargo was shipped between Asia and Europe through the NSR. We have conducted a 68-question stated preference (SP) survey in order to predict the expected market shares using the Suez Canal Route and the NSR. The SP surveying is a method that provides better transport estimates by asking respondents to select choices or to prioritize options in a specific future scenario The survey presents five scenarios, spreading out the shipping costs of the NSR by 120%, 110%, 100%, 80% and 70% of the costs for the existing Suez Canal Route and the SP survey design enlarged the sample of the survey from Korean logistics companies to include Chinese and Japanese logistics companies. In order to capture a wider range of responses, this survey will include shipping liners as well as the original respondents, unlike previous studies that limited their samples to forwarders and logistic companies. In this way, we were able to collect 14 more respondents in Japan and 11 more in China.

According to Table 2.2, below, Chinese respondents currently prefer the SCR to the NSR, but in a scenario where the NSR is 10 days faster and the ocean freight is equivalent with the SCR, more than half of Chinese respondents chose the SCR. In contrast, Korean and Japanese respondents show a different pattern, preferring the NSR to the SCR in greater numbers than the Chinese companies. Chinese companies are hesitant to change to shipping via the NSR, for reasons explained by their usual transportation

Table 2.2. The NSR Shares by Scenario in 3 Countries

Scenario	NSR Cost	NSR Time	NSR Shares In Korea	NSR Shares In Japan	NSR Shares In China	NSR Shares In 3 countries
			(2011)	(2012)		
①	120%	30days	1%	2%	3%	3%
②	110%	30days	5%	6%	5%	8%
③	**100%**	**30days**	**20%**	**20%**	**11%**	**21%**
④	80%	30days	86%	79%	38%	72%
⑤	70%	30days	97%	94%	57%	89%
⑥	120%	25days	10%	12%	6%	13%
⑦	110%	25days	34%	36%	12%	31%

⑧	100%	25days	72%	69%	24%	59%
⑨	80%	25days	98%	97%	60%	93%
⑩	70%	25days	100%	99%	77%	98%
⑪	120%	20days	52%	57%	14%	44%
⑫	110%	20days	84%	84%	26%	72%
⑬	100%	20days	96%	95%	43%	89%
⑭	80%	20days	100%	100%	79%	99%
⑮	70%	20days	100%	100%	89%	100%

routes in China, the system uses diverse transportations such as TSR, TCR, TMGR, and TMR, while in Korea and Japan the predominant logistics system is primarily based on marine transportation.

As mentioned in the previous section and shown in Figure 2.4, the TSR's over-land route does not impact the viability of the NSR and the TSR service area are scarcely duplicated. However, taking a conservative approach, the capacity of the TSR is estimated at 1 million TEU.

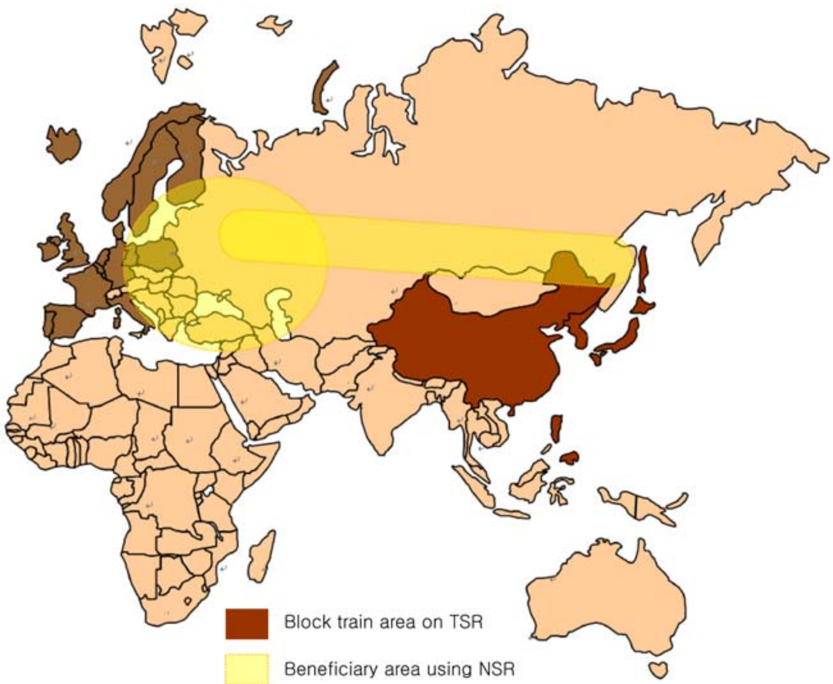


Figure 2.4. The NSR area and TSR area

Using the data from Lloyd's Marine Intelligence Unit (LMIU), which is based on the calculation of multiplying container traffic between ports by vessel capacity and frequency, we are able to estimate the weight of origin and destination (O/D) of traffic volumes. The attainable weight of container traffic that can bring distance-saving effects to target countries[4] via the NSR is about 6%. We can also get the forecasted container traffic volumes of six Asian countries by adjusting real GDP growth rate of each country on actual performed traffic data in 2010. Multiplying these data by each weight of traffic O/D of target European countries, we may calculate the final traffic volume that can be converted into the NSR.

In 2007, the main countries using the TSR to move cargo between Europe and Asia were China, shipping a volume of 235,188 TEU with a 48% share, Korea shipping a volume of 206, 264 TEU with a 43% share, and Japan shipping a volume of 43,688 TEU with a share of 9% (Lukov 2008). These 2007 amounts have been subtracted from the traffic of the three countries, arriving in Europe with 1 million TEU. Because some of the TSR traffic is already excluded by some target countries and ports, although this can be seen as a strict assumption, the volume shipped between the ports of Bussan and Vostochny would be considerable when using the TSR.

As shown in Table 2.3. 13 million TEU of cargo traffic was estimated between targeted countries in 2010 with a growth to 48 million TEU in 2030.

Table 2.3. Container Traffic forecast by targeted countries considering TSR

Unit: 1,000 TEU

	China	Korea	Japan	Taiwan	China (SAR HK)	Philippines	Total
2010	9,563	321	561	401	2,319	9	13,175
2015	14,691	909	705	509	2,931	12	19,757
2020	21,402	1,210	892	682	3,919	16	28,121
2025	29,500	1,396	910	791	4,655	20	37,271
2030	39,075	1,580	923	904	5,449	24	47,955
2010~2030	7.3%	8.3%	2.5%	4.1%	4.4%	4.9%	6.5%

The timesaving effects of cargo routes via the NSR depend to a great extent on the length of the ice-class section on the Arctic and on how long the NSR can be open. There have been no available data for the opening period of the NSR from year to year. However, Arctic Marine Shipping Assesment (2009), forecasts that it would open about 90 to 100 days by 2080. Moreover, Ragner (2008) proposes the possibility that in 100 years the Arctic Sea would be open for 170 days at maximum, as the technology evolves. Mark Serreze, director of the US-based National Snow and Ice Data Center also predicted that Arctic ice would completely melt away by 2030 if current trends hold. With these predictions, in our scenarios we proposed three possible durations of opening of the Arctic for shipping: for three months in 2015, for six months in 2020, and for nine months in 2025. We took the prospective that the NSR would be fully commercialized by 2030.

We calculated and included into these scenarios the expected time saved using the routes to Europe from each of six Asian countries, and estimated the container traffic share of the NSR, as seen in Table 2.4. The container traffic is forecasted to reach about 0.3 million in 2015 and around 12 million TEU in 2030 under the condition that the sailing cost through the NSR will stay at the same level as the cost of the SCR. The share of the NSR would also be 1.5% in 2015 and 25.1% in 2030.

Table 2.4. Container Traffic forecast using the NSR

Unit: 1,000 TEU

NSR Cost	Container Traffic Forecast				Share			
	2015	2020	2025	2030	2015	2020	2025	2030
120%	54	425	1,402	3,015	0.3%	1.5%	3.8%	6.3%
110%	128	1,017	3,138	6,452	0.6%	3.6%	8.4%	13.5%
100%	305	2,168	6,081	12,047	1.5%	7.7%	16.3%	25.1%
80%	1,311	6,357	15,193	27,975	6.6%	22.6%	40.8%	58.3%
70%	2,185	8,746	19,420	34,731	11.1%	31.1%	52.1%	72.4%

WHAT ARE THE MAIN OBSTACLES AND RISKS?

The economic benefits of the NSR compared with the SCR and the TSR is clear, though the route still poses a number of obstacles and risks for commercial shipping. In order to validate the viability of the route, the obstacles must first be defined and solutions found to overcome them.

The problem of environmental pollution of the NSR. The Arctic area is valuable to the entire world and when the NSR is opened for commercial shipping, this area may become polluted. In this respect, Arctic states and non-Arctic states have a conflict of interest. Currently, International Maritime Organization (IMO) guidelines specifically address environmental protection and maritime safety in the Arctic in a document entitled Guidelines for Ships Operating in Polar Waters

(2009)[5]. The 2009 Guidelines are largely aimed at ensuring safe shipping by recommending construction and design standards for new "Polar Class" ships,[6] and suggesting various types of equipment, personal survival, and crewing measures applicable to all ships engaged in international voyages in Arctic waters.[7] In addition, shipbuilding using new technology may solve the potential problems of greenhouse gases and oil spills caused by shipping in the NSR. One important option may be an LNG-fueled ice class ship. Many shipbuilding companies are trying to commercialize this ship because it goes a long way to solve the problems of bunker fuel oil supply and environmental regulations. However, the LNG-fueled ice class ship cannot totally protect the environment of the Arctic while being flexible enough to cope with commercialized shipping. Reasonable scientific evaluations of the pollution situation will be helpful for us to make corresponding laws and regulations in an international organization like IMO.

The ice-breaking fee imposed by Russia. In order to make the price of the NSR more competitive than the price of the SCR, it will be necessary to keep the ice-breaking fee at a reasonable level and for the international community to engage in discussions with Russia on this issue on a continuing basis. A key issue to be negotiated with Russia is the ice-breaking fee and the outcome of these ongoing talks will determine whether or not the NSR will become a popular shipping route. In this context Korea, Russia, and the East Asian countries should discuss and decide on an appropriate toll fee for the Arctic routes.

The cargo imbalance between East Asia and the European Union. Import cargo moving across the two regions is not matched in volume. In 2007, the total container trade between the EU and Asia was 27.7 million TEU. Container trade shipped from Asia to the EU was 17.7 million TEU and trade shipped from the EU to Asia was 10.0 million TEU. Because logistics costs have increased many shipping companies anchor at North African and Middle Eastern ports to fill an unbalanced flow in the SCR, but this obstacle remains when commercial shippers access the NSR. The first step in overcoming this problem would be to find target cargo which is trade balanced such as iron, steel and organic chemicals. Additionally, in order to ultimately mitigate costs it will be necessary to develop industrial parks and new cities in heretofore-undeveloped regions like Far Eastern Russia, nearby the NSR.

The deficiency of relay ports and supporting facilities for them in the coastal region of the NSR. Passage through the NSR covers between 2,200~2,900 nautical miles, depending on the point of origin, and is difficult to sail safely without supporting services along the way, including mid-point fueling, supporting ship equipment, ship maintenance and repair services and so on. To solve the problem of the unbalanced shipping trade relay ports must be constructed on the mid-point so that loading and unloading may occur frequently, while current supporting facilities are simultaneously maintained, repaired, and improved. Recently, the Russian government began constructing a nuclear power plant to surmount an electricity shortage for the coastal ports of the NSR. After the first phase of these plants is completed in 2014, seven or eight additional plants will be planned, aiding the function of the coastal ports in the NSR.[8] The joint participation in activities of this kind by the countries that would use the NSR is much needed.

The lack of a comprehensive shipping management system. The NSR is a difficult route with a harsh marine environment, volatile snowstorms, and obstructing icebergs. A shipping management system that collects and makes available information on weather situations, navigation information, waterway status reports, port operations, and other supporting information is necessary to promote shipping operations on the NSR. The Arctic coastal states should be prepared to respond to maritime emergencies, including search and rescue in response to major accidents at sea, such as vessel damage and oil spills. In addition, agreement between Russia and the U.S. on traffic separation and monitoring in the Bering Strait[9] is an important step toward addressing safety and security in the Arctic. Even though piracy problems will likely be minimal due to the harsh climate, insurance costs will increase if risks cannot be managed on the NSR.

The lack of unified politics, policies, and laws. The NSR traverses multiple states in the Arctic coastal area, including Russia and Canada. The range of environmental protection standards set by each country require that the eventual use of the NSR necessitates multilateral diplomatic cooperation between the Arctic states and the non-Arctic states. A framework international cooperation is needed. As an initiating step, an informal dialogue like the annual North Pacific Arctic Conference may contribute to cooperation between Arctic and non-Arctic states. A subsequent step would be a governmental cooperation framework to discuss more sensitive political issues.

The lack of a comprehensive information database of the NSR. The viability of the NSR as a shipping route is related to the world's warming climate. Although many countries have investigated the Arctic situation in consideration of the NSR as a commercial route, the information is limited and is not shared. If an international cooperation framework were set up a comprehensive database of information on the NSR would be possible and would benefit associated countries. The Arctic coastal states could facilitate approval of foreign scientific research within their exclusive economic zones, creating an NSR information platform through cooperation among North Pacific countries. Successful multilateral polar science and research programs should be supported and given access to non-security and non-commercial data from national sources.

To fully commercialize the NSR, we need to overcome the obstacles and reduce risks as mentioned above. However, all obstacles and risks are related to the gradual changing of the Arctic environment and the policies of Arctic coastal countries, notably Russia. Opening the NSR to commercial shipping is an international issue that cannot be solved quickly and simply. Therefore, a framework of international cooperation is needed to move forward gradually and appropriately. Commerical shipping has already begun along short distances from East Siberia to East Asia (Destination-Arctic shipping). This type of shipping is used to obtain natural resources in conjunction with continuous pilot shipping between Asia and Europe through the Arctic Sea. In this context, Lasserre (2011) observed that gateway traffic rather than transit (trans-shipment) traffic was the engine of the NSR shipping growth, suggesting that the NSR would profit local communities and natural resource extraction plants situated along the coastline. This information is based on a survey done for Global 142 shipping company, the results of which propose that the NSR should be initially opened only partially because it needs more time to develop in the global shipping market. Following this period of development, a fully opened NSR will allow general commercial (container) shipping. At the same time, intra-Arctic shipping from Russian region to Russian region could be promoted. These steps will resolve many obstacles and will manage risks, as mentioned above, by making use of technological advances and the establishment of international governance over the NSR. Trans-Arctic shipping will be a busy enterprise and will promote commercial trade between East Asia and the EU.

BILATERAL (MULTILATERAL-) COOPERATION AMONG COUNTRIES RELATED TO THE NSR

Measures for protecting the environment, the determination of an appropriate toll fee, the development of a comprehensive shipping management system, the ratification reasonable international laws, development of supporting multilateral institutions, and the construction of a comprehensive information database must be realized before the NSR can be fully commercialized. Communication between Arctic and non-Arctic states should be initiated as soon as possible. In particular, East Asian countries should discuss the obstacles and join Russia in multilateral shipping agreements. In bilateral meetings, participants should propose solutions to overcome obstacles and the means to carry out these solutions in cooperative ways. In addition, the countries and Russia should discuss ways to promote the route to the international shipping community. For the promotion and development of Russian ports nearby the route, participants will have to collaborate on port development, upgrading the capacity of ports nearby the shipping route and reinforcing multi-mode logistics systems. Far East Russian ports have the potential to be excellent relay ports for the route in terms of supporting supplies for vessels and connecting into land logistics.

Several agreements related to the Arctic Sea route have been updated by the IMO, and the Arctic states have a particular influence over their implementation. Therefore, the opinions of non-Arctic states should reflect on the agreements in terms of mutual benefit and rational decision. Ultimately, in order to commercialize the NSR, several legal steps must be taken: (1) the removal of political, economic and regional obstacles through cooperation among Korea, China, and Japan, (2) a joint settlement of the current management system, (3) cooperation between Korea, China, and Japan and Russia. Russia's attention to joint cooperation for Arctic problems is required through Russia's participation in the ongoing meeting of logistics ministers of Korea, China, and Japan. The relevant ministers from Korea, China, Japan, and Russia should be jointly prepared to promote the commercialized NSR. Russia will need to be engaged in collaboration of natural, economic and technological issues in related to Arctic shipping and must reach an agreement with the U.S. on the Bering Strait seaboard line treaty.

PROSPECTS OF PORT COMPETITION IN EAST ASIA AFTER THE NSR IS COMMERCIALIZED

Little has been offered about the foreseeable changes in the existing East Asian port system in the advent of the NSR opening. The world is still debating the commercialization of the NSR. In this situation, it is difficult to forecast the changes that might affect the East Asia port system after the NSR opens, but these issues must be dealt with as soon as possible.

In order to best identify potential hub ports for handling future NSR traffic, several factors must be considered, including the current situation of the East Asian port system and existing port systems around the world situated at the entrance of major shipping routes. In terms of location, trans-shipment hubs are often located near and within mass freight corridors. For instance, some trans-shipment hubs have developed in the vicinity of the Suez and Panama Canals as well as strategic passages such as the Gibraltar and Malacca straits. At the Panama Canal, for example, there has been intense development of container ports. However, the local market alone is too small to handle the traffic volume at port terminals where global players have invested (for example, Balboa, Coco Solo, Cristobal).

Smaller ports nearby serve as feeder ports, which connect to their respective interior areas. The location patterns of these trans-shipment hubs are relatively simple as demonstrated by Zohil and Prijon (1999), based on the Mediterranean case where there is a linear relationship between the distance to and from the shipping route and the volume of trans-shipped cargo. In the Caribbean, trans-shipment traffic is more important at the center of the region (e.g. Jamaica) than at Panamanian ports because hub ports handle containers not only for Panama-related traffic but also for other shipping routes (for example, between North and South America). As noted by Rodrigue and Notteboom (2010: 21), "the creation of intermediate hubs does not occur in all port systems, but around specific regions ideally suited for maritime hub-and-spoke distribution patterns, thanks to geographical, nautical and market-related advantages".

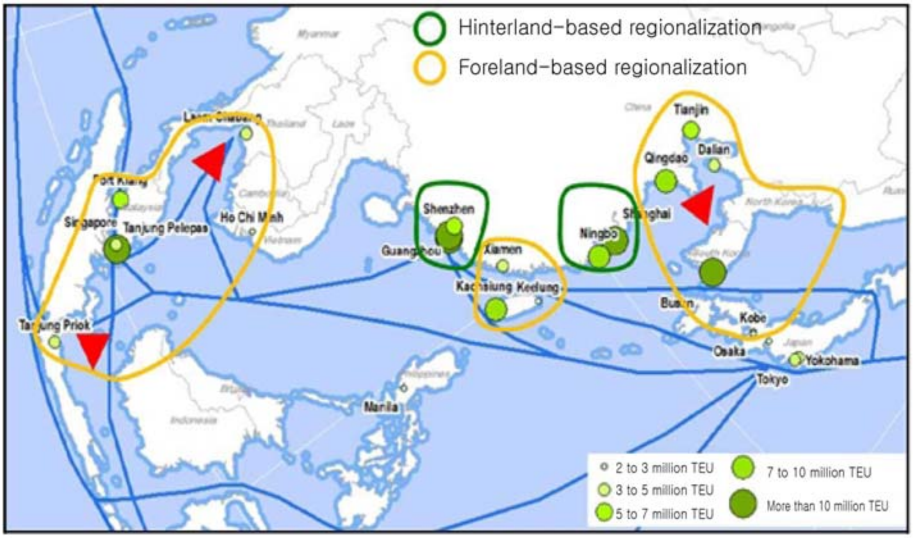
In taking up the specific East Asian cases of Busan, Singapore, and Kaohsiung, Rodrigue and Notteboom (2010) underline that these are more specialized and more focused on near-shore areas than Hong Kong and Shanghai are, which are more oriented toward interior (gateway) traffic (see Figure 2.5).

The advent of the NSR may cause important changes in this pattern causing a loss of trans-shipment traffic at Southeast Asian ports, notably in Singapore, and increase of traffic at Northeast Asian ports, notably Busan. This situation raises two questions: How will Busan and Gwangyang be able to attract and handle additional trans-shipment traffic? And, is there an opportunity for Korea to play the role of main hub at the entrance to the NSR?

This following discussion concentrates on neighboring ports and countries that may potentially act as competitors to Northeast Asian trans-shipment markets in regard to NSR-related cargo flows.

Option 1: Korean ports

Based on the aforementioned literature, an intermediate hub mixing trans-shipment flows and interior (gateway) flows has a better chance of sustaining and increasing its position in the maritime network than a pure trans-shipment hub or a pure gateway port. This is the case of Busan, which is not only a hub port for many North Chinese and Japanese ports but also a gateway for Korea. Busan has strengthened its position in the network (Rodrigue and Notteboom 2010, Ducret et al., 2010, and Lee and Kim 2009) despite rising competition from



Source: Rodrigue and Notteboom (2010), p. 27

Figure 2.5. Intermediate hubs and foreland-based regionalization in East Asia

Chinese ports, which actually remain dominated by gateway functions, not sea-to-sea trans-shipment. On the other hand, Japan has abandoned its role as hub port in the region due to lack of space for further port expansion, and due to environmentalist pressures to preserve coastlines. Korea, notably, Busan, has several advantages over Japan in the perspective of the NSR. These include:

1. ***Experience and expertise in the activities of trans-shipment.*** Busan's old and new ports are experienced in trans-shipment so is the "twin hub" Gwangyang.
2. ***Loyalty of main transport players.*** Korean ports have proven their efficiency with global players willing to distribute their cargo regionally. They also posses their own global port operators and shipping lines.
3. ***Technological advances.*** Korea constantly updates infrastructures and facilities dedicated to container handling at a level at which Chinese and Japanese ports are not likely to be able to compete.

While these reasons recommend Korea, and its Busan and Gwangyang ports as entry points for the NSR, these ports may have limited capacity. In such a case, some possible options may be considered:

for example, a dedicated NSR trans-shipment terminal within Korea may shift existing gateway flows towards secondary gateway ports on the south coast (e.g. Masan, Ulsan, Pohang) or the west coast (Inchon, Pyongtaek, Gunsan) in order not to increase shipping time to/from Korea, and concentrating NSR-related flows at Busan or Gwangyang. Another option is a dedicated NSR trans-shipment terminal offshore, thereby transferring know-how and equipment within the territory. Ulleungdo appears to be a good option for pure trans-shipment flows to/from the NSR (shorter distance). Another option would be Jeju Island, but in all cases the project would bear difficult negotiations with local communities and environmental associations due to their respective tourist and natural values.

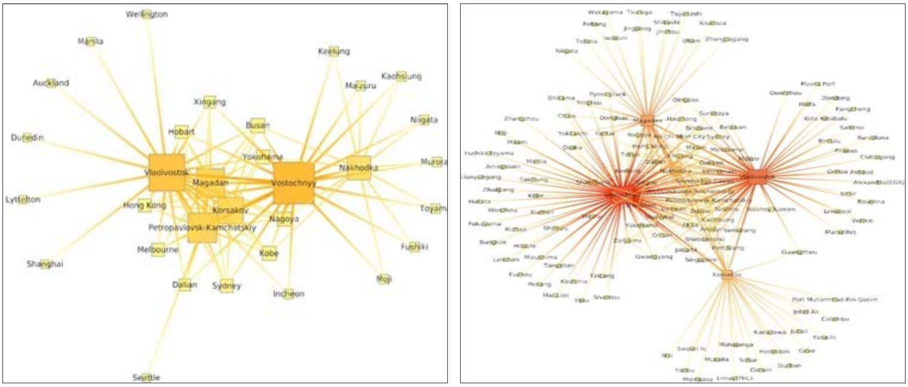
Option 2: Russian Far-East ports

The option of the Russian Far East ports seems logical with regard to two main criteria:

1. The Russian Far East ports are better located than Korean ports in regard to the NSR due to the shorter distance to/from the main route
2. The Russian Far East ports are potentially connected to land-based logistics systems linking Europe and Asia (TSR);

Successful hub ports have the ability to couple gateway flows and trans-shipment flows. However, major obstacles remain, since those ports still have a limited cargo base and suffer from cumbersome procedures in customs. Establishing brand new terminals would not solve all these problems. Another problem is the lack of funds from the Russian government, and the fact that a trans-shipment hub within Russian boundaries might be seen as serving the nation's interest rather than the pure economic interests of shippers and forwarders. Compared with Korean ports, the Russian Far East ports do not have the experience and knowledge of hub activities.

One positive element lies in the recent traffic evolution of the Russian Far East ports. This element is directly translated into an expansion of their maritime connections. In Figure 2.6, we propose to look at the current position of the Russian Far East ports in the maritime (liner shipping) network based only on their connections to other ports. In both 1996 and 2006 we see that Vostochny and Vladivostok have the highest number of connections to other ports, followed by Magadan, Korsakov, and Nakhodka. Although the majority of their connections in 1996 were local, i.e., within Asia (except for Vladivostok



Source: Cesar (2010)

Figure 2.6. Liner shipping connections of the Russian Far East ports between 1996 and 2006

connecting Oceania), by 2006 these ports had become "global" by extending their connections to the Mediterranean, Africa, and the Middle East. They multiplied their links within Asia as well, notably with Chinese and Southeast Asian ports.

Yet, the Russian Far East ports still have a low capacity and nautical accessibility, the basic requirements of any large trans-shipment hub. Presently they remain gateway ports serving their adjacent regions, although cargo flows to and from China by land transport have grown rapidly in recent years. The option to develop a hub port in North Korea at Rajin seems impossible, given the current political situation of the country.

Option 3: Japanese ports

As noted in recent reviews of the situation of Japanese ports, the Japanese government is aware of having lost rank in the global port system over previous decades. To regain their position would call for the launch of new hub ports to compete with Busan. However, there remain serious reservations about the benefits and feasibility of such plans. The Japanese port system is scattered along the coast to serve major urban concentrations (Tokyo, Nagoya and Osaka), so that a hub port project would not benefit the whole port system but only singular locations. Dividing the hub function among two or more locations may not be a solution. Creating a brand new hub port only for NSR cargo at a remote location in Japan might not be a reasonable option as it would be too specialized in trans-shipment functions and therefore too risky with regard to competition from existing hub ports such as Busan and Gwangyang. Therefore, Japan's investment in an NSR hub would be to further expand existing gateway ports such as Tokyo or Osaka, thereby contradicting previous environmental policies.

Option 4: Multi-hub configuration

Another option for establishing hub ports in East Asia for NSR cargo distribution would be to make use of more than one trans-shipment hub. Geographically, there could be complementarities between several hubs, as in the Mediterranean, Caribbean, and Middle East contexts where several hubs compete for transshipment cargo. Main shipping lines and terminal operators has dedicated transshipment hubs to deploy their services. Although successful hub ports seem to be located along the line of least deviation, this criterion is not sufficient and other factors include the presence of free zones (e.g., Tangier Med in Morocco) and the coupling with interior area services (e.g., Valencia in Spain). Each hub develops specific services while competing on pure transshipment flows. Functionally, some hubs may exert pure transshipment while others may be better suited for relay or interlining services. Perhaps, Busan could be a pure transshipment hub while some other ports such as Shanghai and Tokyo might become relay or interlining hubs so as to combine NSR cargo with other trade routes with North America and South Asia. Based on the example of the Busan-Gwangyang twin-hub strategy, this strategy could also lower high pressure on the single hub in terms of congestion and cargo volume.

In this scenario, Busan functions as a single hub port for the NSR, and Shanghai and Tokyo (or Kobe) become interlining hub ports. In accessing the NSR, Far East ports like Vladivostok and Vostochny become relay and gateway ports. Korsakov Port in Sakhalin, Petropavlovsk Port in Kamchatka and Provideniya Port in the Bering Strait will be pure relay ports, as shown in Figure 2.7.

CONCLUSION

Global warming and the progressive lifting of technical constraints on navigation together will usher in an era of commercial shipping in NSR in the near future. Increasing sea trade volume from globalization and international specialization reinforces the advantages of the NSR. Another reason to utilize the NSR comes from the fact that the entire industrialized world has pushed for the exploration of the untapped natural resources in the Arctic Sea area and non-Arctic states are sure to increase their interest in the Arctic Sea routes. Against this backdrop, this study has comprehensively estimated benefits of the Arctic Sea routes, the SCR and the TSR, revising the route traffic estimation con-

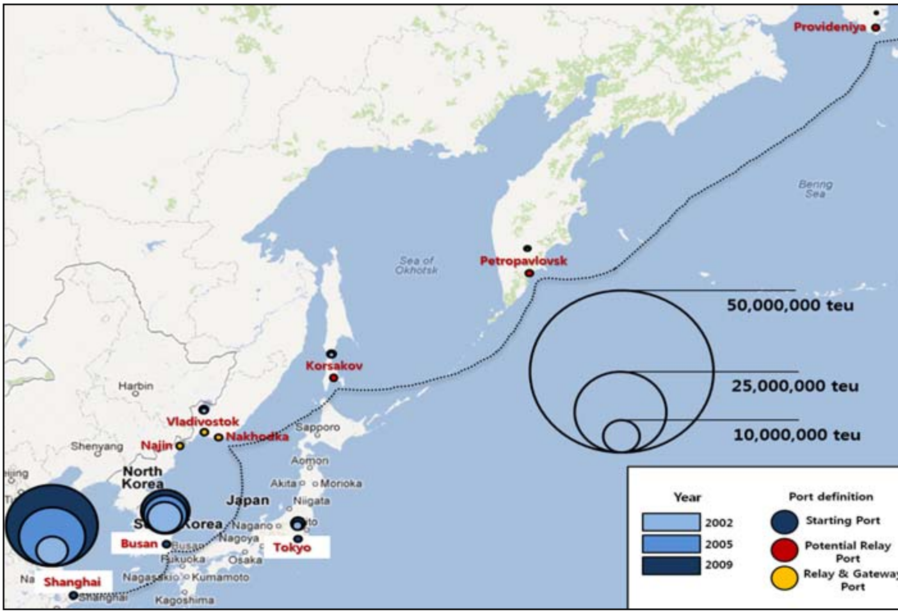


Figure 2.7. Potential hub ports after the NSR opening in East Asia

ducted by the study in the previous year. Moreover, it confirmed competitiveness of the NSR compared with the TSR and suggested the following directions to promote the opening of the NSR:

1. It is necessary to eliminate the obstacles to commercializing the NSR and to approach the issue step by step. For that purpose, destination-Arctic shipping, intra-Arctic shipping and trans-Arctic shipping have to be commercialized sequentially. Destination-Arctic shipping based on mineral resources must be invigorated in order to link the Russian coast and countries that consume Russian resources. As discussed above, this type of shipping is already in the commercialization stage. If destination-Arctic shipping is to be developed, intra-Arctic shipping must be developed simultaneously. As more of the Russian Arctic coastal region is developed, intra-Arctic shipping will be more invigorated, in turn building trans-Arctic shipping. If Arctic shipping is successfully developed in stages, development of transit-Arctic shipping between East Asia and Europe will be a reality soon. However, this eventuality is only possible when environmental destruction and other risks accompanied by development are well addressed. As a result, it becomes clear that stakeholders of the NSR need to prepare the roadmap for NSR commercialization.

2. Technical efforts are required to manage risks and overcome economic challenges and possible air and water pollution generated by shipping in order

to make the route viable. Advances in eco-friendly technologies, including LNG-fueled ships, can solve environmental problems. 'Block-shipping', that is, two or three ships sailing together on the same route when an icebreaker is used, can be an option in short term. The development of ice class ships, which can navigate ice flows without needing ice-breaking services, can reduce the costs of ship production and commercialize relevant technology. In addition, Russia is developing nuclear power plant crafts to support Arctic region ports. These sources of electric power will improve the function of ports as relaying points and will help to save costs, maintain safety and stability, and protect the coastal environment and atmosphere.

3. There is a need to improve the economic feasibility of the NSR and to balance the imports and exports between East Asia and Europe. If imports and exports are unbalanced, economic feasibility is difficult to achieve due to increased shipping costs. At the same time, costs resulting from using the Russian coastal route and icebreakers need to be calculated. Shipping costs could be reduced by increasing freight demand through the development of the coastal region, especially the Russian Far East region, and through the development of a large number of assistive ports. Consequentially, it is necessary to improve the economic environment including the free trade agreement among Korea, Japan, China and the EU as well as additional costs, such as insurance fees, by managing unexpected risks.

4. The NSR governance needs to be established. In order to build a governance structure for the NSR, dialogue and cooperation should continue on important issues, including toll hikes between Korea, Japan, China and Russia, boundary demarcation in the Bering Sea between Russia and the United States, environmental problems between coastal states and Korea, Japan, and China, and disputes over common use of the NSR between coastal states and non-coastal states. Tangible progress was already made in building the multimodal transport system between Korea, Japan, China and Russia with the Great Tumen Initiative, which pushes up the cargo demand and freight in the Far East. Furthermore, a cooperation system between East Asian countries and Russia started to float, for example, a system on shipping, port management, and regional development between Korea and Russia. Based on this cooperation, the nations involved will need to increase their communication opportunities through the NPAC and to build a governance system through discussion with international organizations.

5. The port and logistics infrastructure needs to be developed according to port environmental changes in East Asia. It is necessary to enlarge and improve the infrastructure and facilities of Busan, Gwangyang, Shanghai, and Tokyo since they could become starting ports of the NSR. Simultaneous development and maintenance of infrastructure and facilities should follow at ports in the Russian Far East region, Kamchatka Peninsula and Arctic coastal region as they can act as relay ports. If their role, which would be decided through competition, turns out to be appropriate to their size and location, it would become possible to build the global logistics hub linking East Asia, the EU, Canada, and the United States in the same context of the phased NSR development.

Because the area is one of the last repositories of natural resources and most vulnerable to environmental impacts, research on sailing route commercialization that takes into account the interactions between technology and governance should be done to determine the sustainable usage of the Arctic Sea. For our planet and our future, the NSR should be commercialized under the slogan, "With protecting environment, cautious conversation and investigation, more cooperative implementation."

Notes

1. A 2009 assessment by the Arctic Council counted 6,000 vessels in the Arctic, mostly fishing trawlers and mining barges in the lower reaches. The 41 vessels that traversed it last year shipped 834,931 tons of cargo (Vladimir V. Mikhaylichenko, 2012 North Pacific Arctic Conference Proceedings).
2. According to Lee (2011), if a 8,000TEU vessel transports the container shipment with its 60% capacity, the fee imposed on the shipment amounts to maximum 3.9 million dollars; Approx USD 780 per one fully loaded TEU (Russian Federal Tariff Service issued Order #122-T/1 from June 07, 2011, "Federal Rates Service").
3. We used the data of Lloyd's Marine Intelligence Unit (LMIU) in order to estimate the future container traffic volume between countries benefitting from the time and cost saving effects by using the NSR. Also, we were able to get the forecasted container traffic volumes of six Asian countries by adjusting real GDP growth rate of each country on actual performed traffic data in 2010. Then, we multiplied the gained data by each weight of traffic O/D of target European countries in order to get the final traffic volume that can be converted into the NSR. Then, we had conducted a SP survey in order to gain the expected shares of using the SCR and NSR in the future.
4. Between Asian countries including China, Korea, Japan, Taiwan, Hongkong and Philippines and European countries including Russia, Poland, Sweden, Norway, Denmark, Finland, Estonia, Latvia, Lithuania, Iceland, Germany, Netherland, Belgiun, UK, Ireland, France, Portugal, Spain, Italy.
5. IMO, Res. A. 1024(26) [Polar Shipping Guidelines].

6. Polar Shipping Guidelines, supra note 78, para. 1.1.2 and Part A.
7. Ibid., para. 1.1.1 and 1.1.3.
8. Морские вести России, N0.7 (2012), p.8
9. In 1990, Russia and the U.S. agreed on the sea board line treaty in the Bering Strait. Russia has still not ratified the treaty. It remains an international dispute when we use the NSR.

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Comments on Chapter 2: Scientific perspective

Lawson W. Brigham

Chapter 2, (*Potential Arctic Shipping: Benefit, Risk, Cooperation and Change),* is an informative overview of many of the challenges and issues facing future container ship traffic in the Arctic Ocean. He focuses his attention appropriately on use of the Northern Sea Route for trans-Arctic navigation, for it is this route which has been used recently for transport of natural resources out of the Russian Arctic (and from northern Norway) to global markets in the Pacific. All of these voyages were conducted during a narrow period of time in summer during conditions with minimum ice. There were 34 trans-Arctic voyages along the NSR in a short, summer navigation season in 2011 and an additional 35 voyages transporting more than 1 million tons of cargo were undertaken during summer 2012. By contrast, there were approximately 18,000 voyages using the Suez Canal in 2011 during the year-round navigation season. Many of the risks and challenges that the author highlights in his chapter are the reasons for this stark contrast in use of these waterways as global trade routes. One of the key issues is the length of the economically-viable navigation seasons in a future Arctic Ocean. No one in the global maritime world knows with any certainty the answer to this critical question.

COMPARISON OF THE NSR WITH CONTINENTAL RAIL

I believe it very important that the NSR be compared with rail across the Eurasian continent. The author notes, importantly, that rail is the shortest route to connect Europe and Asia, at least for container cargo. For the transport of natural resources, of course, it may be another matter since those resources originate in northern Europe and the Russian Arctic. Additional links between the southern tier rail lines and the northern resources would have to be developed for full rail service in support of Arctic natural resource development in the region. The author rightly points out the competitiveness of the Trans-Siberian Railway (TSR) is highly influenced by rail fare increases and for many reasons the capacity of the TSR will remain low. One key issue is that the TSR is a year-round operation that could compare more favorably with Arctic shipping if its capacity grew. The greatest advantage of the TSR, if investments were made in building its capacity and infrastructure, is that it could theoretically operate in a seamless, integrated flow of "just in time cargo," whereas flows in Arctic shipping along the NSR would contend with the vagaries (and potential risks) of Arctic navigation. Again, if Arctic navigation is only seasonal, perhaps during a longer navigation season extended beyond summer, how might the flow of regular container traffic compare with rail operating more efficiently over the course of an entire year? What delays are inherent in the TSR in winter, a key element in this comparison of competitiveness of both rail and sea routes? Should the Russian Federation invest more in this continental rail "bridge" or invest as an alternative in fully developing the NSR?

The promises of the NSR and the TSR, both developed during the Soviet era, remain unfulfilled early in the twenty-first century. However, the promise of the NSR in facilitating the transport of natural resources by ship out of the Russian Arctic appears economically viable for the decades ahead, especially during extended summer navigation seasons. I believe the Russian Federation will focus on NSR infrastructure investments to ensure the flow of natural resources to global markets, mostly in the Pacific, as an integral component of their national economic wellbeing. The primary focus will be appropriately on bulk carriers and tankers operating along the NSR in extended seasons of navigation, while secondary interest will be on the opportunity to capitalize on any container traffic. Some of that traffic and tonnage could plausibly flow from return voyages from the Pacific to the Russian Arctic and northern Europe. However, the primary driving factor for current expansion of the NSR is to support natural resource development in the Russian Arctic, consistent with the findings of the Arctic Council's Arctic Marine Shipping Assessment (AMSA released in 2009) for major shipping throughout the Arctic.

THE SHIPPING CHALLENGE OF THE ARCTIC OCEAN'S FUTURE SEA ICE COVER

A review of the Arctic sea ice simulations of the Global Climate Models (GCMs) reveals that the Arctic Ocean remains fully or partially ice-covered for 9-10 months each year through the century and beyond. However, we do know that the extent, thickness and character of Arctic sea ice are changing in extraordinary ways. The possibility of an ice-free Arctic Ocean for a brief period of time is plausible even before mid-century, as early as 2030 or perhaps even earlier. This physical change will remove the last vestige of multi-year ice with only seasonal sea ice remaining. While the Arctic Ocean will remain fully or partially ice-covered for much of each year, the ice cover will be entirely first year sea ice with limitations on maximum winter growth in thicknesses (plausibly a maximum of 2.2 to 2.5 m). The sea ice cover will also likely be more mobile which will be another significant challenge for ice navigation, by either ships in convoy under icebreaker escort, or ships sailing as independent icebreaking carriers. For background, Figure 2.8 indicates the main Arctic Ocean marine routes, recognizing the Eurasian Arctic as the region most ice-free during the recent and rapid summer Arctic sea ice retreat.

Several issues remain regarding future sea ice conditions and use of the NSR for trans-Arctic navigation and regular container ship routing. The future conditions will determine what polar class ships will be required to traverse the route in any given season. There will be shorter navigation seasons for lower class ships (PC6 ships) compared to longer navigations seasons of higher class ships (PC3). What will be the length

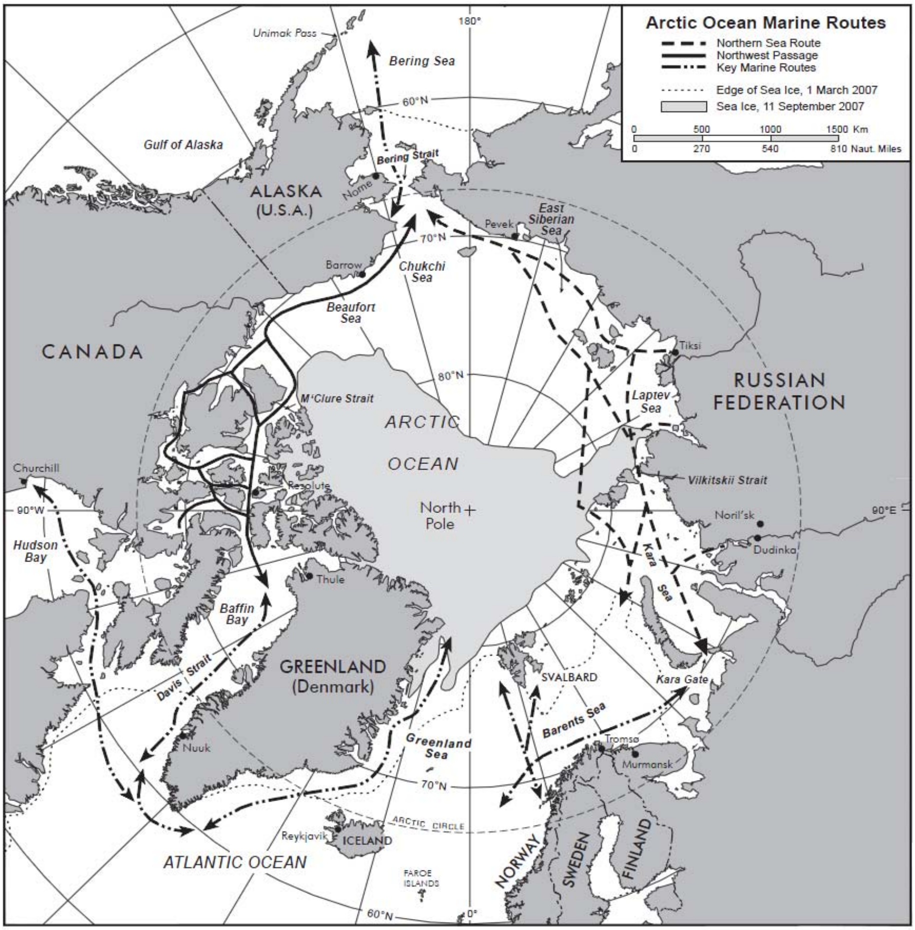


Figure 2.8. Arctic Ocean Marine Routes

of the navigation season, particularly in the autumn, winter, and spring months? What will be the resulting ship speeds, particularly if larger, deeper draft ships will be required to sail north of the islands groups of the Russian maritime Arctic? Ice conditions on more northerly routes will plausibly be more challenging. A key issue is whether all ships will be under constant icebreaker escort during navigation periods other than the summer. Will independently-operated polar class icebreaking carriers be allowed to navigate without icebreaker escort beyond the summer months? What ship speeds might be obtained that will make the NSR competitive, given the prevailing ice conditions in late spring and early autumn? Given the future sea ice simulations of the GCMs, a fundamental question remains whether the NSR can be competitive for container traffic if it is used only on a seasonal basis. While it may be technically and operationally plausible to escort large ships through several meter of ice (for more than 2000 nautical miles), will it be economically viable to do so if the resulting ship speeds are not high enough to make up for the distance savings compared to the Suez Canal route (between the EU and Asia)?

PRACTICAL CHALLENGES AND RISKS

Chapter 2 provides an important review of the main obstacles and risks associated with the use of the NSR: an icebreaking fee system, lack of marine infrastructure, a need for an informational NSR database, a need for unified rules and regulations, and, the challenges of attaining adequate environmental and marine safety measures. Many of these challenges (and needs) are consistent with the 17 recommendations in the Arctic Council's Arctic Marine Shipping Assessment (AMSA). AMSA called for a mandatory International Polar Code of Navigation to replace the current, voluntary International Maritime Organization *Guidelines for Ships Operating in Polar Waters*. Ongoing work at IMO has shown the complexities of developing mandatory regulatory measures that would have three key elements: polar ship construction standards (and identified polar ship classes), polar marine safety equipment, and, ice navigator training requirements and enhanced polar expertise in the pilothouse. Defining the risks associated with different ship types operating in ice-covered and ice-free Arctic waters has proven to be a difficult challenge for the IMO committees. The author's call in his chapter for enhanced international collaboration is timely. IMO is likely the right forum for this to happen among the Arctic and non-Arctic states due to the global nature of the maritime industry. Most certainly the Russian Federation should be a supporter and leader for the NSR to be part of an international framework such as a mandatory Polar Code. Bilateral cooperation, also mentioned in the chapter, will be very important for Arctic waterways such as the Bering Strait region where the U.S. and Russia have adjacent exclusive economic zones (EEZs). Both Russia and the U.S. should cooperate regarding the development of new safety and environmental protection strategies for the Bering Strait region. Any proposed measures, such as voluntary ship routing, in this international strait will have to be submitted to the IMO for review and approval.

Additional challenges confront the use of the NSR for trans-Arctic navigation. There are few ports and associated marine infrastructure along the NSR and most of the Arctic Ocean. Of critical importance for the whole of the Arctic marine environment, only between six and seven percent of the region has been charted to international navigation standards.

The lack of comprehensive charting is an important limitation for the NSR and other potential Arctic shipping routes. Although long stretches of the main straits of the NSR and Northwest Passage have been charted, additional charts are needed for alternative routes in both regions. Finally, the large size and draft of modern container ships looms as a significant factor and practical limitation for global shipping and potential Arctic navigation. Maersk Line has recently ordered ten 18,000 TEU container ships (to be built in Korea by Daewoo Shipbuilding Engineering Company, Ltd.) for delivery by 2013-2015. With dimensions of 400 x 59 x 19 m, ships of this new type are even stretching the limits of operation in the Straits of Mallacca! Maersk Line also operates currently the world's largest containerships at 13,000 TEU (the Emma Maersk at 397 x 56 x 15.5 m ships operating since 2006). Ships of this great size do not appear practical for operation along the NSR or anywhere in the Arctic due their extreme draft and overall size. More discussion and evaluation is required to determine what operational and optimal size and draft limitations might be required for polar class container ships operating along the various routes of the NSR. Ship teu capacities will surely be influenced by any design limitations such as shallower drafts required for operations in Arctic waterways and straits of the NSR. My sense is that modestly sized polar class carriers with built-in icebreaking capability to operate independently may be the norm for potential container operations along the NSR.

EAST ASIA PORT COMPETITION RELATIVE TO THE NSR

Chapter 2 reviews in some detail the East Asia port system and the roles of potential hub ports and multi-hub configurations. He makes a good case for the use of more than one transshipment hub to handle NSR cargo distribution. One interesting factor that requires further understanding is how this vast port infrastructure would operate if the NSR is only used seasonally. How would the hub ports adapt to variable (and seasonal) trans-shipment flows? Would any size limitations for container ships operating along the NSR influence the cargo flows within the port system? Also, key ports in East Asia might develop direct ties to select Russian Arctic ports so that if Russian ships carried out bulk cargoes during summer seasons, containers could be carried on return voyages to the Russian Arctic. Combining East Asia hub ports serving NSR cargoes with other global trade route flows would appear to be a sound strategy as suggested by Chapter 2. Again, plausible seasonal shipping traffic flows along the NSR must be considered one option and the call for a single hub port serving the NSR, such as Busan in South Korea, might better handle potentially variable and seasonal cargo volumes.

SUMMARY AND CONCLUSIONS

The global market connection of Russian Arctic natural resources and greater marine access throughout the Arctic Ocean afforded by regional climate change have provided for opportunities to exercise the NSR system in a "preparatory phase" for commercialization of the route during recent summer operations. Trans-Arctic container shipping possibilities may come later, although some containers could be shipped to the Russian Arctic or even Europe on the return voyages once the main natural resource cargoes have been delivered to their East Asia destinations. Due to the current and projected sea ice conditions for the next two decades, the length of the NSR navigation season remains uncertain. A six-month season is plausible and perhaps economically viable, given the current escort capability of the Russian nuclear icebreaker fleet. More robust economic analyses factoring in a complex of variables are required for the NSR: ice conditions, ship speeds, navigation season lengths, use of northerly routes beyond the island groups of the Russian Arctic, cargo schedules, ice class ship requirements, insurance requirements (and rates), and, operational fees for icebreaking and ice pilotage. Chapter 2 highlights the complex array of factors influencing trans-Arctic navigation along the NSR and I echo his call for enhanced cooperation between the Arctic and non-Arctic states, particularly at IMO in developing a mandatory International Polar Code of Navigation. The expanding use of the NSR should herald a new era of international cooperation in Arctic marine navigation.

Comments on Chapter 2: Inuit perspective

Udloriak Hanson

For those unfamiliar with how the Inuit people are organized, let me offer a few words of explanation. Inuit Tapiriit Kanatami, or ITK, represents the Inuit people of what we call Inuit Nunangat, and what you would call Arctic Canada. The Inuit Circumpolar Council, or ICC, represents the Inuit of what we call Inuit Nunaat, and what you would call the Inuit circumpolar area. The Inuit circumpolar area includes the Inuit part of Canada, but also includes Greenland and the Inuit homelands within Alaska and at the eastern tip of Siberia.

We have worked hard to build up a high level of coherence in our political life, recognizing and accommodating domestic and international political boundaries, without being paralyzed by them. For example, ITK is a member organization of ICC (Canada), and we have intersecting boards of directors. Our time is very limited here and there is much ground to cover so I hope you will forgive me if my remarks are presented in broad brush strokes when there is complexity in Inuit perspectives on this topic.

The title of our session is "Potential Arctic Shipping" and I would like to bring to your attention some of the baseline political and policy considerations that the Canadian Inuit people will bring to bear on any major expansion of shipping in our part of the Arctic. Time will not permit me to be exhaustive or detailed, but I would propose eight key considerations.

Key Consideration 1: Various routes that form the alternate passages of the Northwest Passage pass squarely through Inuit Nunangat. When I say "pass through", I don't mean "pass by". Inuit are a maritime people. Extensive land and marine use occupancy studies have shown that areas used and occupied by Canadian Inuit include larger sea areas than land areas. Arctic sea areas, and the health of arctic seas, remain vital to our identity and to our material well-being and security. The sea provides food, inter-regional and inter-community travel routes, corridors for the import of necessary goods and, similarly, corridors for the export of commodities.

The seas within Inuit Nunangat cover rich geological platforms, still only imperfectly understood, for hydrocarbon exploration and, potentially, production. Any large scale or risk-producing shipping or other use of seas within Inuit Nunangat is not peripheral to us as Inuit people,it is front and center.

Key Consideration 2: Inuit people have not been demographically displaced; we are the strong majority of the permanent populations of both Inuit Nunangat and the Inuit circumpolar Arctic. It is true that in comparison to densely populated areas in other parts of the world we are thin on the ground and on the seas, but our majority is undiminished, and that fact brings with it a whole set of implications for commercial Arctic shipping at both the conceptual and practical levels. We have every intention of sustaining and safeguarding our status as the permanent population of our part of the Arctic.

Key Consideration 3: Inuit people have fundamental rights and expectations under international law, including international human rights instruments. I am sure you are all familiar with the 2007 United Nations Declaration on the Rights of Indigenous Peoples. That Declaration sets out a whole set of tests to govern the behavior of nation states in their interactions with indigenous peoples, particularly in relation to the authorization of resource development and other commercial activities within traditional indigenous homelands.

An operative requirement for most new resource extraction and related transportation projects is "free, prior and informed consent" on the part of the indigenous peoples affected. Equally important as the substance of existing international laws and instruments, is the reality that indigenous rights and interests are a still expanding part of the international legal and political order. There is no reason to believe that global public opinion will permit a reversal of that trend.

Key Consideration 4: Apart from international law, the rights of Canadian Inuit are very well-rooted in domestic Canadian law. A continuous chain of modern treaties between Inuit people and the Crown, representing the Canadian state, now cover lands and seas stretching from the Alaskan border to northern Labrador. These treaties incorporate much of the Canadian side of the Beaufort Sea and all the waters of the Northwest Passage within the Canadian Arctic archipelago. The terms of these treaties vary somewhat from each other, but characteristically create regulatory and other bodies charged with overseeing resource development planning and development, and the environmental assessment and review of development projects, including related shipping elements. Modern Indigenous treaties also contain provisions for dealing with such development related issues as wildlife management, wildlife compensation, and royalty sharing. These treaties have entrenched status under Canadian Constitutional law.

Key Consideration 5: The organization and work of the Arctic Council provide a good example of how, in the international Arctic, an open, respectful, constructive partnership between States and indigenous peoples is a central factor in how and when progress can be made in the coordination of broad objectives and policies. The role of "permanent participants" at the Arctic Council has been an important innovation, but it also can be said to be an important reflection of some longer-term political realities about the Arctic. For non-Arctic states and interests these realities have tangible consequences. I am sure, for example, that there would be many at the European Union who would be surprised that the ill-informed and hypocritical EU legislation blocking seal product imports would color how others evaluate whether the EU can make a useful contribution to the work of the Council.

Key Consideration 6: The previous key considerations combine to make it very difficult to foresee the viability of approaches to development in the Inuit portions of the Arctic that would ignore or marginalize Inuit rights and interests. Perhaps it cannot be said that Inuit people have an all-purpose, formalized "veto" over development and related transportation proposals, but it can be said that such proposals face an extremely high set of barriers in the absence of adequate Inuit participation and support.

Key Consideration 7: Representative Inuit organizations, both in Canada and in the wider circumpolar world, have indicated that Inuit seek a balanced, responsible, and diversified approach to development. Three things have to be weighed in that balance. The first is the need for environmental protections to minimize negative environmental impacts of all kinds and, in particular, to mitigate the risks of catastrophic environmental mishaps.

The second is the need to stimulate economic activities at a level that will allow Inuit people and, in particular, young Inuit people, to enjoy genuine and varied opportunities, including adequate employment, to lead rewarding and productive lives and also to allow Inuit regions and communities to build up a much enhanced degree of economic resilience and self-sufficiency.

The third priority is to ensure that a sufficient share of the public wealth generated by resource development, related shipping, and other projects, is applied within Inuit Nunangat to address, reduce, and, eventually, overcome, the very real and very painful gaps in basic well-being between Inuit people and other Canadians. The negative cycle that sees education, health, and housing problems reinforcing each other must be converted into a virtuous cycle that sees progress in one area reinforcing progress in the others and that accepts that economic development, social development, and cultural continuity must go hand in hand.

Key Consideration 8: An optimistic scenario for Arctic development, in its broadest sense, depends very heavily on the forging of creative and in-depth partnerships between Inuit people and other actors. This is true at the highest levels: active Inuit involvement is necessary in international deliberations affecting the future of the Arctic and Arctic policy making within Arctic States at the national and regional levels. It is also true at the level of community development, and the mix of initiatives and supports developed to assist Inuit households and individuals. Partnership is equally compelling in the private sphere. It is in the self-interest of every private sector development company to search out and enter into solid partnerships with Inuit economic development agencies and businesses. Reliable partnerships with Inuit people in today's world and in the years to come must go well beyond some of the half-hearted, going-through-the-motions, just-for-show efforts Inuit people sometimes have seen in the past. Such things are not only highly probable, but like other Inuit people, I remain confident that they are also very much possible.

Comments on Chapter 2: Russian perspective

Vladimir V. Mikhaylichenko

ARCTIC NAVIGATION IN 2011

In the 2011 navigation period forty-one transit voyages passed through the Northern Sea Route (NSR), including those transporting cargo in ballast for research purposes and transfers. Of these, twenty-six voyages were carrying cargo on tankers (a total of 15 trips, transporting 686,516 tons), bulkers (a total of 3 trips, transporting 109,950 tons), refrigerators (a total of 4 trips, transporting 27,535 tons), and dry cargo vessels (a total of 4 trips, transporting 10,930 tons). In total, 834,931 tons were transported through the route during the 2011 season. The transport of hydrocarbons comprised 82.2% of the total cargo amount. Of the forty-one voyages completed in 2011, twenty-four were on vessels sailing under the flag of the Russian Federation (58%) and 11.3% of Russian flag vessels were carrying cargo. Seventeen voyages were completed by vessels sailing under foreign flags (42%). Foreign vessels comprised 86.9% of total tanker delivery, while Russian tankers accounted for 3.1%.

In comparison with the previous year, turnover in 2011 increased by 5.8 times (145,000 tons in 2010 versus 834,931 tons in 2011). On some days an average of 100 sea and river vessels worked on the NSR in 2011. Most of these vessels were transporting equipment and building materials to oil and gas companies in Baidaratskaya Bay and Ob Bay. The increase in transit occurred due to more numerous shipments of petroleum products. In previous years, the percentage loading of liquid cargo did not exceed 30%. In the future we can expect a significant increase of such traffic on the NSR.

In 2011, the tanker *Vladimir Tikhonov* was the largest vessel ever piloted through the North Sea Route. Several other cargo ships also passed through the route. *Sovcomflot*, a ship owned by JSC Freight One with a deadweight of 162,362 tons carried a cargo of 120,843 tons of gas condensate. The Neste Oil-owned tanker *Palva*, with a deadweight of 74,940 tons and a cargo of 59,313 tons of gas condensate, was piloted through in shortest time, going through the route in just 6.5 days with an average speed of about 14 knots. This voyage was undertaken in the second half of September, the best time for leading, which allowed the Marine Operations Headquarters to choose a navigation route through waters completely clear of ice.

Also in 2011, for the first time in NSR history the tanker *Perseverance*, with a deadweight of 73,788 tons, transported liquid hydrocarbons on three transit routes during one Arctic navigation, completing two routes from west to east and one route back. *Zapolyarny*, a dry cargo vessel of the highest Arctic class (arc7), owned by JSC Freight One and Norilsk Nickel completed two transit routes without icebreaking assistance. *Zapolyarny* transported a cargo of 9,000 tons of nonferrous metal from Port Dudinka to Port Shanghai returned to Dudinka with 7,000 containers.

ANALYSIS OF SHIPMENT VIA NSR IN 2011

Cargo shipment via the NSR in 2011 was estimated at 3,111 kilotonnes (based on the data from the NSR Administration) including:

- Outbound cargo: 806 kilotonnes, comprising 26% of overall shipment
- Inbound cargo: 1,471 kilotonnes (including inner-coastal traffic via NSR), comprising 47.2% of overall shipment
- Transit cargo: 834. 26 kilotonnes, comprising 8% of overall shipment
- Shipment of liquid cargo: 1117.4 kilotonnes, comprising 36% of overall shipment

In adjacent NSR regions that are covered with ice more than six months in 2011 (Article 234 of the Convention on the Law of the Sea) shipments were estimated at 3,900 kilotonnes in the Pechora Sea (the south-eastern part of the Barents Sea), and 4315.3 kilotonnes in the northern part of the Bering Sea.

In 2011 a total of nearly 7.5 million tons of various types of cargo were shipped through the Arctic, including shipments within the NSR boundaries (3,111 kilotonnes) and adjacent regions (4,315.3 kilotonnes). In 2012 shipment within the NSR boundaries may reach 4 million tons, while transit cargo is estimated at half that volume.

Arctic navigation in 2011 showed that cargo ships sailing through the NSR from port of Murmansk to the various ports of Southeast Asia reduced travel time by seven to twenty-two days, compared with sailing through the Suez Canal. This is an important economic advantage of the NSR.

TIME SAVING DURING NAVIGATION VIA NSR FROM EUROPEAN PORTS TO SOUTH ASIAN PORTS, AS COMPARED TO NAVIGATION TO THE SAME PORTS VIA SUEZ CHANNEL

In 2011 the following large vessels (DWT exceeding 20 kilotonnes) navigated the NSR with cargo on board:

Based on the data received from ship owners, the cost per day of the vessels in transit on the NSR, including cost of fuel, is estimated to be approximately $90,000 USD for tankers with deadweight exceeding 150 kilotonnes. For tankers with deadweights between 50-70 kilotonnes the daily operating costs are between $40,000-50,000 USD. For bulk carriers with deadweights of 50-75 kilotonnes the cost is approximately $40,000-50,000 USD. For bulk carriers with deadweights of 20-25 kilotonnes the operating cost is approximately $25,000 USD.

The fee for icebreaking assistance through the NSR, taking in consideration the new flexible tariff, may be equal to the fee for passing through the Suez Canal. The excessive insurance fee for passing through the NSR, accounting for the possibility of ice damage, may be compared with excessive insurance for passing through Gulf of Aden (where the major threat is piracy). The fee for ice pilotage is an additional fee for ships passing through the NSR, but this fee is not very high, costing approximately $10,000 USD for one voyage. In light of these costs, it is clear that the 10-day time savings of navigating through the NSR may reduce ship-owners' expenses by $250,000 to $900,000 USD. However, a serious problem remains affecting economic attractiveness of the NSR. The lack of cargo for return transit from the east to the west would require certain vessels to do return voyages without cargo in ballast. Still, the voyage of the tanker Perseverance at the end of August 2011 shows that there is enough cargo for shipment via the NSR! It is necessary to search for this cargo to prove economic effectiveness of shipment through the NSR.

Vessel	Deadweight	Transit route	Duration
1. Tanker *Perseverance*	73,788 tons	Murmansk (Vitino)–Ningbo (China)	12 days
2. Bulk Carrier *Sanco Odissey*	74,800 tons	Murmansk – Beilung (China)	18.5 days
3. Bulk Carrier *M. Kutuzov*	23,500 tons	Murmansk – Gingang (China)	10 days
4. Bulk Carrier *Dm. Pozharsky*	23,500 tons	Murmansk – Gingang (China)	11 days
5. Tanker *Vl. Tikhonov*	16,236 tons	Murmansk – Bangkok (Thailand)	7.3 days
6. Tanker *Marilee*	74,898 tons	Murmansk – Hangzhou (China)	9 days
7. Tanker *Sti Heritage*	73,957 tons	Murmansk – Bangkok (Thailand)	7 days
8. Tanker *Stena Poseidon*	74,957 tons	Murmansk – Incheon (South Korea)	22 days
9. Tanker *Palva*	74,940 tons	Murmansk – Huizhou (China)	16 days
10. Tanker *Perseverance*	73,788 tons	Onsan, Yosu (South Korea) – Havre (France)	5 days
11. Tanker *Mariann*	74,999 tons	Murmansk – Incheon (South Korea)	20 days
12. Tanker *Affinity*	73,541 tons	Murmansk – Huizhou (China)	14.5 days
13. Tanker *Perseverance*	73,788 tons	Murmansk – Huizhou (China)	8 days

Today the Federal State Unitary Enterprise Atomflot and Directorate of the Partnership are doing this kind of work. Together with our partners in Alaska (the Institute of the North) we are preparing a meeting with certain consignors: Red Dog Mines in Alaska, which transports shipments of zinc concentrate to Europe, and the ports of Dutch Harbor and Adak in the Aleutian Islands which ship frozen fish to Europe.

Red Dog Mine exports over 1 million tons of zinc and lead concentrate per year, usually dispatching part of this concentrate to the European market via the Panama Canal. Surely, shipping between Alaska and Europe may be done much faster through the Northern Sea Route. The distance from the Red Dog Port to the Rotterdam Port through the Northern Sea Route is 4,438 nautical miles, less than half the distance of shipping through the Panama Canal, a route of 10,887 nautical miles. The price for icebreaking assistance on the Northern Sea Route for vessels with cargo of concentrate is approximately equal to the price of sailing through Panama Canal, a cost of $4.00-4.50 USD per ton of cargo. Red Dog Mine dispatches concentrate 100 days per year, from the end of June until the end of September, a very favorable period for transit through the NSR. At this time of the year a cargo vessel can follow icebreaker at full speed.

CONSTRUCTION OF NEW ICEBREAKERS

By the 2015-2016 season the transit traffic through the NSR may rise to 5 million tons, which would require more than 100 ice-breaking leadings per year. To carry out this work it is necessary to have a sufficient number of icebreakers in permanent readiness. According to the Russian Ministry of Transportation and the State Corporation Rosatom, which has conducted a nuclear icebreaker fleet since 2008, it was necessary to begin construction of the head general icebreaker, a new generation nuclear icebreaker. Otherwise, an “ice pause” in 2016 may inhibit a comprehensive program for the development of LNG on the Yamal Peninsula and transportation of hydrocarbons from offshore fields in the Barents and Pechora seas due to the amortization of two shallow-draft nuclear icebreakers Taimyr and Vaigach, working in estuaries. An “ice pause” would reduce the transit potential of the NSR and would limit the dominance of the Russian Federation in the Arctic zone.

The new icebreaker by Project 22220 is the head general vessel to be working in both shallow and deep NSR routes. It replaces two previous types of icebreakers, *Arcticand Taimyr*. The project development was completed in 2008-2009 and the project was approved by the Rosmorrechflot Technical Board in 2009. The federal target program, Development of Russian Transport System (2010-2015), has provided the production of the head general icebreaker since 2010. However, due to the optimization of the federal budget in 2010-2011, funding for these purposes has not been allocated. Only in 2012 did the Russian government assign financing of 5 billion rubles to start building one icebreaker and announced its tender offer. The icebreaker is scheduled to be completed in 2017 and two icebreaker sister ships are expected to be delivered in 2020.

The Federal Law "About amendments to certain Legislative Acts of Russian Federation regarding state regulation of commercial navigation on the route in the waters of the Northern Sea Route" (No. 132-ФЗ) was dated on 28 July 2012 . The bill includes the following steps for its implementation:

- Government regulation on the NSR route, historically a single transportation line of the Russian Federation in the Arctic, will be legally fixed.
- The government of the Russian Federation will set NSR borders.
- The Administration of the NSR will be created as a federal government agency with the definition of its functions to replace the existing Department of Rosmorrechflot, significantly raising the status of the Administration.
- New "Regulations for Navigation on the Seaways of the Northern Sea Route," "Regulations on the Headquarters of Marine Operations," "Requirements for the Design, Equipment and Supply of Vessels Navigating the Northern Sea Route," "Regulations on the Ice Pilot for NSR," etc. will be developed.
- The rates for leading services on the NSR will be approved at the state level.

Development, approval, and implementation of the documents mentioned above must be completed without delay for regular and safe operations on the NSR. The Law was published on July 30, 2012 in the official newspaper Rossiyskaya Gazeta and went into effect 180 days after publishing.

ORDER OF NAVIGATION THROUGH THE NORTHERN SEA ROUTE

"The Regulations for navigation on the seaways of the Northern Sea Route" were officially published on july 13, 1991 in the notices to mariners 29. The following documents can be found on the official web site of Ministry of Transport of The Russian Federation (www.morflot.ru): "Commemorative booklet to the owner or master of a vessel," "Regulation for navigation on the seaways of the Northern Sea Route," "Regulations for icebreakers and pilot guiding of vessels through the Northern Sea Route," "Requirements for the design, equipment and supply of vessels, navigating the Northern Sea Route,"

"Federal rates service order" (no. 122-t/1) dated June 7, 2011 in Moscow, "Procedure of granting permission for the escorting of ships along the Northern Sea Route," "Declaration of readiness of the ship to navigate in the waters of the Northern Sea Route."

STEPS NEEDED TO RENDER ASSISTANCE TO A SHIP IN TRANSIT VIA NSR SEAWAYS

To submit application to the Icebreaking Support and Hydrographic Department (NSR Administration) of the Federal Agency for Marine and River Transport, Ministry of Transport of Russia (http://www.morflot.ru/ sevmorput/), correspondence may be addressed to

Head of NSR Administration: Nikolay MONKO
Tel. +7 495 626-10-64, e-mail: MonkoNA@morflot.ru, www.morflot.ru
125993, Moscow, Petrovka Street, 3/6

To sign a contract for icebreaking services on NSR Seaways with Federal state unitary enterprise *Atomflot* or FESCO JSC Federal state unitary enterprise *Atomflot*, Department of Perspective development and operations, correspondence may be addressed to

Department head: Vladimir ARUTJUNYAN.
Tel. +7 (8152) 553-311, e-mail: arutyunyanvg@rosatomflot.ru,
www.rosatomflot.ru 183017, Murmansk-17, ATOMFLOT

FESCO JSC, Special Fleet department
Department head: Vyacheslav NAGANYUK
Tel. +7 (4232) 52–14–13, e-mail: 63000@63.fesco.ru, www.fesco.ru
690091, Vladivostok, Aleutskaya Street, 15.

PROCEDURES OF GRANTING PERMISSION FOR THE ESCORTING OF SHIPS ALONG THE NSR AND SHIPS PROCEEDING EN ROUTE TOWARD THE NSR FROM SEA WITHOUT CARGO HANDLING IN PORTS OF THE RUSSIAN FEDERATION

1. Submission of applications and declarations about the readiness of ships to navigate the Northern Sea Route.

2. Applications for the escorting of ships along the NSR are submitted to the NSR Administration in accordance with item 3.1 of the "Regulations for Navigation on the Seaways of the Northern Sea Route," 1990.
3. Procedure of the submission of applications and of the required information is specified in Item 2 of the "Regulations for Icebreaker and Pilot Guiding of Vessels through the NSR" (hereinafter referred to as the Regulations).
4. Applications are submitted by ship owners or masters of ships not later than 15 days before the beginning of traffic in the water area of the NSR. It is recommended to submit applications in advance. The NSR Administration accepts applications for consideration within the time period from 4 months to 15 days before the beginning of traffic in the water area of the NSR.

In addition to applications, to facilitate administrative actions on granting permissions, ship owners and masters of ships should send the NSR Administration declarations according to the attached example signed by master of ship and ship owner.

- Consideration of applications and declarations
- According to Item 2.3 of the Regulations, the NSR Administration considers applications for not longer than 10 days and informs the applicants of the appropriate decision.

After the NSR Administration has considered applications and declarations, permissions in accordance with the set form for the escorting of ships along the NSR are issued or a reasoned refusal is sent to the applicant.

PROCEDURES OF GRANTING PERMISSION FOR SHIPS PROCEEDING TOWARD THE NSR FROM INLAND WATER WAYS AND SEA PORTS OF THE RUSSIAN FEDERATION

- Submission of applications about the readiness of ships to navigate the Northern Sea Route.
- Applications for the escorting of ships along the NSR are submitted to the NSR Administration in accordance with item 3.1 of the "Regulations for Navigation on the Seaways of the Northern

Sea Route," 1990.

- Procedure of the submission of applications and of the required information is specified in Item 2 of the Regulations for Icebreaker and Pilot Guiding of Vessels through the NSR (hereinafter referred to as the Regulations).
- Applications are submitted by ship owners or masters of ships not later than 15 days before the beginning of traffic in the water area of the NSR. It is recommended to submit applications in advance. The NSR Administration accepts applications for consideration within the time period from 4 months to 15 days before the beginning of traffic in the water area of the NSR.
- Consideration of applications.

In order to determine the compliance of ships with the established requirements, a survey of ships is carried out before they exit to the Northern Sea Route. The survey of ships is administered by sea port masters in accordance with article 79 of the "Code of Commercial Navigation," Order No. 140 of August 20, 2009 and "the Requirements for the Design, Equipment and Supplies of Vessels Navigating the NSR" each time a ship leaves a sea port proceeding towards the NSR. The NSR Administration may refuse to grant permission for the following reasons: prohibitions or restrictions imposed in compliance with the established legislation, inconsistency with the requirements set for ships navigating the NSR, and the refusal to make agreements for icebreaker escorting if ice conditions and the ice class of the ship require it.

After the NSR Administration has considered applications, either permissions in accordance with the set form for the escorting of ships along the NSR are issued or a reasoned refusal is sent to the applicant. The NSR Administration issues the permission for a calendar period (not more than one year) taking into account the ice class of ship and admissible conditions of navigation in ice. If in the course of the ship's survey the sea port master detects defects jeopardizing the safe navigation of the ship in the NSR, the sea port master performing the survey may refuse to grant the ship permission to leave the sea port in accordance with article 80 of the "Code of Commercial Navigation", even if the ship has the permission to navigate in the area of the NSR issued by the NSR Administration.

ORDER OF PRIORITY OF ESCORTING SHIPS ALONG THE NSR

During the navigation period is permissible along the NSR ships are under the surveillance of the Headquarters of Marine Operations. Observation of ship traffic from west to east allows the Headquarters of Marine Operations to coordinate ship flows, providing ships with a pilot, icebreaker support, and notifying ship masters of ice and hydrometeorological conditions. Depending on ice conditions, the Headquarters may specify and provide for the following types of escorting: icebreaker escorting or escorting according to the recommended routes to a definite geographic point (Item 1.4 of the *Regulations for Icebreaker and Pilot Guiding of Vessels Through the NSR).*

In accordance with Item 2.12 of the Regulations for Icebreaker and Pilot Guiding of Vessels through the NSR the priority established by the Headquarters of Marine Operations for the date and origin point of icebreaker escorting of ships, as stipulated in agreements for conducted between ship owners and icebreaking fleet operators. In prioritizing the escort of ships, the Headquarters of Marine Operations considers recommended routes to a definite geographic point. One type of escorting is used for ships navigating in ice-free areas of the NSR or for ice class ships enabled to independently proceed along the NSR under certain ice conditions. In the latter case, the escorting priority is not fixed. Ships may depart for the voyage as soon as they are ready to depart after receiving the permission of the NSR Administration or registration of ship for leaving the sea port.

Two new documents are introduced in the specification of documents: “Procedure of Granting Permission for the Escorting of Ships along the NSR” and “Declaration of Readiness of the Ship to Navigate in the Waters of the Northern Sea Route.” These documents make access to the NSR for ship owners and masters of ships much easier. For example, Article 1 of the “Procedure” now allows ship masters and owners to submit an application no later than 15 days before the beginning of traffic in the water area of the NSR, previously it was not later than 4 months. In addition, the new “Procedure” allows owners and ship masters to get permission without preliminary examination of the ship if it transits without cargo operations in Russian ports and has submitted declarations to fully satisfy the NSR Administration.

The effective and regular operation of the NSR requires solving major issues to ensure maritime safety and good service for transit vessels. In 2011 the funding for the continued development of mapping, securing reliable operation of the navigation and hydrographic equipment through the NSR, and regular water soundings on the Northern Sea Route allocated from the budget. Seven hydrographic vessels have been involved for the first time in recent years on the route. Several issues still require attention, however, including determining the possibility of bunkering vessels around the NSR, maintaining a supply of fresh water, setting up crew rotation points, and the implementation of emergency and urgent repairs of vessels and their diving inspections. Additionally, ports would need to be opened for non-Russian vessels with the appropriate servicing infrastructure so that foreign ships can take advantage of these same services. Some potential ports on to establish these services for the NSR could be Port Dickson on the West and Port Pevek on the East. These ports are located on the NSR, have deep-water and closed roads, and are suitable for large-capacity vessels. It will also be necessary to restore infrastructure for servicing vessels in the far-eastern Port Providenie, called the "East Gate of the Arctic," and already opened to foreign vessels.

TARIFF POLICY OF THE NSR

The new tariff (the FTS of Russia No. 122-t/1 of June 7, 2011) for the services of icebreakers on the NSR is flexible and allows for the application of tariffs below the limit, significantly increasing the attractiveness of the NSR for ship owners and operators, including foreign ones and those engaged in transit navigation. The previous rates virtually locked the NSR, since the rates were prohibitively four to six times higher than the rates of the Suez Canal. As a result of flexible tariff policy, more than 834,931 tons of cargo were carried in transit in 2011, which is an absolute record in the history of the NSR.

The leading of vessels in order to ensure delivery on the NSR is more active now and the transportation of equipment for the construction of pipelines in the Arctic and scientific research, including work on the delimitation of the Russian Arctic Shelf, is more frequent. Four nuclear icebreakers and one diesel icebreaker currently perform proper ice breaking support in the NSR. There is also new advanced cargo traffic in the NSR, including the carriage of frozen fish from far east to the western Russian ports and transportation of petroleum products produced at the Arctic fields. Large tankers with a cargo of oil products undertake round trips from east to west and back.

According to the governmental order of the Russian Federation from July 3, 1995 (No. 239), "About Measures on Streamlining State Regulations of Prices (Tariffs)," on the basis of the references from Rosatom, the state corporation on atomic energy, and the report of the Board of FST of Russia from June 7, 2011 (No.33), provisions have been made to set maximum tariffs for icebreaking fleet services on NSR Seaways. Additionally, under the recommendations of these documents, the establishment of tariffs for icebreaking fleet services on NSR Seaways can be applied at the level or below the maximum tariff.

SUMMARY

To increase the economic attractiveness of NSR cargo traffic, the tariff for icebreaking leading on the route must remain equal to or less than the 10-15% tariff for using the Suez Canal. It will be necessary to promptly negotiate "Regulations for Navigation on the Seaways of the Northern Sea Route," "Regulations on the Headquarters of Marine Operations," "Requirements for the Design, Equipment and Supply of Vessels Navigating the Northern Sea Route," "Regulations on the Ice Pilot for NSR", etc., and make these documents simple and understandable for all ship owners, including foreigners. Additionally, it will be necessary to increase the amount of back cargo in order to decrease number of ballast voyages through the NSR.

Today the Federal State Unitary Enterprise Atomflot and the Directorate of the Partnership are doing this kind of work. Together with our partners in Alaska (the Institute of the North) we are preparing a meeting with consignors, for example, Red Dog Mines, and the Ports of Dutch Harbor and Adak, to build a new double-draft icebreaker to be completed in 2017. This new icebreaker will help to eliminate the expense of engaging an icebreaking fleet for transit vessel leading. In order to make the NSR a viable route it will be necessary to outfit new deep-water routes to provide for the safety of navigation for large capacity vessels (with the draft over 15 meters) and to restore or build new infrastructures for servicing vessels on the route and to open ports for servicing foreign vessels.

Comments on Chapter 2: European perspective

Jerome Verny

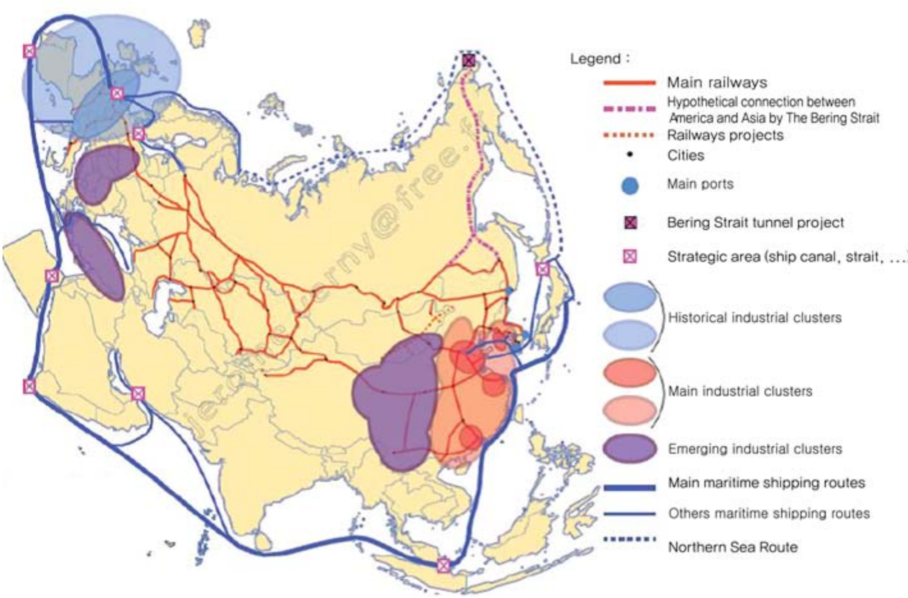
There is real potential for Arctic shipping along the North Sea Route (NSR) thanks to new transport services options like integration between the NSR and the Trans-Siberian Railway (TSR). Traveling from Shanghai to Rotterdam, an average transit time along this route is twelve to eighteen days, versus one or two days by air and an additional twenty eight days necessary on route through the Suez Canal. When shipping via the NSR, transporting 1 TEU (equivalent to 14 metric tons) between Shanghai and Rotterdam is approximately double the expense of shipping through the Suez Canal. Though both options are cheaper than shipping by air freight, the total shipping cost depends on the value of the product, the cost of logistic services, time constraints, the season, the shippers and logistics providers' strategies, and the reliability versus efficiency relationship. As Chapter 2 suggests, with global warming and the melting of polar ice, a new itinerary can be imagined permitting maritime transport between the markets of northeastern Asia and northwestern Europe via the NSR, passing through the Arctic Ocean and utilizing the TSR.

Several factors justify renewed interest in the NSR. For example, the NSR presents advantages linked to its geography. In the map below, it is clear that the shortest distances between the industrial clusters in northeastern Asia and the European consumer market are connected by the NSR and the TSR.

This map also highlights the Bering Strait tunnel project, a potential international commercial route viable in the long term. I included this route in the map because I believe there will be more discussion about this project in the near future. The Kremlin wants to complete the extension of the rail network to the tip of Siberia by 2030. But the new geography of places and flows also depends on the relocation of industrial clusters towards eastern and central Europe and towards western China. The offshoring, versus backshoring, of the industrial clusters is correlated with the new value added logistics strategy. This new economic geography can explain the renewal of research works on the NSR and the TSR. The development of the NSR could depend on the reliability of the TSR, an intermodal system, and a new supply chain organization. It is imperative to analyze the prospective link between the NSR and the TSR as The author tries to do.

As Chapter 2 presents, the NSR poses new accessibility challenges for north-east Asian countries, but also does for Europe. Murmansk and Indiga are the two ports that will supply Eastern Europe, the new economic center of the continent, from the NSR. But these Russian ports must prepare for the evolution of a new geography of freight flows (see Figure 2.9). Port authorities need to invest, in the near future, in new terminals, in new handling tools, and more. At the same time, they will need to optimize their land accessibility using new inland transport infrastructures. However, building transport infrastructures is not enough. It is also necessary to develop good organization across infrastructures.

One example, of course, are dry ports. There may be well developed infrastructures, but dry ports are developed only if we can integrate them and optimize organization of freight flows through an understanding of the evolution of supply chain management. Logistic platforms on dry ports add value to each product (for example, postponement, in order to minimize the transshipments costs between rail and road). The optimal location of dry ports will be strategic in the success to link the NSR with eastern Europe. In order to promote inland accessibility, opportunities for northeast Asian and European countries and to develop intermodalism, the European Union and Russia need to develop plans for cooperation on the NSR as soon as possible.



source : Jerome Verny

Figure 2.9. New geography of freight flows

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Comments on Chapter 2: Chinese perspective

Xu Hua

In Chapter 2, six major obstacles of Arctic shipping are presented. The first of them is the ice breaking fee imposed by Russia, which lessens the attractiveness of the NSR and prevents more carriers from sailing on it. I will consider this cost as one of the three determinants of the economic potential of the NSR. Another determinant is the sea ice extent along the NSR. As the author mentions, the estimated ice-free duration of the NSR in the long-run varies widely among different researchers, so it is uncertain how long the NSR will be navigable during a year. Although it is clear that in September sea ice is no longer a barrier to the NSR, the sea ice extent in August and October is uncertain and likely change to a great extent on a year-to-year basis. For example, in 2011 the NSR was totally ice-free at the end of July, while in 2008 the sea ice east of the Taymyr Peninsular, which blocked the NSR, did not melt until September. If a ship need to pass though the NSR in August and October, backup from an icebreaker will be indispensable to maneuver through the changing sea ice. The last determinant is the bunker price. If other conditions remain unchanged, the fuel cost saved by shipping through the NSR will rise (or fall) when the bunker price is higher (or lower). So, the above three determinants—the ice breaking fee, the sea ice extent, and the bunker price—determine how long the most economical duration will be in which ships pass through the NSR with icebreaker escort. When the ice breaking fee is low but the bunker price is high, for example, it may be economical to expand the navigational duration by more intensive use of icebreakers even if the NSR is blocked by sea ice.

The prime difference between the author's work and mine is that I specifically focus on Asia-Europe container lines that use the NSR as a seasonal alternative route. Because the schedule of an ocean-going container line is fixed, usually a weekly service is provided in spite of the distance. That is to say, the total transit time of an Asia-Europe line via the traditional Suez Canal Route (SCR) is unchanged when the ship goes through the NSR. The only difference between the SCR and the NSR is that ships can steam more slowly on the NSR, and in turn the fuel cost can be saved considerably.

An Asia-Europe line can use the NSR as an alternative route seasonally. As we have observed, the NSR has been totally open throughout September since 2008. If a ship from an Asia-Europe line passes through the NSR instead of the SCR in September, it can be free from icebreaker escort. However, while the NSR is blocked by sea ice in August and October, ships can still choose the NSR in these months if the ice breaking fee is low enough or the ice condition is light enough for ships to pass. There is the trade-off between the ice breaking fee and the fuel cost, leading to overall savings. Below is a model that quantifies this trade-off.

The fuel cost model. The fuel cost per round is determined by the fuel consumption rate, the transit time per round, and the bunker price:

$$F = FP \cdot BHP = FP \cdot m \cdot V^3$$

F - fuel consumption rate (t/h)

FP - fuel consumption rate of unit power (t/h/kW)

BHP - brake horsepower of the engine (kW), which is cubic proportional to the speed.

V - speed (knot)

m - proportional factor

Furthermore, the speed is related to the distance and transit time:

$$V_i = L_i / T_i$$

V_i - average speed in leg i of the route (knot)
L_i - distance of leg i of the route (n mile)
T_i - transit time of leg i of the route (h)

Thus, the fuel cost per round can be written as:

$$CF = PF \cdot \sum_{i=1}^{I} F_i \cdot T_i = PF \cdot FP \cdot m \cdot \sum_{i=1}^{I} L_i V_i^2 = K \cdot \sum_{i=1}^{I} L_i V_i^2$$

where $K \equiv PF \cdot FP \cdot m$
CF - fuel cost per round ($)
PF - bunker price ($/t)
I - number of legs of the route

We assume that there is a typical weekly Asia-Europe line, on which eight ships are assigned with a total transit time per round of fifty-six days and call at four ports in East Asia and Western Europe each, with staying one day at each port. The voyage time on sea, therefore, is forty-eight days. This line can be divided into four legs if it uses the SCR: two intra-regional legs (that is, in East Asia and West Europe) and two inter-regional legs (eastbound and westbound ocean-going SCR legs). Similarly, the line can be divided into six legs if it uses the NSR: two intra-regional legs, two inter-regional non-ice legs (eastbound and westbound NSR legs which consist of ice-free water segments), two inter-regional ice legs (eastbound and westbound NSR legs which consist of ice water segments). Each leg of the line is shown in Figure 2.10.

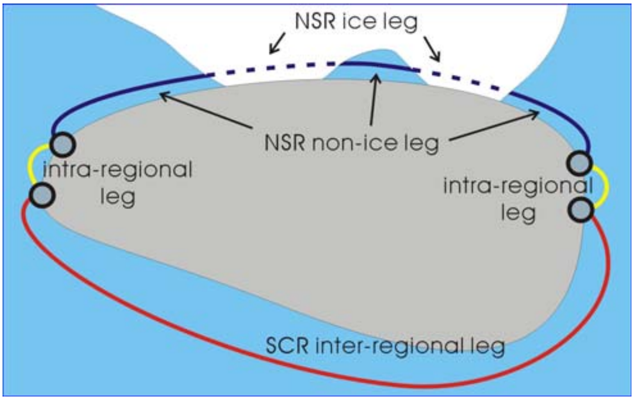

Figure 2.10. Legs of NSR and SCR

The speed of ships via the SCR is:

$$V_S = (L_A + L_E + L_{SE} + L_{SW})/48/24$$

V_S - speed in all legs of the SCR (knot)
L_A - distance of the intra-regional leg in East Asia (n mile)
L_E - distance of the intra-regional leg in West Europe (n mile)
L_{SE} - distance of the eastbound inter-regional leg of the SCR (n mile)
L_{SW} - distance of the westbound inter-regional leg of the SCR (n mile)

The fuel cost of a ship sailing on the eastbound and westbound SCR voyages are:

$$CF_S = K \cdot (L_A + L_E + L_{SE} + L_{SW}) \cdot V_S^2 = K \cdot (L_A + L_E + L_{SE} + L_{SW})^3 / 1152^2$$
$$CF_{SE} = K \cdot L_{SE} \cdot V_S^2 = K \cdot L_{SE} \cdot (L_A + L_E + L_{SE} + L_{SW})^2 / 1152^2$$
$$CF_{SW} = K \cdot L_{SW} \cdot V_S^2 = K \cdot L_{SW} \cdot (L_A + L_E + L_{SE} + L_{SW})^2 / 1152^2$$

CF_{SE} - fuel cost on the eastbound inter-regional leg of the SCR ($)
CF_{SW} - fuel cost on the westbound inter-regional leg of the SCR ($)

Similarly, the fuel cost of a ship sailing on the eastbound NSR voyage is:

$$CF_{NE} = K \cdot \left(L_{NNE} V_{NNE}^2 + L_{NIE} V_{NIE}^2\right)$$

CF_{NE} - fuel cost on the eastbound NSR voyage ($)
LN_{NE} - distance of the eastbound non-ice leg of the NSR (n mile)
LN_{IE} - distance of the eastbound ice leg of the NSR (n mile)
VN_{NE} - speed in the eastbound non-ice leg of the NSR (knot)
VN_{IE} - speed in the eastbound ice leg of the NSR (knot)

In fact, VNIE is the average speed of an icebreaker cutting a way through an ice field, and is based on data from practice. According to the assumption that the transit time is fixed via the NSR, we can draw a constraint condition. After all, we can add the ice breaking fee to the fuel cost as the object function to be optimized:

$$\min\{C_{NE}\} = \min\{CF_{NE} + BF_{NE}\} = \min\left\{K \cdot \left(L_{NNE} V_{NNE}^2 + L_{NIE} V_{NIE}^2\right) + BF_{NE}\right\}$$
$$\text{s.t. } L_{NNE}/V_{NNE} + L_{NIE}/V_{NIE} = L_{SE}/V_S = 1152 \cdot L_{SE}/(L_A + L_E + L_{SE} + L_{SW})$$

$$L_{NNE} + L_{NIE} \geq L_{NE}*$$

C_{NE} - sum of the fuel cost and the ice breaking fee of the eastbound NSR voyage ($)

BF_{NE} - ice breaking fee of the eastbound NSR voyage ($), a function of the distance of the ice leg. It goes higher when LNIE is larger, which implies that the worse the ice condition is, the more ice breaking service is needed.

$L_{NE}*$ - minimum distance of the entire eastbound inter-regional leg of the NSR (n mile)

It should be noted that LNNE and LNIE are variables because the exact route of the NSR can be varied due to different ice condition. In most circumstances, if a ship wants to pass through a shorter ice leg to save on the ice breaking fee, it has to pass a longer non-ice leg, as Figure 2.11 shows.

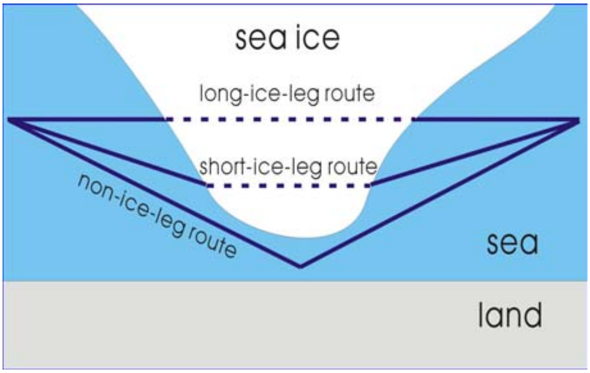

Figure 2.11. Trade-off between non-ice leg and ice leg

The approach for westbound NSR voyage is symmetrical. We can see that when the NSR is totally open in September, LNIE and BFNE both equal to zero and LNNE equals to LNE*, so CNE reduces as:

$$C_{NE} = K \cdot L_{NNE} V_{NNE}^2 = K \cdot L_{NE}*^3 \left(L_A + L_E + L_{SE} + L_{SW}\right)^2 / L_{SE}^2 / 1152^2$$

After all, through the above approach, we can calculate CNE* and CNW*, the optimal cost of the eastbound and westbound NSR voyages respectively, including the fuel cost and the ice breaking fee. Compare them with the fuel cost on the SCR:

$$R_E \equiv C_{NE} */CF_{SE}$$
$$R_W \equiv C_{NW} */CF_{SW}$$

When RE is bigger than 1, it indicates that the NSR is more economical than the SCR, and a ship on the eastbound voyage of an Asia-Europe line has an incentive to choose the NSR as an alternative route rather than remain on the SCR. For a westbound voyage the situation is the same. Because of the seasonal fluctuation of the sea ice extent, the distance of the ice legs LNIE and LNIW can vary widely. Therefore, for an Asia-Europe line the alternative route of the NSR is seasonal (see Figure 2.12). Furthermore, the bunker price and the ice breaking fee also influence the result. If the ice breaking fee is higher, a ship is more likely to remain on the SCR. However, the effect of the bunker price is not so explicit.

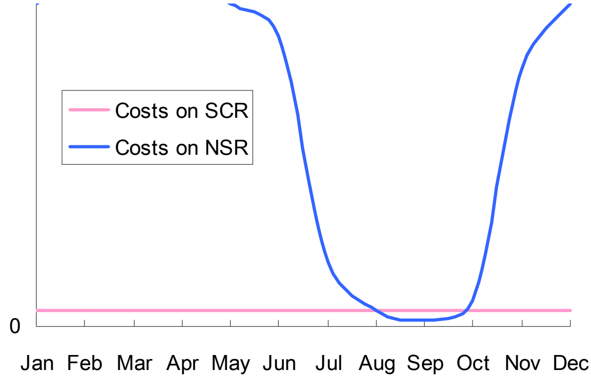

Figure 2.12. Seasonal costs comparison between the SCR and the NSR

Comments on Chapter 2: Japanese Perspective

Ryuichi Shibasaki

My comments mainly consist of three parts. First, I will summarize recent responses to arctic shipping delivered from several bodies in Japan including the Japanese government, media, other organizations, and researchers. Secondly, I would like to provide a kind of worldwide perspective for potential arctic shipping from the viewpoint of the Panama Canal and Suez Canal as potential competitors. Since I am now engaged in a Japan International Corporative Agency (JICA) project to improve management capacity of the Suez Canal Authority (SCA) as a specialist on demand analysis and the forecast of maritime shipping, I will give a few comments from that perspective. Additionally, I am a researcher who specializes in developing simulation models for worldwide intermodal freight flow. From that perspective I will comment on the possibility of developing a model which includes arctic shipping and related issues.

RESPONSES TO ARCTIC SHIPPING IN JAPAN

Until recently, Arctic shipping was rarely featured in Japanese media but interest is steadily increasing. For example, Asahi-Shimbun (which is one of the most popular newspapers in Japan) recently ran an article on Arctic shipping over its first and second pages (Asahi-Shimbun 2012), addressing how shipping distance will be saved and how much ice-breaking vessels will cost. Related business papers and journals also sometimes feature arctic shipping (for example, Zasshi Kaiun (Maritime Shipping Journal), January 2010).

Since more than thirty vessels passed through the Arctic last summer, Japanese government attention to the North Sea Route is rapidly increasing and they are starting to gather information through various channels. For example, the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) of Japan launched an internal study meeting on Arctic shipping on August 3, 2012 which was attended by leaders from all related departments in the ministry including Maritime Bureau, Ports and Harbors Bureau, Hokkaido Bureau, Coast Guard, and Metrological Agency (MLIT of Japan 2012).

Since Japan is located at the east end of the Far East, the Arctic route would not only save shipping distance to northern Europe but there is also potential for a Japanese port to serve as a hub as a gateway for Arctic shipping. For example, the port of Tomakomai, which is the biggest port in the Hokkaido region, had a seminar on the potential of Arctic shipping and the possibility for port of Tomakomai becoming a gateway for the arctic shipping, in collaboration with the IAPH project team, discussed below.

The Ocean Policy Research Foundation launched a "Japan-Arctic Sea Talk" in 2010, and published policy recommendations in Japan for a sustainable utilization of the Arctic Sea (Ocean Policy Research Foundation 2012). There are nine recommendations including "to appropriately respond for a potential change in logistics expected with the development of the North Sea Route," in which recommendation it is pointed out that the Japanese response for potential logistics change is far behind Korea, considering the activities of Korea Maritime Institute (KMI) and Korea Transit Institute (KOTI).

The International Association of Ports and Harbors (IAPH) organized a project team (Port Planning and Development Committee) and launched research on the effect of the Arctic Sea routes navigability on port industry last year. In the project team, two Japanese experts, Dr. Furuichi (JICA expert), and Dr. Otsuka, who presented at last year's North Pacific Arctic Conference, play a key role. They delivered a mid-term report at the recent International Association of Ports and Harbors (IAPH) conference (May 2012) on the potential of the Arctic Sea Routes by showing trial calculation results of how much shipping cost can be saved by utilizing the NSR (Furuichi, Otsuka, and Tomakomai Port Authority 2012).

ARCTIC SHIPPING AS A COMPETITOR FOR THE PANAMA AND SUEZ CANAL

The Panama Canal is now implementing its expansion project to be completed in 2014. Before the project was approved in a national referendum in 2006, the Panama Canal Authority (PCA) made various studies on future demand to pass through the Panama Canal after expansion. All the reports are still available in its website http://www. pancanal.com/eng/plan/temas/. Among them, the Arctic marine transport is seen as a potential competitor, although its main competitor is Northern Western Passage (NWP), not the NSR (Panama Canal Authority 2005). Since the major focus of the PCA studies was to determine whether the expansion project of the Panama Canal is viable or not from a financial viewpoint, especially in the worst case scenario, the NWP and NSR were apparently deemed just as one of various risk factors. At any rate, it is not too much to say that the NSR and NWP are potentially strong competitors for the Panama Canal, even though they will not be realized in the near future.

As for the Suez Canal, the NSR is the more threatening competitor due to its geographical condition. As many researchers have pointed out, more than 40% of the shipping distance between North Europe and Far East Asia can be saved by utilizing the NSR. Because vessels that can benefit by utilizing the NSR are limited from both viewpoints of vessel type (e.g. vessels in regular service such as containership may find it difficult to utilize the NSR because it cannot be used throughout the year) and regional combination (e.g. for many tankers connecting Middle East and Europe, the NSR will not be a strong competitor), it will take more time until the potential of the NSR as a competitor becomes clear. However, the SCA already recognizes it as a strong future competitor. We are going to analyze the degree to which the NSR will be able to compete, in our ongoing project to forecast future demand of the Suez Canal.

POTENTIAL FOR DEMAND FORECASTING MODEL AND RELATED DISCUSSIONS

I have developed an international intermodal freight flow model considering both maritime and land shipping network all over the world (National Institute for Land and Infrastructure Management of Japan 2010, Shibasaki and Watanabe 2010, Shibasaki and Watanabe 2012). The model can predict a flow pattern of maritime container shipping and land cargo transport by inputting cargo shipping demand on a regional basis and related policies on logistics infrastructure. I also attempted a risk simulation by using the model on a scenario in which the Singapore-Malacca Strait is blockaded due to some reason. The result was that the impacts to Malaysian ports such as Port of Tanjung Pelepas and Klang are significant compared with those to Port of Singapore and Indonesian ports (Shibasaki 2010). In this model, in addition to all major trunk routes for maritime container shipping including a service between Europe and Far East Asia, the Trans-Siberian Railway (TSR) is also already incorporated, although validation and calibration of the model when TSR is included is still inadequate. I would like to develop a model that includes both the NSR and TSR in order to evaluate the impacts of the NSR on the worldwide cargo shipping market and global logistics infrastructure such as the Suez Canal and Panama Canal, after sufficient verification of the model.

There are two possible problems when developing a model to include the NSR. First, my model does not include maritime bulk shipping at the moment. There is no real technical problem in developing a route choice model for maritime bulk shipping; therefore, in the ongoing project for the Suez Canal, it will be included. A more important problem (or in other words, a discussion point) is how to evaluate the significant characteristics of the NSR, i.e., seasonal differences of availability. This cannot be easily incorporated into the model developed on a regular shipping basis. A new approach will be required.

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Comments on Chapter 2: Korean perspective

Seo-Hang Lee

For the last several years, the Arctic's sea ice cover has undergone an historic transformation due to climate change. Ice in the region is thinning and there is reduction of it in all seasons, including loss of multi-year ice in the central Arctic Ocean. These changes allow increases in marine access throughout the Arctic Ocean and potential longer seasons of navigation and possibly trans-Arctic voyage in the summer.[1] These changes also make the Northern Sea Route (NSR), the Arctic sea route along the Russian coast of Siberia, one of the most feasible international shipping routes connecting Europe and East Asia.

Previously, no non-Russian ships traversed the NSR, but during the summer seasons since 2004, merchant, research, and expedition vessels have journeyed through the NSR and that volume is set to increase. For instance, the 34 vessels that traversed the route last year shipped 820,000 tonnes of cargo. The official Russian forecast suggests that this year's figure will be 1.5 million tonnes. By 2020, according to American estimates, the figure will rise to 64 million tonnes, making the transit traffic in the NSR more regular. Last September, shortly before the end of the NSR's four-to-five month season, Mr. Putin, then the Prime Minister of Russia, predicted that the NSR would one day rival the Suez Canal.[2]

The Arctic sea routes, notably the NSR and the Northwest Passage, could bring significant economic benefits. For example, the NSR, transiting the coast of Siberia between North Atlantic and North Pacific, would trim about 5,000 nautical miles and a week's sailing time from the use of the Suez Canal and the Malacca Straits. Taking the Northwest Passage, which weaves between Canada's high Arctic islands, could reduce the distance by 15%. This would mean a shorter journey time, or alternatively allow ships to go more slowly, saving on bunker fuel, the price of which rose by one third last year. The Arctic passages are also free of the piracy that is rampant in some other parts of the world, costing shipping companies an estimated $7 billion USD to $12 billion USD a year in insurance premiums, ransoms and disruption.[3]

These potential savings in time and money are the main reasons why Korea, which is heavily dependent upon the sea lane in terms of transportation of its exports and imports,[4] is very much interested in the Arctic sea routes, particularly the NSR. Korea believes that the Arctic sea route could serve as a new useful sea lane, which will enable shorter times between Europe and East Asia, thus resulting in substantial cost saving for ship operators. In fact, in early September 2009, two German merchant vessels (Beluga Fraternity and Beluga Foresight) made successful voyages through the NSR and the Northeast Passage, departing from Ulsan of Korea to Novy Port in Russia. They eventually sailed around the Yamal Peninsula, crossed the Barents Sea to Murmansk, and headed on to Onne, Nigeria, being escorted along sections of the NSR by Russian nuclear ice breakers. No doubt, these voyages highlight the possibility of clear passage through the Arctic sea routes.

Before the Arctic sea route can be reliably used as a transit passage between Europe and East Asia, however, several issues will need to be resolved. Dr. Sung-Woo Lee identified a number of obstacles and challenges in the chapter, and these risks have to be properly addressed. We believe that all the stakeholders in the Arctic shipping—Arctic and non-Arctic states and relevant international organizations—must be included in discussions of the improvement of a critical waterway used for international navigation.

In addition to shipping, Korea is interested in other Arctic-related maritime industries. Korea, as a leading shipbuilder in the global market, is interested in building icebreakers, drill ships and other vessels which can contribute to safe operation in Arctic resource development and exploration. For instance, in recent years, the STX, the Hyundai and Samsung Heavy Industry have won several deals with Russia to build a LNG carrier, oil tanker (Vasily Dinkov) and a drill ship with ice breaking capacity.[5]

Korea, as one of the stakeholders in Arctic shipping, will do its best to foster international cooperation. Korea's efforts to promote cooperation in the Arctic may be grouped into three levels: bilateral, regional (multilateral), and global. First, the bilateral efforts include the joint ventures and the business-to-business talks with the Arctic states including Russia. Secondly, the regional measures may include the strengthening discussion and cooperation with China and Japan on Arctic marine transport. Finally, in view of the comprehensive nature of the Arctic environment, international cooperation will be necessary at the global level to include all the stakeholders of the Arctic.

Notes

1. Lawson W. Brigham, "The Challenges and Security Issues of Arctic Marine Transport," in James Kraska, ed., Arctic Security in an Age of Climate Change (New York: Cambridge University Press, 2011), p. 20.
2. The Economist, June 16th 2012, Special Report, p. 15.
3. Ibid.
4. In Korea, in terms of volume, seaborne trade accounts for 99.6~99.7%

of the total foreign trade; airborne trade represents 0.3~0.4%. Almost no cargo movement over land is reported since Korea does not have much trade with the communist regime of Pyongyang.

5. The Economic Daily (Maeil Kyungje), July 19 and 20, 2012.

PART II

The IMO and Arctic Marine Environmental Protection

3. The IMO and Arctic Marine Environmental Protection: Tangled Currents, Sea of Challenges*

David L. VanderZwaag

INTRODUCTION

In the wake of the 1982 UN Law of the Sea Convention (LOSC),[1] the International Maritime Organization (IMO) and its complex array of rules and standards governing international shipping are certainly central to marine environmental protection in all ocean regions including the Arctic. Article 211(1) of LOSC requires states to work through the IMO to establish international rules and standards to prevent, reduce and control vessel-source pollution and to promote the adoption of routeing systems designed to minimize accidents which might cause pollution of the marine environment. Article 211(2) requires all flag states to adopt laws and regulations for the prevention and control of pollution from vessels flying their flag with such laws and regulations having at least the same effect as that of generally accepted international rules and standards. Article 94(4)(c) obligates all flag states to ensure their masters, officers and crews observe all applicable international regulations relating to the safety of life at sea and the prevention and control of marine pollution. Article 211(5) allows coastal states to adopt vessel-source pollution laws and regulations applicable to foreign ships in exclusive economic zones (EEZs), but those laws and regulations must conform to generally accepted international rules and standards.[2] For straits used for international navigation, LOSC provides all vessels the right to transit passage[3] and a coastal state's pollution control powers are limited to giving effect to applicable international regulations.[4]

However, the role of the IMO and the applicability of its international shipping standards may be limited in some waters of the Arctic in two ways. First, Article 234 provides coastal states with special legislative and enforcement powers to control marine pollution from vessels where waters are ice-covered for most of the year.[5] An example of an Arctic coastal state exercising such powers is Canada, which has unilaterally imposed zero discharge standards for oil[6] and garbage[7] from ships and in 2010 imposed, without seeking IMO approval, mandatory reporting for some vessels before entering the Northern Canada Vessel Traffic Services Zone covering all of Canada's Arctic waters (Figure 3.1).[8]

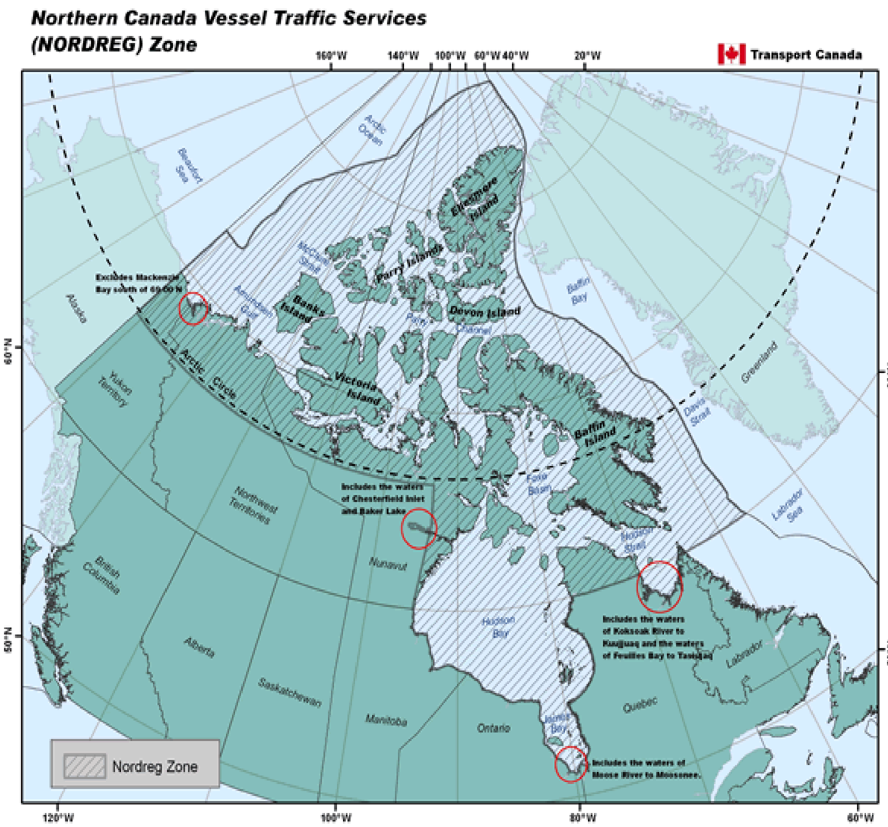


Figure 3.1. Map of the NORDREG Zone

The Russian Federation has also imposed special restrictions on shipping through the Northern Sea Route, for example, tankers are not allowed to discharge oily ballast water and deposits of garbage from ships are prohibited.[9] Denmark in its Strategy for the Arctic 2011-2020, issued in August 2011, gives notice that it may also consider the adoption of unilateral measures relying on Article 234 of LOSC.[10]

Many questions of interpretation surround Article 234.[11] Those questions include, among others: What constitutes ice-covered waters for most of the year? What is the significance of giving special coastal state powers only in the exclusive economic zone?[12] How far may navigational reporting and safety requirements be imposed by an Arctic coastal state without IMO approval? Canada's unilateral imposition of mandatory reporting through NORDREG for ships entering Canadian Arctic waters raised considerable expressions of concern by other states on various grounds including the failure to work through the IMO Sub-Committee on Safety of Navigation in seeking formal approval.[13] Canada helped to "calm the waters" by subsequently clarifying in an explanatory document that it was relying on Article 234 for its unilateral measures[14] and Canada requested that the IMO bring the NORDREG system to the attention of Member Governments through an information circular which did occur.[15]

A further issue raised by Article 234 is whether the special legislative and enforcement powers bestowed on coastal states also apply to straits used for international navigation.[16] Since Article 233 of LOSC, which sets out various safeguards for straits used for international navigation,[17] does not specifically exempt straits from the application of Article 234, there is a strong argument for the extension of special coastal state powers to international straits meeting the various requirements of Article 234 including the required ice coverage.[18]

A second manner in which IMO and its standards may be limited is through the exercise of general coastal state jurisdictional rights over internal waters and the territorial sea. Having complete sovereignty in internal waters, such as ports, a coastal state may impose its own special discharge conditions on foreign vessels and might even seek to require specific equipment and crewing requirements. In the 12 nautical mile (nm) territorial sea, a coastal state may also prescribe and enforce its own discharge standards[19] but a coastal state is not allowed to apply its design, construction, manning or equipment standards to foreign ships unless giving effect to generally accepted international rules or standards.[20]

What constitutes internal waters in the Arctic continues to be an area of considerable controversy.[21] For example, Canada has enclosed its Arctic Archipelago with straight baselines and considers the enclosed waters of the Northwest Passage to be internal.[22] The United States continues to argue that the Northwest Passage is an international strait where the right of transit passage applies.[23] The controversy is partly fueled[24] by the uncertainty in international law as to what is exactly required in the way of shipping use, for example, the number of foreign ships transiting, their total tonnage and the diversity of flags represented.[25]

This chapter provides an overview of the IMO's role in Arctic marine environmental protection through a two-part "cruise". Part 1 reviews the tangled array of IMO conventions and guidelines relevant to Arctic shipping. Part 2 highlights the sea of challenges confronting the future governance of Arctic shipping. Those challenges include: completing negotiations for a legally-binding Polar Shipping Code; deciding whether to ban the use or carriage of heavy fuel oil in the Arctic; addressing black carbon and greenhouse emissions from ships; identifying and taking protective measures for ecologically and culturally significant Arctic waters; dealing with noise from commercial shipping; and ensuring full ratification of key IMO conventions.

Since the focus of this chapter is on the IMO and Arctic marine environmental protection, a number of closely related topics and their relevant conventions are not specifically addressed. Those topics include: maritime safety,[26] maritime labour,[27] training standards[28] and liability and compensation for vessel-source pollution.[29]

TANGLED CURRENTS

A complex array of IMO agreements and guidelines are relevant to Arctic marine environmental protection. Law and policy currents fall into three categories: IMO marine environmental conventions, IMO general shipping guidelines and IMO Arctic-specific guidelines.

IMO marine environmental conventions

Besides two agreements encouraging bilateral and regional cooperation in responding to oil and hazardous substances pollution incidents,[30] four IMO conventions (with two having protocols) are central to marine environmental protection. Those conventions are: the International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978 (MARPOL 73/78),[31] the International Convention on the Control of Harmful Anti-Fouling Systems on Ships,[32] the International Convention for the Control and Management of Ships' Ballast Water and Sediments[33] and the Convention on the Prevention of Marine Pollution by Dumping of Wastes and other Matter[34] and its 1996 Protocol.[35]

MARPOL 73/78. Probably best known for establishing special construction provisions for oil tankers, such as double hull requirements,[36] MARPOL also sets out international standards for pollutant discharges from ships through six annexes. Annex I includes detailed regulations to prevent and control vessel-source oil pollution and sets discharge limits for oily ballast and bilge water. Regulation 15 of Annex I establishes a 15 ppm discharge limitation on oily bilge water from oil tankers as well as other ships. Regulation 34 of Annex I limits the discharge of oily ballast water from oil tankers to a rate of 30 litres per nautical mile while a tanker is en route and over 50 nautical miles from the nearest land. Special areas may be established through the IMO where stricter oil discharge standards may apply, such as for the Antarctic, where oily discharges are prohibited from any ship.[37]

MARPOL's Annex II, besides setting design, construction and equipment requirements for ships certified to carry noxious liquid substances (NLS) in bulk,[38] seeks to limit discharges of noxious liquid substance residues, particularly from deballasting operations or tank washings. Regulation 6 of Annex II provides for dividing NLS into four categories for control purposes: Category X—substances presenting a major hazard to either marine resources or human health; Category Y—substances presenting a hazard to marine resources or human health; and Category Z—substances presenting a minor hazard to marine resources or human health. The fourth category, Other Substances, contains substances not considered harmful that are not subject to any requirements of the Annex. The International Bulk Chemical Code in its chapter 17 lists hundreds of chemicals with their categorized hazard (X, Y or Z) while its chapter 18 lists chemicals not posing a hazard.

Regulation 13 of MARPOL Annex II sets out detailed discharge controls for the three categories of hazardous NLS. For example, discharges into the sea generally may not occur unless: the ship is proceeding on route at a speed of at least 7 knots; the discharge is below the waterline; and the discharge is made at a distance of not less than 12 nm from the nearest land in a water depth of not less than 25 metres.[39] For category X substances (the most hazardous), a stringent tank prewash requirement at a reception facility applies before a very diluted residue may be discharged in accord with the above requirements.[40] A prewash requirement is not normally required for residues in category Y and Z. The Antarctic is designated a special area where no NLS discharges are allowed.[41]

Annex III of MARPOL includes regulations for the prevention of pollution by harmful substances carried by sea in packaged form.[42] Packages are to be adequate to minimize the hazard to the marine environment[43] and labels on packages containing harmful substances must be able to survive at least three months' immersion in the sea.[44] Harmful substances are required to be properly stowed and secured to minimize hazards to the marine environment[45] and jettisoning of packages containing harmful substances is generally prohibited.[46]

MARPOL Annex IV contains regulations to control the pollution of sewage from ships. Ships of 400 gross tonnage and above and ships carrying more than 15 persons, when engaged in international voyages, are required to be equipped with sewage systems, either a sewage treatment plant, a sewage comminuting and disinfecting system or a holding tank.[47] Comminuted and disinfected sewage may be discharged at a distance of more than 3 nm from the nearest land, while untreated sewage in a holding tank may be discharged more than 12 nm from the nearest land if the ship is proceeding at not less than 4 knots and the discharge is not instantaneous but at a moderate rate.[48]

Amendments to Annex IV, adopted by the IMO Marine Environment Protection Committee (MEPC) in July 2011,[49] promise to further tighten sewage discharge standards, particularly from passenger ships. The amendments designate the Baltic Sea as a special area and allow for additional special areas to be designated where special sewage treatment and discharge requirements will apply.[50] Discharge of sewage will be prohibited in special areas except when a sewage treatment plant has been installed meeting standards to be developed by the IMO.[51]

MARPOL Annex V regulates garbage discharges from ships. While prohibiting the disposal of plastics into the sea,[52] various garbage disposals are allowed from the normal operations of a ship dependent on the distance from land. For example, disposal of food wastes and other garbage, such as rags, bottles and metals, is allowed if 12 nm or more from the nearest land.[53] In special areas, which include the Antarctic,[54] garbage disposals are prohibited except for food wastes.[55]

Amendments to Annex V, adopted by the MEPC in July 2011, will substantially curb future garbage discharges.[56] A much more preventative approach to garbage discharges is adopted with a general prohibition on garbage discharges into the sea[57] with limited exceptions spelled out in the regulations. Outside special areas, allowable discharges while the ship is en route include: comminuted or ground food wastes not less than 3 nm from the nearest land;[58] untreated food wastes if 12 nm or more from the nearest land;[59] cargo residues not recoverable using commonly available methods for unloading (if 12 nm or more from the nearest land);[60] animal carcasses as far from the nearest land as possible;[61] and cleaning agents or additives contained in wash water (linked to cleaning cargo hold, deck, and external surfaces) so long as they are not harmful to the environment.[62]

Within special areas, stricter discharge standards will apply. For example, food wastes may only be discharged if comminuted or ground and not less than 12 nm from the nearest land or the nearest ice shelf.[63] Only cleaning agents or additives contained in deck and external surfaces wash water may be discharged taking into account IMO guidelines.[64]

To protect the Antarctic special area, each party at whose ports ships depart en route to or arrive from the Antarctic area is required to ensure as soon as practicable adequate garbage reception facilities and flag states are required to ensure their vessels have sufficient garbage retention capacity on board before entering the Antarctic area and have concluded arrangements to discharge garbage at reception facility after leaving the area.[65]

MARPOL Annex VI, first adopted in 1997 and substantially revised in 2008,[66] regulates air pollution from ships. The deliberate emission of ozone depleting substances is prohibited.[67] Emission standards for marine diesel engines are set according to the date of installation.[68] One of the most important controls is setting a limit on the sulphur content of fuel oils used on board ships with the standard evolving from: 4.5 percent m/m prior to January 1, 2012; to 3.5 percent on and after January 1, 2012; and 0.50 percent on and after January 1, 2020.[69] Special emission control areas may also be designated through the IMO where more stringent air pollution controls from nitrogen oxides (NOx), sulphur oxides (SOx) and particulate matter[70] might be imposed. For emission control areas the maximum sulphur content of fuel is set lower than the general standard, evolving from 1 percent after July 1, 2010 to 0.10 percent m/m on and after January 1, 2015.[71]

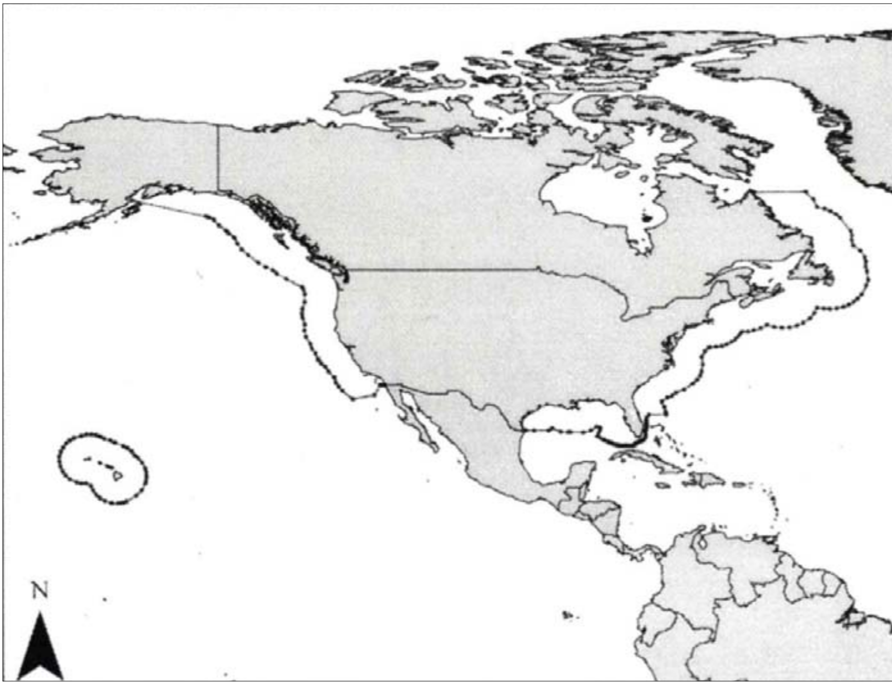
Canada and the United States have designated a North American Emission Control Area for NOx, SOx and particulate matter.[72] The Area covers marine waters off both the Pacific and Atlantic coasts, but does not extend north of 60° latitude (Figure 3.2).

Annex VI also restricts the incineration of waste other than in a shipboard incinerator.[73] The following cannot be incinerated: Annex I, II, and III residues; PCBs; Annex V garbage containing more than trace concentrations of heavy metals; petroleum products containing halogenated compounds; and sewage sludge and sludge oil not generated on board the ship.[74] Polyvinyl chlorides (PVCs) may be incinerated, but only when the incinerator is of an approved type.[75]

At the MEPC meeting in July 2011, initial steps to address greenhouse gas emissions from ships were taken through additional amendments to Annex VI. A new Chapter 4 was added setting out regulations on energy efficiency for ships[76] of 400 gross tonnage and above. New ships will be required to meet Energy Efficiency Design Index (EEDI) requirements set out in Regulation 21.[77] Each ship, including existing ships, will be required to keep on board a Ship Energy Efficiency Management Plan (SEEMP).[78]

Anti-fouling Systems (AFS) Convention. The AFS Convention, adopted in 2001 and coming into force on 17 September 2008, provides a framework for controlling the use of anti-fouling systems, including paints, that may have toxic effects on human health or the environment. The Convention allows systems to be listed in Annex 1 for prohibition or restriction[79] but only one listing has occurred to date, organotin compounds which act as biocides. The Convention prohibits the application or re-application of such compounds and ships are not allowed to bear such compounds on their hulls or must bear a protective coating to prevent leaching.[80]

Ballast Water Convention. Adopted in 2004 but not yet in force,[81] the



(IMO, MEPC.1/Circ. 723, Annex 1, p. 7.)

Figure 3.2. General view of the North American Emission Control Area

Ballast Water Convention (BWC) aims to prevent, minimize and ultimately eliminate the transfer of harmful aquatic organisms and pathogens from ships' ballast water and sediments.[82] Two main management approaches, ballast water exchange and treatment, are followed. Ships are required, whenever possible, to conduct ballast water exchanges at least 200 nm from the nearest land and in water at least 200 metres in depth.[83] By 2016 all ships carrying ballast water, with limited exceptions, will be required to have ballast water management systems (BWMS)[84] meeting a performance standard set out in Regulation D-2[85] and approved in accordance with Regulation D-3.[86]

The BWC encourages regional cooperation in ballast water research and management. Article 13(3) calls upon Parties, particularly those bordering enclosed or semi-enclosed seas, to endeavour to enhance regional cooperation including through the conclusion of regional agreements.

An example of a regional effort to address ballast water threats is provided by the Antarctic. Antarctic interested states agreed interim regional cooperation was necessary to prevent potential invasive marine organisms from being transported into the Antarctic Treaty Area by ships through their ballast water and worked with the IMO in adopting Guidelines for Ballast Water Exchange in the Antarctic Treaty Area in July 2007.[87] The Guidelines encourage vessels to exchange ballast water before arrival in Antarctic waters and, if that is not possible, to undertake exchanges in water at least 50 nm from the nearest land in waters of at least 200 metres depth.[88] Vessels, having spent a significant time in the Arctic, are encouraged to discharge their ballast water sediments and to clean ballast water tanks before entering Antarctic waters.[89]

No parallel initiative has occurred for the Arctic region[90] where the Arctic Council has given minimal attention to ballast water issues to date. The Council's 2009 Arctic Marine Shipping Assessment merely urged Arctic states to consider ratifying the Ballast Water Convention and encouraged Arctic states to assess the risk of introducing invasive species through ballast water so that adequate prevention measures could be implemented in waters under their jurisdiction.[91]

While the global market for ballast water treatment technologies is expected to be huge[92] and approved treatment technologies have been quite rapidly progressing[93], questions remain whether states and the shipping industry will be able to meet the BWC deadlines for installing ballast water management systems to meet the D-2 performance standards. In 2012 various countries reported on the very limited installation of BWMS, for example, India and Sweden indicated that 93.6 per cent of their ships had not yet installed management systems[94] while Hong Kong, China reported 98.96 per cent of its ships with ballast water capacity between 1,500㎥ and 5,000㎥ had not installed BWMS and none of its ships with ballast water capacity of less than 1,500㎥ or greater than 5,000㎥ had made installations.[95] China, Japan and the Republic of Korea also reported very low percentages of their vessels having installed BWMS.[96] A number of delegations to the MEPC's 63rd session in 2012 expressed concerns over the slow implementation of the BWC in light of various constraints, including limited shipyard capacity and costs involved, and suggested that application of the dates contained in regulation B-3 may have to be reconsidered.[97] The MEPC has invited member states to provide updated information on the status of BWMS implementation in their respective countries.[98]

Of the BWMS approved for use by the MEPC, a considerable number make use of chlorine compounds as Active Substances. In the case of systems utilizing chlorination, by-products are a potential concern. Chlorination by-products (such as trihalomethanes, a possible human carcinogen)[99] are included in the risk assessment, however the assessment is performed by the applicant. This is potentially troublesome as a lack of transparency has been noted in some applications.[100] Further, the risk assessments are performed for a single system—there appears to be no analysis of the potential cumulative effect of multiple ships deballasting in one area in a relatively short period of time.[101] The Joint Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP) has included the potential impact of disinfection byproducts in the marine environment as a topic in its New and Emerging Issues Programme.[102]

London Convention, 1972 and Its 1996 Protocol. While the London Convention takes quite a permissive approach by allowing dumping of almost all types of wastes pursuant to national ocean dumping permits, except for wastes listed on a global prohibited list,[103] the 1996 Protocol adopts a precautionary approach.[104] Only wastes listed on a global "safe list' may be disposed of at sea[105] and even then Parties are to ensure dumping proposals are subject to waste prevention audits before granting a dumping permit.[106]

IMO general shipping guidelines

While numerous IMO guidelines have been forged to govern various aspects of international shipping, such as those governing ballast water management,[107] ocean dumping[108] and places of refuge for ships in need of assistance,[109] two sets of generally applicable guidelines may be particularly relevant to the Arctic,[110] namely, Revised Guidelines for the Identification and Designation of Particularly Sensitive Sea Areas (PSSAs)[111] and Guidelines for the Designation of Special Areas under MARPOL 73/78.[112] In addition, the IMO has issued a Guidance Document for Minimizing the Risk of Ship Strikes with Cetaceans.[113]

PSSA Guidelines. Adopted in December 2005, the Revised PSSA Guidelines provide guidance to IMO Member Governments in how to formulate and submit applications for designation of a particularly sensitive sea area where special protective measures may be taken. A PSSA is an area that needs special protection because of its ecological, socio-economic or scientific significance, and the area is vulnerable to international shipping impacts.[114] When a PSSA is approved, one or more associated protective measures may be imposed including special discharge restrictions, mandatory ship routeing and reporting systems, and areas to be avoided.[115] After a PSSA receives final designation, all associated protective measures should be identified on nautical charts in accord with the International Hydrographic Organization's symbols and methods.[116]

Thirteen PSSA's have been designated around the globe to date.[117] However, no PSSA has yet been established in the Arctic or the Antarctic.

Guidelines for the Designation of Special Areas under MARPOL 73/78.

Revised in 2001, the Guidelines provide guidance to MARPOL Parties on the formulation and submission of applications for designating special areas under Annexes I, II and V of the Convention. The Guidelines note that a special area may encompass the maritime zones of several states or even an entire enclosed or semi-enclosed area.[118] The Guidelines set out criteria in three categories, oceanographic conditions, ecological conditions and vessel traffic characteristics, that must be met.[119] A special area designation can only become effective when adequate reception facilities are provided for ships in accordance with MARPOL provisions.[120] Proposals are to be submitted to the MEPC and should include all the information listed in the Guidelines including precise geographical coordinates for the area to be designated and a background document explaining the need for designation.[121]

In light of recent amendments to MARPOL Annex IV allowing the designation of special areas to more strictly control sewage from passenger ships, the MEPC has approved draft 2013 Guidelines for the Designation of Special Areas under MARPOL 73/78.[122] The Guidelines will cover the possibility of further Annex IV designations and the Guidelines are expected to be adopted at the twenty-eighth session of the IMO Assembly in December 2013.[123]

Guidance Document for Minimizing Ship Strikes with Cetaceans. The Guidance Document, approved by the MEPC in July 2009, suggests general principles and possible actions to be taken by Member Governments to reduce and minimize the risk of ship strikes with cetaceans. Governments are encouraged to: establish mechanisms whereby ship strikes can be reported and documented;[124] promote education and outreach, for example, through Notices to Mariners regarding concentrations of whales;[125] and consider various operational measures such as routeing and reporting requirements.[126] Governments are also urged to cooperate with other states in whose waters a shared whale population occurs and coordination could include the development of joint proposals for specific measures through the IMO.[127]

IMO Arctic-specific guidelines

Two sets of IMO guidelines specifically address environmental protection and maritime safety in the Arctic: Guidelines for Ships Operating in Polar Waters (2009)[128] and Guidelines on Voyage Planning for Passenger Ships Operating in Remote Areas (2007).[129]

Guidelines for Ships Operating in Polar Waters. Adopted by the IMO Assembly on 2 December 2009, the Guidelines for Ships Operating in Polar Waters replaced earlier Guidelines for Ships Operating in Arctic Ice-covered Waters (2002)[130] and extended coverage to both the

Antarctic and Arctic. The 2009 Guidelines are largely aimed at ensuring safe shipping by recommending construction and design standards for new Polar Class ships;[131] and suggesting various equipment, personal survival and crewing measures[132] applicable to ships engaged in international voyages in Arctic waters.[133]

Only one short Chapter, Chapter 16 consisting of about one page, is devoted to environmental protection. The overall emphasis is on ensuring damage control in case of accidents. All ships are encouraged to have the capability to contain and clean up minor deck spills and contain minor over side spills.[134] Ships should also be equipped to make temporary repairs in case of a minor hull breach.[135] Following applicable national and international pollution standards and industry best practices is recommended.[136]

Guidelines on Voyage Planning. The Guidelines on Voyage Planning for Passenger Ships Operating in Remote Areas, are aimed at preventing groundings and collisions and do not include recommendations for avoiding environmentally sensitive areas or restricting ship movements in the vicinity of marine mammals.[137] The Guidelines urge passenger ships operating in remote areas, including in Arctic and Antarctic waters, to develop detailed voyage and passage plans. Such plans should consider such factors as: quality of hydrographic data; availability of aids to navigation; places of refuge; availability of ice navigators; no-go areas because of ice conditions; and safe distance to icebergs.

SEA OF CHALLENGES

By far the greatest challenge confronting shipping governance in the Arctic is the need to conclude a mandatory and effective Code for Ships Operating in Polar Waters. Other key challenges include: deciding whether to ban the carriage of heavy fuel oil (HFO) in the Arctic; addressing black carbon and GHG emissions from ships; identifying and taking protective measures for ecologically and culturally sensitive areas; dealing with noise from commercial shipping; and ensuring full ratification of key IMO agreements.

Completing Negotiations for a Mandatory Polar Code

The development of a legally-binding Polar Code to provide a regulatory overlay to existing international agreements applicable to polar shipping has been a work in progress since the IMO's Maritime Safety Committee in 2009 tasked its Design and Equipment (DE) Sub-Committee with drafting a Polar Code with a target completion date of 2012.[138] Scores of discussion and position papers have been submitted by NGOs, industry organizations and governments on best ways forward in crafting the Code. The DE Sub-Committee has used various working and correspondence groups to push drafting forward with the most recent draft contained in the February 2012 Report of the Working Group on the Development of a Mandatory Code for Ships Operating in Polar Waters to the DE Sub-Committee.[139]

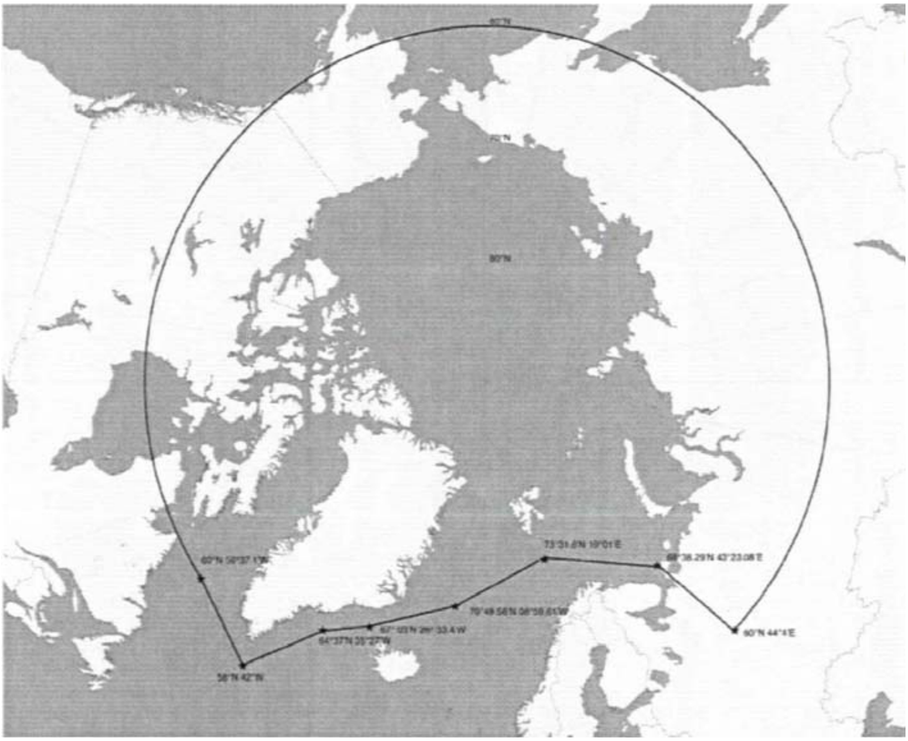
Some aspects of the Code seem certain. The bulk of the Polar Code will be devoted to design, construction, equipment, and operational requirements in support of maritime safety. The Code is expected to have 2 parts, Part A setting out mandatory requirements and Part B providing additional guidance. The Code will include an environmental protection chapter.[140]

However, drafting efforts have proven to be difficult with all sections of the Code still under discussion and numerous issues remaining to be resolved including:

- Whether the geographical scope of the present voluntary guidelines (Figure 3.3) should be broadened to include more southerly waters in the Pacific and Atlantic?[141]
- Which ships should be covered beyond passenger and cargo ships?[142]
- What type of phase-in provisions, if any, should be allowed for existing ships?
- Which provisions should be mandatory versus recommendary?
- Should differential as well as common standards be adopted for the Arctic and Antarctic?
- What training standards should be included, for example, for ice navigators?

One of the most contentious issue areas has been over the inclusion of environmental provisions in the Code. IMO convened a workshop on environmental aspects of the Polar Code in September 2011 but the workshop avoided making specific regulatory or drafting recommendations.[143] Numerous issues surround the proposed environmental protection chapter including:

- What vessel-source pollution discharge standards should be included?[144]
- Whether and how to address ballast water and hull-fouling threats?[145]
- Whether to include special requirements for anti-fouling systems in polar waters, for example, requiring the use of ice abrasion resistant coatings and the use of biocide-free systems?[146]
- Whether to include special measures for keeping containers carrying



(IMO, A26/Res.1024/Corr.1)

Figure 3.3. Maximum extent of Arctic waters application under the Polar Guidelines

harmful substances or dangerous goods from being lost at sea and causing adverse environmental impacts?
- Whether to restrict incineration in certain parts of the Arctic?[147]
- What measures to include, if any, relating to avoidance of interactions between ships and marine mammals or disruption of subsistence hunting?[148]

Consensus has also yet to be reached regarding the best way to make the Polar Code mandatory with three main routes possible. Those options are: adopting the Code through amendment of the SOLAS Convention; developing amendments to key conventions, such as SOLAS, MARPOL, the AFS Convention and the BWC; and making the Code a stand alone agreement.[149]

The Polar Code remains a "work in progress." The DE Sub-Committee at its 56th session in February 2012 decided to refer various chapters of the Code other relevant sub-committees for their consideration with their comments expected to be submitted to the DE Sub-Committee's 57th session in March 2013.[150] The Polar Code Correspondence Group has been re-established to further develop parts of the draft Code not referenced to other bodies and to report to DE 57.[151] The original target completion date for negotiations in 2012 has now been extended to 2014.[152]

Deciding Whether to Ban the Use or Carriage of Heavy Fuel Oil on Ships in the Arctic

Since the IMO's Marine Environment Protection Committee in March 2010 adopted a ban on the use or carriage of HFO on ships operating in the Antarctic Treaty Area, effective from 1 August 2011,[153] the question of whether a similar ban should be adopted for the Arctic continues to be debated. The Arctic Council's Protection of the Arctic Marine Environment (PAME) Working Group is undertaking a project led by Norway to study the risks of HFO use in the Arctic and to possibly suggest international regulation.[154]

Two options would exist for imposing a ban on HFO use or carriage in at least some Arctic waters. Annex I of MARPOL could be amended, as for the Antarctic[155] or such a ban could be incorporated into the new Polar Code.[156]

Addressing Black Carbon and GHG Emissions from Ships

While Arctic states might eventually work through the IMO to designate one or more areas of the Arctic as emission control areas, two air emission issues, black carbon and greenhouse gases, are presently taking priority attention within the IMO. Black carbon, emitted from ships through incomplete combustion of fuel, is a growing concern because of its climate warming potential.[157] The MEPC has tasked the Bulk Liquids and Gases (BLG) Sub-Committee with investigating appropriate control measures to reduce the impacts of black carbon[158] and to submit a report to the 65th session of the MEPC where the Committee would agree on appropriate action(s).[159] The BLG Sub-Committee has established a correspondence group to examine issues pertaining to black carbon and the group is to report back to BLG 17.[160]

While the IMO has adopted new regulations on energy efficiency for ships,[161] sorting out further measures for reducing GHG emissions from ships remains a major challenge.[162] Countries have disagreed over the most appropriate forum to address GHG emissions, IMO or the UN

Framework Convention on Climate Change processes, and whether a common but differentiated responsibility principle should apply in the shipping context.[163] The possible adoption of market-based measures (MBM) has been particularly controversial with some delegations oppose to developing MBM as they believe the IMO should just focus on technical and operational measures.[164] The MEPC has agreed that a further impact assessment on market-based measures is needed with a focus on possible impacts on consumers and industries in developing countries[165] and will consider terms of reference for the assessment at its 64th session.[166] The possible setting of GHG emission reduction targets for international shipping has also been deferred to MEPC 64.[167]

Identifying and Taking Protective Measures for Ecologically and Culturally Significant Arctic Waters

While the Arctic Council's 2009 Arctic Marine Shipping Assessment report, as one 17 recommendations, urged Arctic states to identify areas of heightened ecological and cultural significance and to implement protective measures,[168] follow-through remains a challenge. Three working groups of the Council, the Sustainable Development Working Group, the Arctic Monitoring and Assessment Programme and the Conservation of Arctic Flora and Fauna, are cooperating in a study of areas of heightened ecological and cultural significance.[169] Vessel-routeing measures in the Arctic remain sparse. Whether coastal states may move unilaterally to establish mandatory routeing in their EEZs by relying on the special legislative and enforcement powers given by Article 234 of LOSC is also a looming issue.[170]

Dealing with Noise from Commercial Shipping

The need to address the issue of noise from commercial shipping and its adverse impacts on marine life remains a further challenge. The IMO's DE Sub-Committee has been directed to develop non-mandatory technical guidelines for ship-quieting technologies as well as potential navigational and operational practices.[171] The DE Sub-Committee at its 56th session decided to establish a Correspondence Group on Minimizing Underwater Noise with a mandate: to examine available options for ship- quieting technologies and operational practices; to develop non-mandatory draft guidelines for reducing underwater noise from commercial ships; and to submit a report to DE 57 in March 2013.[172] Meanwhile, the International Standards Organization (ISO) has been developing a standard for the measurement and reporting of underwater noise radiated from merchant ships with the publication of the final version of ISO 16554 expected in the second half of 2012.[173]

Ensuring Full Ratification of Relevant International Agreements

While a detailed review of ratification records of key IMO conventions by Arctic states and other states is beyond the scope of this chapter, full ratification has been limited with the Ballast Water Convention and 1996 London Protocol being particularly problematic.[174] As of 31 August 2012 only Canada, Norway, Sweden and the Russian Federation among Arctic states had ratified the Ballast Water Convention, and only 35 states overall, representing 27.95 percent of the world tonnage, had formally adopted the Convention. Only 42 states were Party to the London Protocol and, among Arctic states, non-Parties included Finland, the Russian Federation and the United States.

The record of ratification by East Asian states is also not strong. For example, the Ballast Water Convention has not been ratified by key countries, such as China, Japan and Singapore. Only China, Japan, the Philippines and South Korea have adopted the LP 1996.

CONCLUSION

The fast-changing Arctic, linked to thinning and decreasing ice-cover and globalization realities, is mirrored by a shifting governance regime for Arctic shipping. A mandatory Polar Code promises to join, hopefully within the next few years, the tangle of changing regulatory currents applicable to ships operating in the Arctic.

While the role of IMO is critical in ensuring safe and environmentally friendly shipping, the central roles of Arctic coastal states must not be forgotten and their sea of challenges. Improving Arctic marine infrastructure remains an especially daunting challenge with many dimensions including: port services and waste reception facilities; icebreaker assistance; vessel traffic systems; navigational aids; hydrographic charting; and circumpolar environmental response capacity.[175] Shipping infrastructure is clearly more advanced in the Barents Sea and Northern Sea Route regions than other areas of the Arctic.[176]

The interests and values of Arctic indigenous peoples and local communities must also be recognized.[177] Future shipping developments may bring both benefits but also potential risks and costs, both social and environmental, in the North. Identifying and protecting areas of heightened ecological and cultural significance in the Arctic from shipping impacts is a voyage hardly begun.

In light of the plethora of challenges, the time seems ripe for expanding international dialogues on the future of Arctic shipping and how to ensure shipping occurs in harmony with environmental and human values in the Arctic. The roles of flag states, including those in Asia, and their interests and capacities must also not be forgotten! The proposed 2012-2016 North Pacific Arctic Conferences offer a promising venue and might even become closely linked with the ongoing work of the Arctic Council in relation to marine shipping.

Notes

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1. December 10, 1982, 1833 UNTS 396.
2. Art 211(6) does allow coastal states to work through the IMO to adopt special pollution prevention and navigational measures in their EEZs where international rules and standards are considered inadequate.
3. LOSC, supra note 1 at Art 38.
4. Ibid at Art 42(1)(b). For a review of Arctic straits, see Donald R Rothwell, "International Straits and Trans-Arctic Navigation" (2012) 43 Ocean Development & International Law 1.
5. Article 234 states: Coastal States have the right to adopt and enforce non-discriminatory laws and regulations for the prevention, reduction and control of marine pollution from vessels in ice-covered areas within the limits of the exclusive economic zone, where particularly severe climatic conditions and the presence of ice covering such areas for most of the year create obstructions or exceptional hazards to navigation, and pollution of the marine environment could cause major harm to or the irreversible disturbance of the ecological balance. Such laws and regulations shall have due regard to navigation and the protection and preservation of the marine environment based on the best available scientific evidence.
6. Arctic Shipping Pollution Prevention Regulations, CRC, c 353, s 29. The Regulations do allow limited exceptions such as engine exhaust and in emergency situations where deposits may be necessary for saving life or preventing the loss of a ship.

7. Arctic Waters Pollution Prevention Act, RSC 1985, c A-12, s 4.
8. Northern Canada Vessel Traffic Services Zone Regulations, SOR/2010-127. Vessels covered include, among others, those of 300 gross tonnage or more and those carrying as cargo a pollutant or dangerous goods.
9. See David L. VanderZwaag, Aldo Chircop and Victor M. Santos Pedro et al., "Governance of Arctic Shipping" in Arctic Marine Shipping Assessment 2009 Report (Arctic Council, 2009) [AMSA] at 67; Maxim Vladimirovich Korel'skiy, "Russian Federation: Analysis of national laws and regulations" in Erik Molenaar, et al. (eds), Legal Aspects of Arctic Shipping: Final Report (London: MRAG, 2010) 157.
10. Available at <http://um.dk/en/~/media/UM/English-site/Documents/Politics-and-diplomacy/Arktis_Rapport_UK_210x270_Final_Web.ashx> at 18 (accessed 12 July 2012); as discussed in Kristen Bartenstein, "Navigating the Arctic: The Canadian NORDREG, the International Polar Code and Regional Cooperation" (2012) 54 German Yearbook of International Law 77 at 118.
11. For a review of the many questions of interpretation raised by Art 234, see Kristen Bartenstein, "The 'Arctic Exception' in the Law of the Sea Convention: A Contribution to Safer Navigation in the Northwest Passage?" (2011) 42 Ocean Development & International Law 22; and Donat Pharand, "The Arctic Waters and the Northwest Passage: A Final Revisit" (2007) 38 Ocean Development & International Law 3 at 46-48 [Pharand].
12. One interpretation is that coastal states are given no greater powers over foreign shipping than those applicable in the territorial sea while another is that coastal states are granted broader powers, in particular to unilaterally adopt special ship construction, crewing and equipment requirements. AMSA, supra note 9 at 53. For strong support for the latter view with the negotiators implicitly accepting that the exceptional powers applicable to the EEZ would also apply to the territorial sea, see Pharand, supra note 11 at 47.
13. See Ted L. McDorman, "National Measures for the Safety of Navigations in Arctic Waters: NORDREG, Article 234 and Canada" (paper delivered at the Conference on Globalizations and Law of the Sea, Washington, DC, 1-3 December 2010 [to be published by Martinus Nijhoff in Conference proceedings]); Bartenstein, supra note 11 at 100-109.
14. Canada, "Comments on document MSC/88/11/2" IMO Doc. MSC/88/11/3 (5 October 2010).
15. IMO, Information on the Mandatory Canadian Ship Reporting System in Canada's Northern Waters (NORDREG), IMO Doc SN.

1/Circ. 291 (5 October 2010).
16. AMSA, supra note 9 at 53.
17. For example, Art 233 limits enforcement powers against non-sovereign immune vessels by states bordering straits. Enforcement measures for violations of navigational or environmental standards may only be taken if a foreign ship is causing or threatening major damage to the marine environment of the strait.
18. Pharand, supra note 11 at 46-47.
19. For such a view, see Alan Khee-Jin Tan, Vessel-Source Marine Pollution: The Law and Politics of International Regulation (Cambridge: Cambridge University Press, 2006) at 205; Erik J Molenaar, Coastal State Jurisdiction Over Vessel-Source Pollution (The Hague: Kluwer Law International, 1998) at 201-203.
20. LOSC, supra note 1 at Art 21(2).
21. AMSA, supra note 9 at 53.
22. Donald McRae, "Arctic Sovereignty? What Is at Stake?" (2007) 64(1) Behind the Headlines 1.
23. President George W. Bush issued a Presidential Directive on January 9, 2009 affirming the American stance on the Passage which continues to be followed in American policy. See National Security Presidential Directive (NSOP-66) and Homeland Security Presidential Directive (HSPD-25) (9 January 2009), available at <http://www.fas.ofg/irp/offdocs/nspd/nspd-66/htm>s III (B)(5) (accessed 11 July 2012).
24. The first criterion for an international strait in Art. 37 is clearly met, namely, a geographical requirement that the strait connect one part of the high seas or an exclusive economic zone and another part of the high seas or an exclusive economic zone. The Northwest Passage links EEZs in the eastern and western Arctic. Pharand, supra note 11 at 36-37. Further controversy surrounds whether Canada can justify its drawing of straight baselines based on historic waters status or relying upon international law requirements for drawing baselines around a group of islands in the vicinity of the coast. See Donat Pharand, Canada's Arctic Waters in International Law (Cambridge: Cambridge University Press, 1988) at 91-132 and 133-179.
25. Pharand, supra note 11 at 34-35.
26. A key convention is the International Convention for the Safety of Life at Sea (SOLAS) which governs numerous aspects of ship safety including construction, radio communications, navigational reporting and routeing, and carriage of dangerous goods. IMO, SOLAS Consolidated Edition 2009 (London: IMO, 2009).
27. For a review of the Maritime Labour Convention, 2006, see Moira McConnell, Dominick Devlin & Cleopatra Doumbia-Henry, The

Maritime Labour Convention, 2006: A Legal Primer to an Emerging International Regime (Boston: Martinus Nijhoff, 2011).

28. Manila amendments to the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) and its Code, adopted on 25 June 2010, did establish new training guidance for personnel serving on board ships operating in polar waters. An overview of the Convention and Code is available through the IMO website at <http://www.imo.org/About/Conventions/Listof Conventions/ Pages/ Default.aspx> (accessed 20 January 2012). The STCW Code provides rather general and rather minimal guidance, for example, for masters and officers in charge of a navigational watch in polar waters, the Code recommends training in various subjects including: knowledge of ice characteristics, a ship's performance in ice and cold climates, voyage and passage planning, regional regulations and recommendations, equipment limitations, safety precautions and emergency procedures, and environmental considerations. Manila Amendments to the STCW Code, STCW/ CONF. 2/34, 3 August 2010, Part B, s. B-V/g.
29. For a review of IMO's liability and compensation agreements, see AMSA, supra note 9 at 65-66.
30. International Convention on Oil Pollution Preparedness, Response and Co-operation, 1990, 30 November 1990, 30 I.L.M. 733 (1991); and Protocol on Preparedness, Response and Co-operation to Pollution Incidents by Hazardous and Noxious Substances, 2000, 15 March 2000, IMO Doc. HNS-OPRC/CONF/111Rev.1, Attachment1. In May 2011, representatives of the eight Arctic states took a step forward in furthering regional cooperation in responding to oil spills by establishing a task force to develop an international instrument on Arctic marine oil pollution preparedness and response with a regional agreement expected to be concluded by the next Ministerial meeting in 2013. Arctic Council, Nuuk Declaration on the Occasion of the Seventh Ministerial Meeting of the Arctic Council, 12 May 2011, Nuuk Greenland, 4, available at <http://www.arctic-council.org/ index.php/ en/about/documents/category/ 5-declarations> (accessed 11 July 2012).
31. IMO, MARPOL Consolidated Edition 2011 (London: IMO, 2011).
32. October 5, 2001, IMO Doc AFS/CONF/26, Annex.
33. February 23, 2004, IMO Doc BWM/CONF/36, Annex.
34. December 21, 1972, 1046 UNTS 120.
35. November 7, 1996, 36 ILM 1 (1997).
36. MARPOL, supra note 31 at Annex I, Regs 19 and 20.
37. Ibid at Reg 15(4).
38. Ibid at Annex II, Reg 11.

39. Ibid at Reg 13(2.1).
40. Ibid at Reg 13(6.1.1).
41. Ibid at Reg 13(8.2).
42. Harmful substances are those identified as marine pollutants under the International Maritime Dangerous Goods Code, Annex III, Reg 1(1.1).
43. Ibid at Reg 2.
44. Ibid at Reg 3(1).
45. Ibid at Reg 5.
46. Ibid at Reg 7(1).
47. Supra note 31 at Annex IV, Reg 9.
48. Ibid at Reg 11. The IMO's Marine Environment Protection Committee has further recommended standards regarding the rate of sewage discharge. See Res MEPC157(55) (13 October 2006), Recommendation on Standards for the Rate of Discharge of Untreated Sewage from Ships.
49. Res MEPC. 200(62) (15 July 2011); MEPC, Report of the Marine Environment Protection Committee on Its Sixty-Second Session, MEPC 62/24 (26 July 2011) Annex 12.
50. Ibid through a new para 5bis added to Reg 1.
51. Ibid through a replaced Reg 11.
52. Supra note 31 at Annex V, Reg 3(1)(a).
53. Ibid at Reg 3(1)(b)(ii).
54. Ibid at Reg 5(1)(g).
55. Ibid at Reg 5(2). Except for the Wider Caribbean Region, such disposal must be made not less than 12 nm from the nearest land.
56. Res MEPC. 201(62) (15 July 2011); MEPC, supra note 49 at Annex 13. The amendments will enter into force on 1 January 2013.
57. Ibid at Reg 3(1). The discharge of all plastics and cooking oil is also specifically prohibited. Ibid at Reg 3(2)(3).
58. Ibid at Reg 4(1).
59. Ibid at Reg 4(2).
60. Such cargo residues must not contain any substances classified as harmful to the marine environment taking into account IMO guidelines. Ibid at Reg 4(3). Guidelines for the implementation of the revised Annex V, adopted by the Marine Environment Protection Committee in 2012, list various parameters where cargo residues are considered harmful including carcinogenicity, mutagenicity and reproductive toxicity. Res MEPC. 219(63) (2 March 2012); MEPC, Report of the Marine Environment Protection Committee on Its Sixty-Third Session, MEPC 63/23/Add. 1 (14 March 2012), Annex 24, s 3.2.
61. The 2012 Annex V Guidelines further recommend that animal car-

casses generated during the normal operation of a ship should be discharged greater than 100 nm from the nearest land and in the maximum water depth possible. Ibid at s 2.12.5. Large mortalities in excess of those generated during the normal operation of a ship, for example, from an infectious disease outbreak or a heat wave, are not considered garbage and may be subject to the international ocean dumping regime. Ibid at s 2.12.12.

62. The 2012 Annex V Guidelines provide further guidance that a cleaning agent or additive is considered not harmful to the marine environment if it: is not a harmful substance in accordance with the criteria in Annex III and does not contain any carcinogenic, mutagenic or reprotoxic components. Ibid at s 1.7.5.
63. MARPOL Annex V (amendments), supra note 56, Reg 6(1.1).
64. Ibid at Reg 6(2).
65. Ibid at Reg 6(3). This is already a requirement under the existing Annex V.
66. Res MEPC. 176(58) (10 October 2008); MEPC, Report of the Marine Environment Protection Committee on Its Fifty-Eighth Session, MEPC 58/23/Add. 1 (14 October 2008) Annex 13.
67. MARPOL, supra note 31 at Annex VI, Reg 12(2).
68. Ibid at Reg 13.
69. Ibid at Reg 14(1).
70. Emission Control Areas may be designated for NOx or SOx and particulate matter or for all three types of emissions. Ibid at Reg 2(8).
71. Ibid at Reg 14(4).
72. See IMO, Information on North American Emission Control Area (ECA) under MARPOL Annex VI, MEPC.1/Circ 723 (13 May 2010). Effective for SOx and particulate matter emissions on 1 August 2012.
73. MARPOL, supra note 31 at Annex VI, Reg 16(1).
74. Ibid at 16(2).
75. Ibid at 16(3).
76. Res MEPC. 203(62) (15 July 2011); MEPC, Report of the Marine Environment Protection Committee in Its Sixty-Second Session, MEPC 62/24/Add.1, Annex 19 (26 July 2011). Expected to enter into force on 1 January 2013.
77. A considerable phase-in period is allowed as Administrations may choose to waive the mandatory requirements until at least 1 January 2017. Ibid at Reg 19(4)(5). A complex methodology is established for calculating energy efficiency designs for ships and three sets of guidelines have been issued: 2012 Guidelines on the Method of Calculation of the Attained Energy Efficiency Design Index (EEDI)

for New Ships; 2012 Guidelines on Survey and Certification of the Energy Efficiency Design Index (EEDI) and Guidelines for Calculation of Reference Lines for Use with the Energy Efficiency Design Index (EEDI). MEPC, supra note 60, Annexes 8, 10 and 11, respectively.

78. Ibid at Reg 22. Guidelines for the Development of a Ship Energy Efficiency Management Plan (SEEMP) were adopted in March 2012 and suggest various best practices for fuel efficient operation of ships such as: improved voyage planning; weather routeing; speed optimization; optimum trim and ballast; hull and propulsion systems maintenance; waste heat recovery; alternative fuels; and renewable energy sources such as wind or solar. Ibid., Annex 9.
79. AFS Convention, supra note 32 at Arts 4 and 5.
80. Ibid at Annex 1.
81. Article 18 of the Convention provides for entry into force twelve months after the date on which not less than thirty states, the combined merchant fleets of which constitute not less than thirty-five percent of the gross tonnage of the world's merchant shipping, have become Parties.
82. For a detailed review of the Convention and numerous implementing guidelines, see Moira Helena Fonseca de Souza Rolim, The International Law on Ballast Water: Preventing Biopollution (Leiden: Martinus Nijhoff, 2008).
83. Ballast Water Convention, supra note 33 at Reg B-4.
84. Ibid at Reg B-3.
85. The performance standard sets limits on the number of viable organisms in ballast water discharges and on the level of indicator microbes, such as E-coli and Vibrio cholera.
86. For systems using Active Substances, including the use of chemicals, the IMO has issued procedural guidelines and has established a technical GESAMP-Ballast Water Working Group to review management system applications and a three-stage approval approach applies: Basic Approval (allowing land-based and ship board testings to proceed), Final Approval (by the Working Group and MEPC) and Type Approval (by a Flag Administration). See "Procedure for approval of ballast water management systems that make use of Active Substances (G9), Res MEPC 169(57) (4 April 2008) [G9 Guidelines]. For management systems not using an Active Substance, for example deoxygenation, a testing procedure is outlined in IMO Guidelines for approval of ballast water management systems (G8) and only a Type Approval is required. Res MEPC 174(58) (10 October 2008). For a further review of the testing processes, see Lloyd's Register, Ballast Water Treatment Technology: Current Status (June 2011) at 5-6.

87. Res MEPC. 163(56) (13 July 2007).
88. Ibid at Annex, s 5.
89. Ibid at s 9.
90. See Liang Jing, Bing Chen, Baiyu Zhang & Hongxuan Peng, "A review of ballast water management practices and challenges in harsh and arctic environments" (2012) 20 Environ. Rev. 83 at 97.
91. AMSA, supra note 9 at 7.
92. The global market for purchasing and installing ballast water management systems has been estimated to be in the range of US $50 to $74 billion. Institute of Marine Engineering, Science and Technology (IMarEST), "Preview of global ballast water treatment markets", MEPC 63/INF 11 (23 December 2011) at 1.
93. Between March 2006 and August 2011, 34 ballast water management systems making use of Active Substances, received Basic Approval and 20 received Final Approval in accordance with procedure G9. IMO, "List of ballast water management systems that make use of Active Substances which received Basic and Final Approval," BWM.2/Circ.34 (9 August 2011).
94. "Present status of availability of ballast water management system installations on ships registered under the Indian flag" MEPC 64/INF. 27 (27 July 2012) and "Present status of ballast water management system installations on ships managed by Swedish shipowners" MEPC 64/INF. 5 (29 June 2012).
95. "Implementation of the Ballast Water Management Convention for existing ships" MEPC 64/2/8 (27 July 2012).
96. "Current status of the installation of ballast water management systems on board, submitted by China" MEPC 64/2/13 (27 July 2012); "Updated data and information on the status of ballast water management system installations submitted by Japan" MEPC 64/2/10 (27 July 2012); and "Current status of installation and information on availability of ballast water management systems, submitted by the Republic of Korea" MEPC 64/INF. 19 (27 July 2012).
97. MEPC, supra note 60 at para 2.22.
98. Ibid at para 2.24.
99. Health Canada, Trihalomethanes <http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/trihalomethanes/guide-ng.php> (accessed 19 July 2012).
100. Report of the eighteenth meeting of the GESAMP—Ballast Water Working Group, MEPC 63/2/10 at para. 4.3.3.4 (11 November 2011).
101. However, it should be noted that the G9 Guidelines do provide that risk evaluations should qualitatively take into account cumulative effects that may occur due to the nature of shipping and port operations. G9 Guidelines, supra note 86 at para 6.4.2.

102. Report of the forty-ninth session of the GESAMP/EHS Working Group on the evaluation of the hazards of harmful substances carried by ships, EHS 49/8 (29 June 2012) Annex 4 at 2.
103. London Convention, supra note 34 at Annex I.
104. For a detailed review, see David L VanderZwaag and Anne Daniel, "International Law and Ocean Dumping: Steering a Precautionary Course Aboard the 1996 London Protocol, but Still an Unfinished Voyage" in Aldo Chircop, Ted L McDorman & Susan J Rolston (eds), The Future of Ocean Regime-building: Essays in Tribute to Douglas M. Johnston (Leiden: Martinus Nijhoff, 2009) at 515.
105. Wastes listed in Annex 1 which may be considered for dumping include: dredged material; sewage sludge; fish wastes; vessels and platforms or other man-made structure at sea; inert, inorganic geological material; organic material of natural origin; bulky items primarily comprising iron, steel, concrete and similarly unharmful materials for which the concern is physical impacts (limited to where wastes are generated at locations, such as small islands with isolated communities, having no practicable access to other disposal options); and sequestration of carbon dioxide under the seabed.
106. London Protocol 1996, supra note 35 at Annex 2.
107. For a review of 17 guidelines supporting implementation of the Ballast Water Convention, see Rolim, supra note 82 at 130-134.
108. For a summary of the various ocean dumping guidelines, see VanderZwaag and Daniel, supra note 104 at 527-532.
109. Guidelines of Places of Refuge for Ships in Need of Assistance, adopted on 5 December 2003, IMO Res A. 949(23).
110. The Arctic Marine Shipping Assessment specifically called upon Arctic states to explore the need for internationally designated areas for the purpose of environmental protection in regions of the Arctic Ocean, possibly by the designation of "Special Areas" or "Particularly Sensitive Sea Areas" through the IMO. AMSA, supra note 9 at 7. No such designations have yet been sought to date.
111. Adopted on 1 December 2005, IMO Res A. 982(24) [PSSA Guidelines].
112. 112. Adopted on 29 November 2001, IMO Res A. 927 (22), Annex 1 (superceding previous Guidelines contained in resolution A. 720(17)).
113. IMO, MEPC.1/Circ.674 (31 July 2009).
114. PSSA Guidelines, supra note 111 at para 1.2.
115. Ibid at paras 7.1, 7.5.2.3. At least one proposed association protective measure should be included with a PSSA submission along with the legal basis.

116. Ibid at para 9.1.
117. They are: the Great Barrier Reef, Australia (1990); the Sabana-Camagüey Archipelago, Cuba (1997); Malpelo Island, Colombia (2002); the sea around the Florida Keys, USA (2002); the Wadden Sea, Denmark, Germany, Netherlands (2002); Paracas National Reserve, Peru (2003); Western European Waters (2004); extension of the Great Barrier Reef PSSA to include Torres Strait (2005); Canary Islands, Spain (2005); the Galapagos Archipelago, Ecuador (2005); the Baltic Sea area, Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland, Sweden (2005); the Papahānau-mokuākea Marine National Monument, USA (2007); and the Strait of Bonifacio, France and Italy (2011). IMO Particularly Sensitive Sea Areas, <http://www.im.org/OurWork/Environment/Pollution Prevention/PSSAs/Pages/Default.asp> (accessed 19 January 2012).
118. Supra note 112 at para 2.2.
119. Ibid at para 2.3.
120. Ibid at para 2.7.
121. Ibid at para 3.1-3.3.
122. MEPC, supra note 60 at Annex 27.
123. MEPC, Report of the Marine Environment Protection Committee on Its Sixty-Third Session, MEPC 63/23 (14 March 2012) at para 9.2.
124. Guidance Document, supra note 113 at para 9.
125. Ibid at para 10.
126. Demonstrated by proposals by Canada and the United States to establish routeing and reporting measures to protect the highly endangered North Atlantic right whale. Ibid at para 12.1.
127. Ibid at para 13.4.
128. IMO, Res A. 1024(26) [Polar Shipping Guidelines].
129. IMO, Res A. 999(25), adopted on 29 November 2007.
130. IMO, MSC/Cir. 1056-MEPC/Cir. 399 (23 December 2002). For a review of the guidelines, see Øystein Jensen, "Arctic shipping guidelines: towards a legal regime for navigational safety and environmental protection?" (2008) 44 Polar Record 107.
131. Polar Shipping Guidelines, supra note 128 at para 1.1.2 and Part A.
132. For example, all ships are urged to carry at least one Ice Navigator with the Navigator having documentary evidence of satisfactorily completing an approved programme in ice navigation, and on-the-job training of Ice Navigators is encouraged. Ibid at para 1.2.1 and 14.2.
133. Ibid at para 1.1.1 and 1.1.3.
134. Ibid at para 16.2.2.

135. Ibid at para 16.2.1.
136. Ibid at para 16.3
137. The Guidelines only make one environmental reference, recommending special consideration be given to the environmental nature of the area of operation along with the limited resources and navigational information. The wording "environmental nature" appears to refer to the various possible hazards, such as ice, winds, tides and fog. Guidelines on Voyage Planning, supra note 129 at para 1.1.
138. IMO, Maritime Safety Committee, Report of the Maritime Safety Committee on Its Eighty-Sixth Session, MSC 86/26 (12 June 2009) at 114.
139. Report of the Working Group (Part 1), DE 56/WP.4 (16 February 2012).
140. As decided by the DE Sub-Committee in March 2011 and noted by the Marine Environment Protection Committee in July 2011. See MEPC, supra note 49 at para 11.14.
141. As suggested by a group of NGOs, FOEI/IFAW/WWF/Pacific Environment in submission to the DE Sub-Committee regarding the Pacific, DE 55/12/X (14 January 2011) and the Atlantic, DE 55/12/17 (28 January 2011).
142. For example, possible extension to cover barges, fishing vessels and pleasure craft. The DE Sub-Committee has decided that the Code should initially be developed to apply to SOLAS passenger and cargo ships with the possibility of expanding the scope of the Code to cover other vessels in the future. DE Sub-Committee Report to the Maritime Safety Committee, DE 56/25 (28 February 2012) at para 10.7.
143. IMO, Workshop on Environmental Aspects of the Polar Code, DE 56/INF.3 (17 November 2011).
144. For example, various NGOs have been urging prohibitions on discharges of oil, noxious liquid substances and garbage (except possibly for food wastes) in the Arctic and restrictions on the discharge of untreated sewage and greywater. See DE Sub-Committee, Report of the Correspondence Group, DE 56/10/1 (11 November 2011) at chapter 15, paras 15.3.2-15.3.7
145. The IMO has already adopted guidelines to control biofouling of ships with various measures urged, such as development of a biofouling management plan for each ship and regular inspection and cleaning. See 2011 Guidelines for the Control and Management of Ships' Biofouling to Minimize the Transfer of Invasive Aquatic Species, Res MEPC. 207(62); MEPC 62/24/Add.1, Annex 26 (Adopted on 15 July 2011).

146. As suggested by FOEI/IFAW/WWF/Pacific Environment in a submission on the environmental protection chapter, DE 56/10/12 (24 December 2011) at paras 15 and 16.
147. See Report of the Correspondence Group, supra note 144 at para 15.3.8.
148. The IMO Sub-Committee on Safety of Navigation, requested to review possible inclusion in the Polar Code of provisions on polar vessel planning and operations to avoid interactions with cetaceans and marine mammals, decided at its 57th Session in June 2011 that the existing Guidance Document for Minimizing the Risk of Ship Strikes with Cetaceans was sufficient. See IMO, Outcome of NAV 57, MEPC 62 and FP 55, DE 56/2/1 (22 September 2011) at para 6. The United States has recently suggested including vessel planning in the Polar Water Operational Manual being proposed for carriage aboard ships in the Arctic. See IMO, Voyage Planning in the Polar Water Operational Manual, DE 56/10/9 (24 December 2011).
149. See IMO, Outcome of DE 55-Legal opinion on making the Polar Code mandatory, MEPC 62/11/4/Add.1 (6 May 2011).
150. DE Sub-Committee, supra note 142 at para 10.25.
151. Ibid at para 10.32.
152. Ibid at Annex 16, 2.
153. See Report of the MEPC on Its Sixtieth Session, MEPC 60/22 (12 April 2010) at Annex 10.
154. See Det Norske Veritas, Heavy Fuel in the Arctic—Interim Report (2010).
155. MARPOL, supra note 31 at Annex 1, Reg 43.
156. See Submission on the environmental protection chapter, supra note 146 at para 11. As suggested by a number of NGOs.
157. Black carbon has been estimated to cause 680 times more warming than the same amount of CO_2 over 100 years and 2,200 times over 20 years. IMO, Reduction of emissions of black carbon from shipping in the Arctic, MEPC 60/4/24 (15 January 2010) at para 3.
158. Various measures have already been identified, such as reducing vessel speed, modifying vessel and propeller designs to reduce fuel consumption, use of wind-sails, improved ship routeing and installation of diesel particulate filters. See Reduction of emissions of black carbon from shipping in the Arctic, MEPC 60/4/24 (15 January 2010).
159. MEPC, supra note 49 at para 4.20.
160. BLG Sub-Committee, Report to the Maritime Safety Committee and the Marine Environment Protection Committee, BLG 16/16 (20 February 2012) at para 8.59.

161. See notes 76-78, supra and accompanying text.
162. For a comprehensive review of international efforts to reduce air pollution from shipping including IMO initiatives to address GHG emissions see Sherry P Broder and Jon M Van Dyke, "The Urgency of Reducing Air Pollution from Global Shipping", in Aldo Chircop, Norman Letalik, Ted L McDorman and Susan Rolston (eds), The Regulation of International Shipping: International and Comparative Perspectives (Leiden: Martinus Nijhoff, 2012) at 249-291.
163. The nature of disagreements may be seen in the statements by delegations of Brazil, China, India, Saudi Arabia and Venezuela upon the adoption of the energy efficiency standards for ships at the MEPC's 62nd session. MEPC, supra note 76 at Annex 20.
164. MEPC, supra note 60 at para 5.25.7.
165. Ibid at para 5.14.
166. Ibid at para 5.18.
167. Ibid at para 5.42.
168. AMSA, supra note 9 at 7, Recom II(c).
169. Arctic Council, Status on Implementation of the AMSA 2009 Report Recommendations (May 2011) at 8.
170. With Art 234 bestowing special powers to prevent, reduce and control marine pollution, it remains uncertain how far a coastal state may stretch the provision to cover maritime safety and navigational measures. See notes 13-15 and accompanying text.
171. For the latest proposal by the United States, see Proposed framework for non-mandatory guidelines, DE 56/24 (9 December 2011).
172. DE Sub-Committee, supra note 142 at para 24.6.
173. Ibid at para 24.5.
174. Ratification information, as of 31 August 2012, is drawn from IMO, Status of Conventions <http://www.imo.org/About/Conventions/StatusOfConventions/Pages/Default.aspx> (accessed 28 September 2012).
175. AMSA, supra note 9 at 7.
176. See Lawson Brigham, "Marine Protection in the Arctic Cannot Wait" (2011) 478 Nature 157.
177. See generally, David L VanderZwaag & Cynthia Lamson (eds), The Challenge of Arctic Shipping: Science, Environmental Assessment, and Human Values (Montreal & Kingston: McGill-Queen's University Press, 1990).

Comments on Chapter 3: Environmental perspective

Thomas L. Laughlin

This chapter summarizes the work of several organizations led by the International Union for Conservation of Nature (IUCN), the Natural Resources Defense Council (NRDC) and, more recently, the University of Alaska, Fairbanks. It explores options for mitigating the possible negative effects of shipping in the Bering Strait region. The views expressed are my own.

In November 2010, IUCN and NRDC, in cooperation with the Center for Marine Biodiversity and Conservation at the Scripps Institution of Oceanography, University of California, San Diego, convened a workshop to identify Ecologically and Biologically Significant Areas (EBSAs) of the Arctic marine environment.[1] The workshop included thirty-four scientists and indigenous people's representatives with expertise in Arctic marine ecosystems and their components. Workshop participants were asked to apply the seven criteria developed pursuant to the Convention on Biological Diversity (CBD) to the Arctic region to identify these areas. The criteria are uniqueness, life history importance, importance to endangered/threatened species, vulnerable/fragile/slow recovery areas, areas of high productivity, areas of high diversity; and "naturalness." The importance of an area for subsistence or cultural heritage was also considered.

The workshop product is depicted in three broad geographical areas:

(1) Pacific: North Bering/Chukchi/Beaufort/East Siberian Seas;
(2) Northwest Atlantic: Labrador/Hudson Bay/Baffin Bay/Canadian Arctic; and
(3) Northeast Atlantic: Greenland Sea/Barents Sea/Kara Sea/Laptev Sea.

The focus of this chapter is on a subset of EBSAs in the Pacific, the first of these areas. The EBSA map developed by the workshop for this region is shown in Figure 3.4.

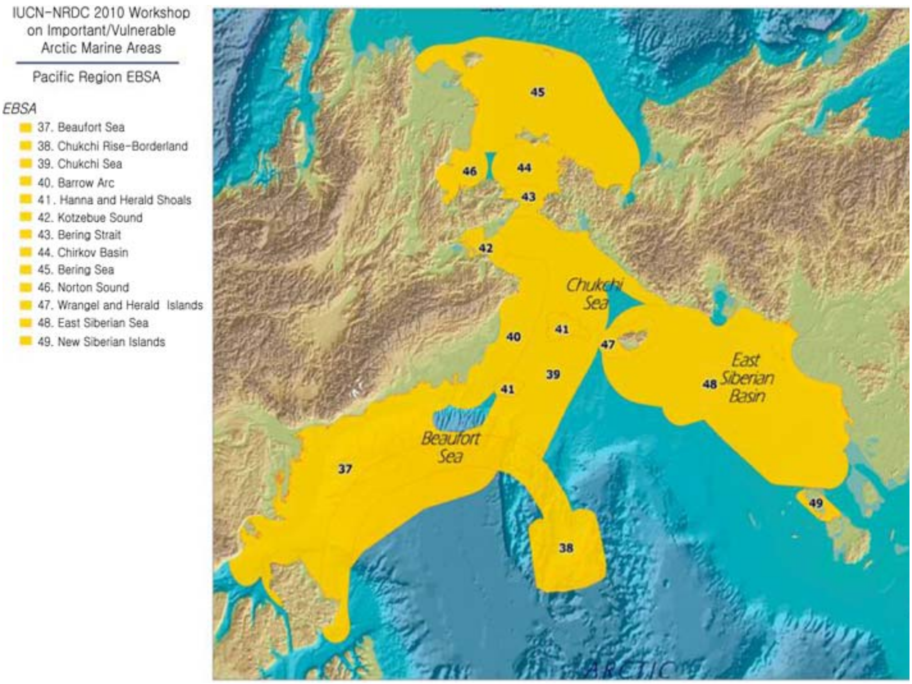

Figure 3.4. Pacific Region Ecologically and Biologically Significant Area

It is clear from this map that this region of the Arctic contains broad swaths of biologically and/or ecologically significant areas. In considering this picture, workshop participants concluded that it would be useful to further refine the map to identify those areas that meet most or all of the CBD criteria or which meet one or more of them at a global level of significance. The term "super EBSA" was coined to describe these areas. The map showing super EBSAs of the Arctic is shown in Figure 3.5.

These two maps show that, while the size of the area covered is significantly reduced when applying the higher "super" EBSA standard, the Bering Strait region remains almost completely identified as a super EBSA, indicating that it is one of the very most productive regions of the Arctic.

Ships transiting the Arctic and all other traffic supporting industrial development in the Beaufort and Chukchi Seas must pass through this area. We know that this traffic is expanding, but it is already considerable today. A recent map prepared by the Marine Arctic Exchange of Alaska (Figure 3.6) shows traffic through the region for the period May 1, 2010 to October 26, 2010. Based on Automatic Identification Systems

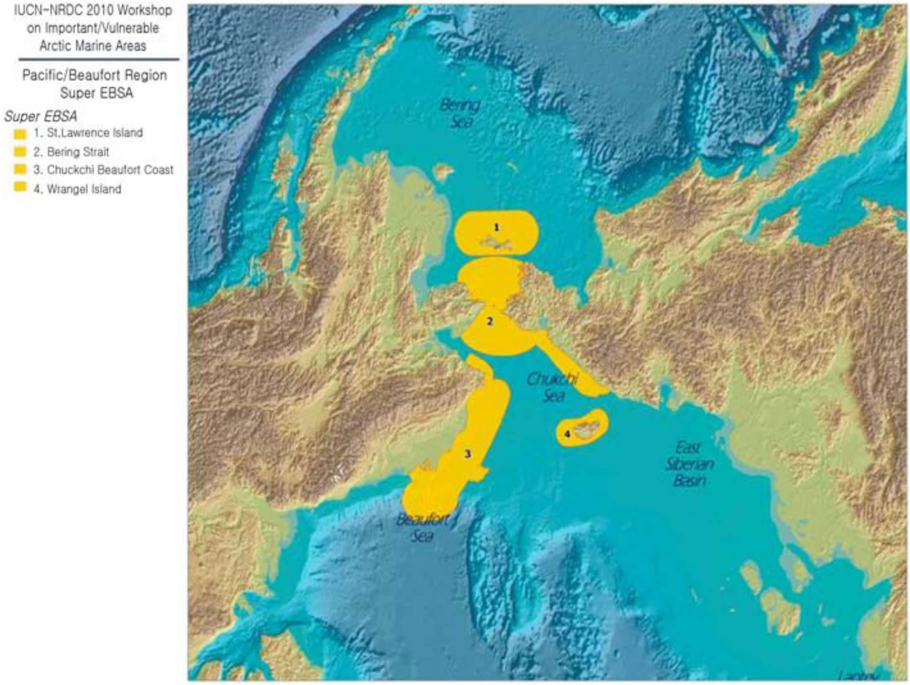

Figure 3.5. Pacific/Beaufort Region Super Ecologically and Biologically Significant Area

(AIS) data from the Marine Arctic Exchange vessel tracking system, there were approximately 240 transits of the Bering Strait by commercial vessels in 2010.

About half of these were domestic vessels (tugs, barges, fishing boats and landing craft). Twenty percent of these were cargo vessels calling on the Red Dog Mine and three percent were tankers, with the balance being passenger vessels, icebreakers, and research ships.[2]

NOME WORKSHOP

In light of current and projected ship traffic in the super EBSAs of the Bering Strait region, a workshop was convened in Nome, Alaska from June 26-28, 2012. The workshop was organized by IUCN, NRDC and the University of Alaska, Fairbanks. Over thirty individuals participated, including scientists, those working in government, in non-governmental sectors, and people from indigenous communities. The meeting focused on identifying options for the protection of three super EBSAs: St. Lawrence Island, the Bering Strait, and Wrangel Island.

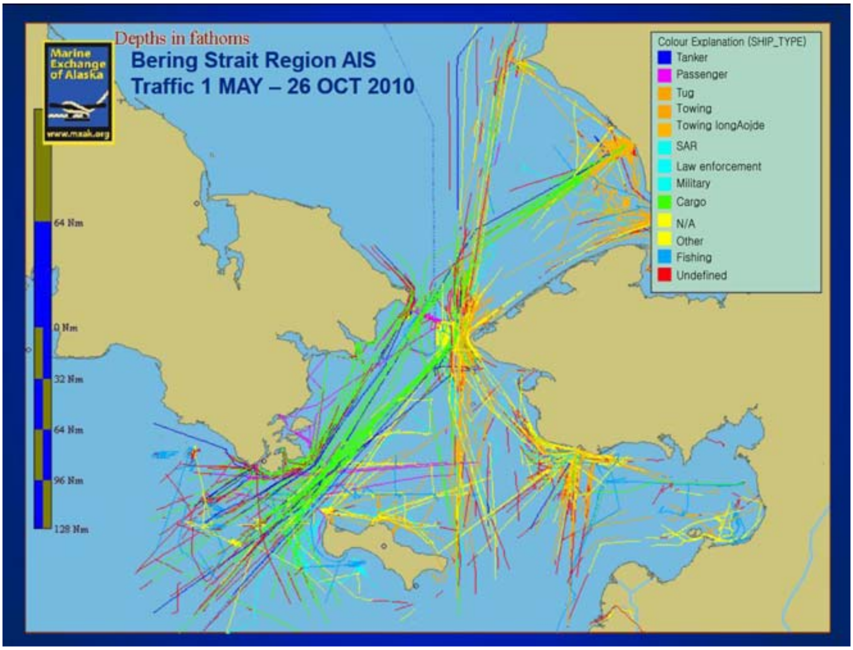

Figure 3.6. Bering Strait Region AIS Traffic May 1–October 26, 2010

The workshop identified four broad categories of activity in which actions would be fruitful, including: communications and outreach, protected areas, US-Russia bilateral opportunities, and development of a globally applicable polar code.

Communications/outreach

The meeting considered a wide range of communication and outreach options. The first set of activities involved gathering information regarding which communications technologies are currently working well in the region. Such information will allow communications systems to be built on the most robust available alternatives. At the same time, expert information would be sought on what technologies are available, including identification of existing "purpose-dedicated" systems (e.g. those established in support of oil development). Development of this information base could be supplemented by an experimental demonstration project applying one or more communications techniques, followed by a regional "lessons learned" workshop. In combination, these actions will enable local decisions about the creation of multi-function communications approaches.

Another form of communication supported by meeting participants was the development of a set of maps showing subsistence use of the Bering Strait marine region. Efforts are currently under way to produce these maps for the US side of the Strait. Once such maps are developed, and supplemented by similar maps within Russian territory, they should be provided to local, regional and national governments. These governments could then develop a set of voluntary measures to protect critical areas from the possible negative effects of shipping, based on the maps. One important advantage of voluntary measures is that they may be developed far more quickly than mandatory regulations. Moreover, they lend themselves more readily to bilateral agreement between the two Bering Strait states. Once developed, these measures would be shared with shippers operating in the region via appropriate government agencies (for example, in the US, the US Coast Guard).

Protected Areas

Several protected areas options were considered at the meeting. Of these options, the one that had the greatest attraction for the meeting participants was the Particularly Sensitive Sea Areas (PSSA) designation by the International Maritime Organization. The advantages of the PSSA designation include global recognition, as well as the ability to create measures under a PSSA designation which take into account subsistence use. Major disadvantages of the PSSA approach are the degree of effort and length of time such designation requires. In this regard, since a PSSA proposal must be based on a risk assessment, it was thought that a useful first step would to be to proceed with an initial assessment as soon as possible.

Bilateral U.S./Russia Opportunities

Participants stressed the importance of bilateral approaches to actions in the Bering Strait, in particular due to the transboundary cultural ties of the indigenous people living in the area. Two areas were thought to be promising with respect to reinvigorating bilateral discussions. The first, mentioned above, was the development of voluntary measures for regional shippers, based on information developed on subsistence use. If such measures were to be supported by both governments, the impact is likely to be significant, even if the measures are voluntary in nature.

A second area of bilateral discussion might focus on the possible development of a bilateral PSSA proposal to the IMO. A constructive exploratory step in this regard would be the conduct of a preliminary transboundary risk assessment in the Bering Strait region.

Polar Code

Workshop participants recognized the importance of the development of a mandatory polar code by the IMO. Slow progress in this regard lent support to the early development of a set of voluntary measures which might be agreed and promulgated in the interim and which may continue as supplemental to the content of an IMO product.

Possible Actions by North Pacific States

While this paper reports on a range of mitigation ideas applicable to the Bering Strait region, it is appropriate in the context of this meeting to consider what steps might be taken by North Pacific States to ensure that Arctic marine transportation is conducted in a safe and environmentally sound manner.

I suggest the following:

- Strongly support development and adoption of a mandatory polar code in the International Maritime Organization;
- Support designation of protected areas through international instruments, for example, the Convention on Biological Diversity; The World Heritage Convention, and the IMO;
- Contribute to the installation of search and rescue and navigation devices;
- Provide scientific information and share data;
- Contribute knowledge on both the science and management of Large Marine Ecosystems like the Yellow Sea; and
- Explore appropriate cost-sharing arrangement to fund ice breaking vessels with fire fighting and spill response capacity (adapted from A Shipping Solution for the Arctic Ocean; Simon Lisiecki, Arctic Imperative Summit, Girdwood, Alaska, June 21, 2011).

Notes

1. The full report of this meeting may be found at: http://data.iucn.org/btw- wpd/edocs/Rep-2011-001.pdf.
2. Source: Ed Page, personal communication

Comments on Chapter 3: Inuit perspective

Udloriak Hanson

I will confine myself to some broad observations from an Inuit perspective. I should underline that my perspectives are those of a Canadian Inuit. Undoubtedly, an Inuit from other parts of the circumpolar world would draw on similar, but subtly different, life experiences. My appreciation of the depth of expertise contributing to this discussion prompts my first point: Inuit are participating in debates about the current and future legal and political regimes governing Arctic marine areas at a clear disadvantage—namely, our limited expertise in the wide range of technical areas in question. International law, ship design, marine navigation, oil and gas drilling, geology, the interpretation of weather related and other baseline environmental data, spill avoidance and clean-up engineering are areas in which we do not, and cannot realistically hope at any time in the foreseeable future, to be able to compete with the kind of expertise that the governments of Arctic states, and even heavily interested non-Arctic states possess. We cannot afford to invest in building up and sustaining in-house or otherwise ready-to-reach expertise.

For that matter, many multinational resource development companies have, and will continue to have, access to human and financial resources that are beyond our grasp. Inuit do not fool ourselves, nor do we try to fool others about such reality. It would, however, be a serious error for others to conclude that the very real limitations of our technical knowledge base are reasons to ignore or underplay the central importance of Inuit opinions and priorities surrounding the Arctic area. Bigger is not always better and more information does not always translate into better quality decision making. The limited technical capacity of organizations representing circumpolar Indigenous Peoples impose additional legal, political, and moral responsibilities on states undertaking activities in the Arctic. As they go about their collective and separate activities they must do so in ways that invite a high level of indigenous participation.

Sometimes ensuring this participation requires states to provide direct, timely, and significant financial and other resources to representative indigenous organizations so that states can be better informed and can ultimately speak for Indigenous Peoples in international arenas with confidence. There is, of course, an important line between offering help and seeking to buy support. That is a line that must not be crossed. Like state governments, international Arctic bodies, and international bodies with mandates that include the Arctic institutions, should, explicitly and energetically, pursue creative partnership with Indigenous Peoples. The Arctic Council is an example of how this can be done. In June of 2012, the Norwegian Foreign Minister made the following comments about the Council:

> "Various political arenas of cooperation address issues related to the Arctic. Circumpolar and regional cooperation is well developed and steadily increasing. The Arctic Council is the most important forum in this respect. The indigenous peoples of the High North have been given their rightful place as permanent participants. Indigenous peoples' traditional knowledge and skills are important, based as they are on a unique ability to live and work in the Arctic."
> (*emphasis added*)

Other forms of multiparty international partnerships with Indigenous Peoples should be explored. The same applies to domestic Arctic initiatives. For example, in Canada our previous national president of Inuit Tapiriit Kanatami raised the possibility of a joint Government of Canada/Inuit of Canada authority to manage the expected increase of ship traffic in the Canadian waters of the Northwest Passage, drawing both on the precedent of the Canada/United States St. Lawrence Seaway Authority, and on the partnership approach that is at the heart of the constitutionally protected treaties between Inuit and the Canadian Crown. The gap in technical capacity between indigenous organizations and state actors, whether operating on their own or through state-sanctioned international bodies such as the International Maritime Organization means that consultative exercises with Indigenous Peoples must be more than just shallow talk. The circulation of complex materials to indigenous peoples as part of a kind of scatter-gun, one-size-fits-all approach to communications with anyone and everyone is seldom helpful. International law underscores that indigenous peoples are not mere stakeholders to be lumped in with other stakeholders.

A preferable approach recognizes that consultation requirements with indigenous peoples must be carried out in a way that allows for a genuine and reciprocal exchange of assumptions, outlooks, and objectives. The principles set out in the United Nations Declaration on the Rights of Indigenous Peoples are relevant reference points, including the primacy of "free, prior and informed consent." In Canadian Constitutional law, consultation with Indigenous Peoples must be in search of accommodation, not talk for the sake of talk. That is as it should be. Procedural opportunities do not mean very much in the absence of a willingness to give proper attention and weight to proposals for substantive change. In the pursuit of new approaches to international collaboration in the Arctic, including such things as the contents of an Arctic shipping code, it will be important to consider not just how such approaches can minimize or avoid altogether negative impacts on Indigenous Peoples. It will also be important to consider how such approaches can actively advance indigenous rights, interests, and well-being. These positive, proactive dimensions should be built squarely and centrally into interactions in the Arctic between Indigenous Peoples and states, and between Indigenous Peoples and state-sanctioned international bodies.

For example, at the end of the day, when looking at a final version of an Arctic shipping code, it will be important to ask the following questions:

- Was this proposed code developed in such a way as to not just allow, but to facilitate, indigenous participation?
- Does this proposed code accommodate indigenous rights and interests and promote indigenous well-being? How does it do so?
- How can objectives in this regard be met and measures be reliably implemented? Could this proposed code have gone further? and,
- Does this proposed code have the confidence and support of Indigenous Peoples?

Appropriate recognition of the Arctic as the homeland of Indigenous Peoples does not necessitate strained processes or awkward relations. The reality is quite to the contrary. In comparing statements by Arctic leaders, both indigenous and non-indigenous, there is reason to be optimistic that, with goodwill, hard work, and some imagination - things never to be taken for granted, of course - there can be a high level of convergence of indigenous and State goals.

Returning to the June 2012 speech by the Norwegian foreign minister, we read the following about the Government of Norway's "vision for the Arctic region":

"In the Government's white paper on the High North from November 2011, our vision of the Arctic is summed up as follows:

1. Safeguarding peace and security;
2. Ensuring an integrated, ecosystem-based management regime and sustainable use of resources;
3. Strengthening international cooperation;
4. Strengthening the basis for value creation.

In other words, we want to make use of the opportunities that are opening up while at the same time managing the risks involved peacefully, sustainabl(y), and responsibly."

One would hope that principles such as these would have wide understanding and support. Inuit from the circumpolar region have made a conscious effort to relay to the international community, in a constructive and transparent way, the fundamental principles that should govern resource development in Inuit Nunaat, the lands and waters that make up the Inuit homeland in Greenland, Canada, Alaska, and Chukotka. Governance of resource development extends, of course, not just to the issues surrounding the creation and administration of rights of access and exploitation of natural resources. Governance also extends to all the ancillary activities necessary to support such exploitation, including Arctic shipping, environmental standards and measures, and the creation and maintenance of the wider networks of infrastructure and community development that must figure prominently in determining the location, pace, and management of development in Inuit Nunaat. Inuit have communicated our views in a variety of ways and venues. An important Inuit communications mechanism has been the 2011 document entitled, A Circumpolar Inuit Declaration on Resource Development Principles in Inuit Nunaat.

This Declaration followed logically and consistently from the companion 2009 document entitled, A Circumpolar Inuit Declaration on Sovereignty in the Arctic.

I would urge all of those who are working on Arctic issues, whether in highly technical areas, or broad legal, political, and policy issues, to make themselves familiar with the context and contents of this Resource Development Declaration. I will not repeat the detailed points in the Declaration but I will point out the various headings that speak directly to our conference's focus. They include:

- Inuit as Partners in Policy Making and Decision Making
- Global Environmental Security
- Healthy Communities in a Healthy Environment
- Economic Self-Sufficiency and the Sustainable Development of Resources in Inuit Nunaat
- Impact Assessment and Mitigation
- Improving Inuit Living Standards and Expanding Inuit Governance, and
- Promoting and Accommodating a Dynamic Inuit Culture.

Inuit leaders have not pushed Arctic and other states to provide formal endorsement of this Declaration or its companion Declaration on

Sovereignty. Inuit do, however, invite all those with relevant jurisdictional and other responsibilities to acknowledge the value of this Declaration as a careful, balanced, and equitable contribution to the building up of a positive international order in the Arctic, and to look to this Declaration as an appropriate benchmark of contemporary Inuit positions and expectations.

Comments on Chapter 3: Japanese Perspective

Toshiyuki Kano

The Northern Sea Route (NSR) has been discussed from many points of view. The shipping route that links Europe and Asia could reduce the distance cargo must travel by forty percent of the traditional route through Suez Canal. Environment measures prepared by the International Maritime Organization (IMO) are under consideration to be applied to existing rules. Arctic sea ice is predicted to decrease sharply by 2030, making it possible for vessels to navigate the route during the winter season with icebreaker support. This possibility also leads to reduced fuel consumption as well as reduced greenhouse gas emission for ships passing through the route.

CLOSE THE GAPS

It is clear that the Arctic Sea environment is vulnerable. The current IMO rules are based on international research and monitoring of the viability of species in the NSR area. The outcomes of a great number of research and monitoring activities are stored in the database. The database provides a convenient tool for the subsequent analysis of NSR activities, in both the short and long terms. For identifying and taking protective measures, high quality assessment is useful and important. The quality of future assessments, however, will rely on the quality of the baseline data. A data survey is a continuous process and several field surveys must be carried out each year. Continuous updating is necessary to keep the database at an acceptable standard. Responsibility for these data maintenance, research, and monitoring efforts should be shared by both north Pacific Arctic countries and north Pacific potential users.

If the research and monitoring data are available to stakeholders, these efforts can also close the knowledge gaps and mitigate substantial uncertainties and regarding the nature of environmental change, the geological potential of the Arctic, environmental baseline, and methods for dealing with risks associated with significant industrial activities in the Arctic. Rules related to the Arctic Sea are discussed in the Arctic Council with the eight member countries, Canada, Russia, Denmark, Norway, Sweden Finland, Iceland, and the United States. Marine accidents and rescue operations in the Arctic sea were also discussed and an international rule agreed upon in the Arctic Council. Countries such as China, Japan, and Korea should have a role as countries that contribute to this conversation, because they are strong candidates to be potential users of the Arctic Sea.

ICE-CLASS SHIP'S ENERGY EFFICIENCY

In terms of shipping containerized freight between Northeast Asia and Northwest Europe, the NSR has the apparent distance and time advantage over the route through the Suez Canal. While there is a possibility of crossing the NSR with advanced ice-capable ships, the economic and operational aspects of these routes have not yet been fully explored. Energy efficiency for ice-class ships have unique characteristics compared with conventional ships. The Ship and Ocean Foundation, Japan, organized a one month experimental voyage through the NSR in the summer of 1995 to make a comprehensive survey of safe and efficient ice navigation through the route. A variety of measurements were performed for purpose such as the general evaluation of the voyage, observation of natural conditions, evaluation of satellite ice images, and investigation of ship performance (Yamaguchi 1995).

Figure 3.7 shows a speed-power plot, that is, the variation of the shaft horsepower with the ship speed obtained in the Okhotsk Sea, Bering Sea, and Bering Strait. Almost the same results were obtained in the three areas. The shaft force power was not zero near the zero value of ship speed, since the propeller was rotating and had a slight blade pitch when the propeller blade angle was set at 0%. The maximum speed was 15 knots at a power of 13700 ps.[1] Figure 3.8 shows the principal particulars and general figures of the ship, respectively. The Kandalaksha is a 173 meter-long 14700 dwt multipurpose cargo vessel, belonging to the highest Russian ice class for a cargo vessel, the ULA Class (Yamaguchi 1995).

Figure 3.9 shows the variation of shaft horse power with ship speed for a different level of ice concentration in the decayed multi-year ice of the East Siberia Sea. The shaft horse power became larger as the ice concentration exceeds 5. The maximum shaft horse power was 13,000 ps for the ice concentration of 8-10 (Yamaguchi 1995).

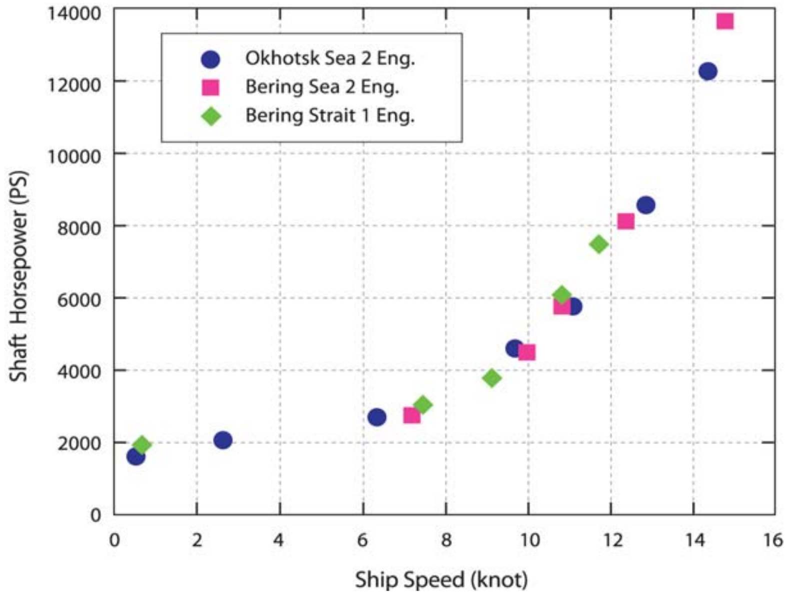

Figure 3.7. Power Speed Test Results in Open Water

Length O.A.	173.0 m
Length B.P.	159.0 m
Breadth molded	24.0 m
Depth molded	15.2 m
Draft, summer loadline	10.5 m
Draft, Arctic subdivision loadline	9.0 m
Dead Weight, summer loadline	19442 ton
Dead Weight, Arctic subdivision loadline	14700 ton
Main Engine	2×Wärtsilä Sulzer 14ZV 40/48
Engine Output	2×7700 kW (21000 BHP)
Propeller	1×CPP, 4 blade, Dia.=5.6 m
Endurance	16,000 SM
Tank Capacity:	
Heavy Fuel Oil	3740 m^3
Diesel Oil	783 m^3
Lub, Oil	85 m^3
Drinking Water	174 m^3
Fresh Water	501 m^3
Water Ballast	972 m^3
Accommodation	52 persons

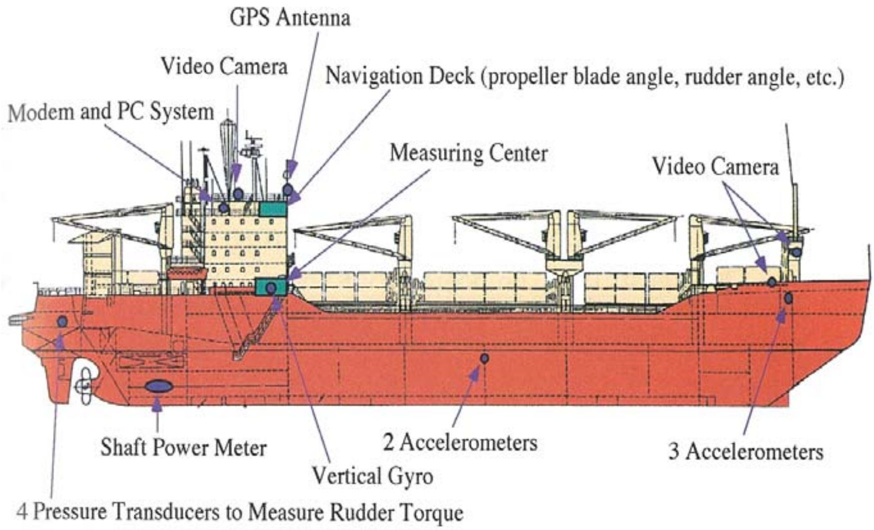

Figure 3.8. The principal particulars and general figures

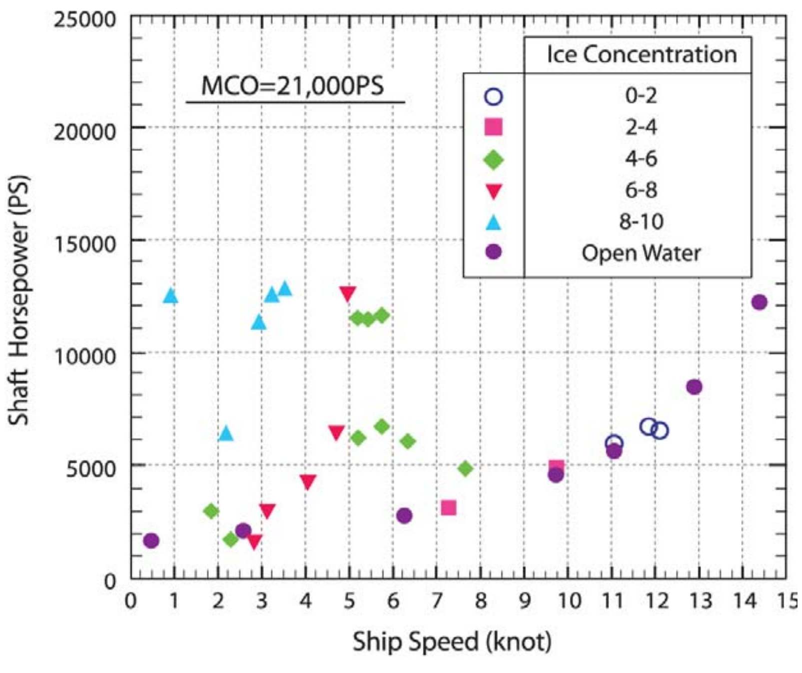

Figure 3.9. Power Speed Test Results in Multi-year Ice of the East Siberian Sea

Figure 3.10 shows the variation of shaft horse power with ship speed for different levels of ice concentration only for decayed first-year ice in the Laptev Sea. The correlation between the shaft horse power and ice concentration is not clearly confirmed. The ship speed and shaft horse power ranges are 4-11 knots and 3,000-6,500 PS, respectively. The maximum shaft horse power is 6,500 PS which is half that in the East Siberian Sea (Yamaguchi 1995).

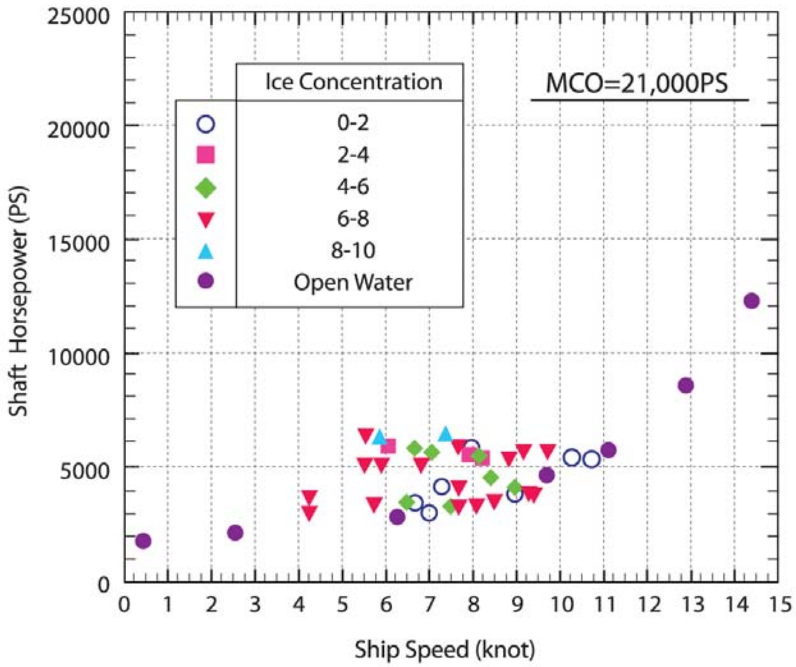

Figure 3.10. Power Speed Test Results in First-year Ice of the Laptev Sea

These results show the energy efficiency in ice-capable ships is inferior to conventional ships, not only in ice operation but also in the open sea. Therefore, while GHG emission decreases over a shortened distance, propulsion performance is inferior to conventional ships and thus emission increases. In light of global environmental issues, the propulsion performance of advanced ice-capable ships in practical use in the NSR should be estimated. Additionally, the total amount of emissions from ships in the NSR and the Suez Canal Route should be estimated and compared. Estimation also directs attention to the environmental impact and final operational capacity cost of each navigation option.

ENVIRONMENTAL SAFETY OF NUCLEAR ICE-BREAKERS

The environmental safety of nuclear ice-breakers in normal and emergency condition is another important consideration (Provdin, Tkachev, and Levin 1994; Semanov 1995). If there are failures in the reactivity systems, primary coolant system, and stranding of icebreaker or ship collision, the implications for nuclear-powered ships must be considered. Emergency-level rises in neutron power, pressure and temperature within primary coolant systems, and reduction or failure of core heat removal are among the possible aftereffects of nuclear propulsion plant and nuclear steam supply system malfunctions.

DEVELOPMENT OF NSR

A shipping route that directly links Europe and Asia would increase shipping in the Russian coastal area. This may dramatically improve Russia's ability to supply their resources of nickel, copper, coal and oil to the global market. If the LNG large-scaled facility construction plan is implemented, considerable transportation increase in this shipping route would be expected. It is therefore necessary to survey the navigation route accurately. Some Russian ports need to open and provide necessary services with fair price including bunkering and maintenance to improve convenience of transportation for foreign ships. Ports, icebreakers, and freight ships need to improve interoperability to develop this operating system. Currently, there are many convenient ports like Singapore that provide high quality services to foreign ships at a fair price on the route through the Suez Canal. The advantage for NSR in this regard should be verified compared to the Suez Canal Route.

SAFETY NAVIGATION SUPPORT INFORMATION SYSTEM

Professor H. Yamaguchi of Tokyo University mentioned (Yamaguchi 1995) a future ice navigation system that could monitor navigation in NSR and provide information on ice floes and safe routes in the Arctic Sea (Figure 3.11). Such a system could allow could help ship avoid accidents at sea and make a contribution to safe navigation that in turn leads to environmental conservation as the number of spills and disasters is curtailed. Current satellite radar can provide information on ice properties as well as the extent of ice. If we can obtain accurate ice information and have access to tools for predicting the future ice con-

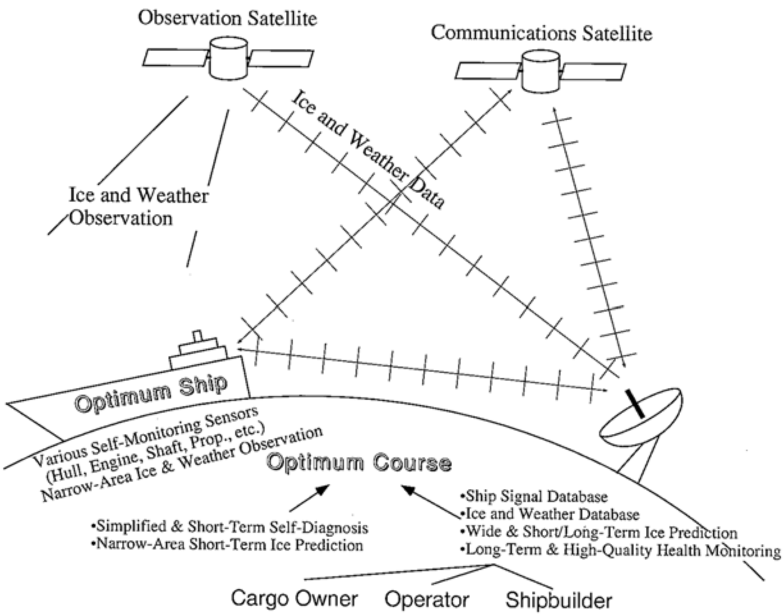

Figure 3.11. Highly Integrated Future Hardware/Software Network for Safe and Efficient Ice Navigation in the Arctic Sea

dition precisely, we can select the optimum route for a particular ship whose capabilities are known. Also, the rapidly advancing shipbuilding technology will soon enable the design and construction of an optimum ship if we can estimate the ice conditions to which she will be subjected. Close cooperation between shipbuilders, operators and cargo owners is required to realize such a system. Because a ship must be independent to some extent, each ship should have a subsystem to monitor its vicinity and immediate conditions in order to sail independently in the case of emergency and to complement the whole system. Such a system contributes to the avoidance of accidents and prevents pollution from ships. In addition, information on radiation in normal and emergency conditions may be included in the monitoring system in the case of the nuclear ice-breakers supporting international shipping.

Notes

1. PS is Metric Horsepower.

References

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Provdin, V, Tkachev, N, and Levin, B. 1994. Project II.6: Environmental safety of ships.7. Environmental safety of nuclear icebreakers. International Northern Sea Route Programme discussion paper.

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Comments on Chapter 3: Korean perspective

Hyun-Kyo Seo

In response to Professor David VanderZwaag's informative offering on Arctic marine protections, I wish to briefly present several related issues from the Korean perspective. The Korean Ministry of Land, Transport and Maritime Affairs (MLTM) is participating in an online Intercessional Contact Group (ICG) led by Norway regarding the Polar Code. MLTM in turn facilitates meetings of a group of domestic experts including members of the Korea Register of Shipping, Korea Polar Research Institute (KOPRI), and members of industry, in particular ship-building companies, to deal with issues raised by the online ICG. When I participated in the domestic expert meeting in July, 2012, it was clear that the government and industry jointly prioritize the sustainability of the polar region and are together trying to review the daft polar code with the goal of fortifying the protection of the polar environment and ensuring safety as international efforts are undertaken there (Arctic Council, ATCM). Korea's world class ship building industry is at the forefront of cutting edge environmentally friendly techniques and fully supports the government's position in the discussion of the Polar Code.

Korea tries to take international regulations and standards into consideration in operation of its infrastructure. For example, on the regulation of Heavy Fuel Oil, a kind of diesel fuel called Marine Gas Oil (MGO) is in use in Araon, Korea's icebreaking research vessel and at the Antarctic King Sejong station. The Antarctic Jang Bogo station is designed to use similar oil and to be run at high energy-efficiency, both of which are called for in the final Comprehensive Environmental

Evaluation already approved by the 35th Antarctic Treaty Consultative Meeting in 2012. Araon was also designed to minimize the emission of black carbon and GHG gas (i.e. refrigerant for freezer). In operating Araon, Korea is trying to mitigate ballast water issues and noise during Arctic and Antarctic cruises.

The Arctic environment is abruptly changing as a result of global climate change. With the increase of shipping activities in the Arctic, the frequency of emergencies is expected to rise, accordingly. Search and rescue operations are critical to consider in human life-saving precautions and environmental protection in the Arctic. In the meantime, an agreement which deals with search and rescue of aeronautical and maritime vessels and passengers, was signed at the Arctic Council ministerial meeting in Nuuk, May 12 2011. This agreement was the first international agreement written exclusively for the Arctic region and the first international agreement made by Arctic Council. The Agreement, entitled "Aeronautical and Maritime Search and Rescue in the Arctic" was made in accordance with the 1944 Convention on International Civil Aviation and 1979 International Convention on Maritime Search and Rescue. The Agreement is the beginning of cooperation among the Arctic Council's eight member countries, and they are now obliged to exchange general information, share information on search and rescue facilities, exchange knowledge of fueling, supply and medical facilities, and details on the training of search and rescue personnel. Korea welcomed the agreement search and rescue operation in the Arctic. Korea, Japan, China, and the European Union are interested in Arctic issues and especially want to join the Arctic Council as the permanent observer states. These nations should support and participate in search and rescue in the Arctic.

Recently, the vessel Araon was involved in search and rescue activities in the Antarctic. Araon rescued thirty-one crewmembers of Sparta, a Russian fishing vessel, trapped in thick sea ice on the Ross Sea during the 2011 Christmas holiday, sacrificing several days of a research cruise to make the rescue. Araon also rescued the crew of the Korean fishing vessel Jungwo-2 on the Ross Sea in January, 2012. As a national operator of Korean polar infrastructure, KOPRI will answer international requests for help in cases of emergency in the Polar Sea, when appropriate.

Korea applied to be an ad-hoc observer of the Arctic Council, and received that status in November, 2008. Since that affiliation was formalized, KOPRI's staff has participated in the meetings as an expert contingent of national delegates. They attended the Arctic Council ministerial meeting, the Senior Arctic Officials meeting, as well as the Arctic Monitoring and Assessment Programme (AMAP) meeting in

Helsinki in 2009 to support the Ministry of Foreign Affairs and Trade. Korea's permanent observer status to the Arctic Council will lead KOPRI in the future to participate actively in the various monitoring and research programs led by working groups under the Council. Under the Article 234 of United Nations Law of the Sea Convention (LOSC), Korea joined LOSC in 1996, and a Korean expert, Dr. Yong-Ahn Park, is one of the members of the UN Commission on the Limits of the Continental Shelf. Another Korean expert, Dr. Jin-Hyun Paik is one of the judging members of International Tribunal for the Law of the Sea (ITLOS). Korea tries to respect the positions of the Arctic coastal countries on the issues relevant with Article 234.

For the sake of comprehensive Arctic sustainability, scientific research and relevant monitoring on the Arctic environment and ecosystems should be encouraged and supported, with a preference for research that protects the environment and indigenous people. The Arctic and the Antarctic are the world's most uncontaminated areas and are especially vulnerable to climate change. In particular, environmental protection is crucial issue because the Arctic area is the homeland of indigenous people. Any decrease of sea ice in the Arctic raises expectations about developing and using the resource because of greater accessibility, but sustainable development is one of the main goals of the Arctic Council and for this reason scientific research and surveys preceded development of the Arctic region. Arctic states and non-Arctic states should work together through research collaboration to ensure environmental protection of the vast Arctic area and scientific research activities to address Arctic environmental issues should be further supported.

PART III

Arctic Marine Living Resourcese

4. Arctic Marine Living Resources

David Fluharty

INTRODUCTION

The whole Arctic marine ecosystem has been in flux in recent decades because of changes in the physical and chemical processes that drive atmospheric and ocean circulation, the loss of sea ice, changes in precipitation and runoff, all of which affect nutrient distribution and availability. These changes result in alterations in ocean microbiology and primary and secondary production which are processes that transfer impacts onto fisheries, marine mammals and seabirds and thereby onto patterns of human activities dependent on them. Increasingly, new human activities made possible as a result of loss of summer sea ice are permitting oil, gas and mineral development, seasonal shipping, and marine tourism in addition to well-developed fisheries in the far North Atlantic and subsistence fisheries throughout the Arctic region. While these changes may have an impact on summer breeding and feeding areas for migratory seabirds and marine mammals in the Arctic region, the interplay continues in their winter range far from the region. Indeed, even indirect influences originating geographically outse the Arctic result in transport of toxic materials into the Arctic ecosystem that may exacerbate changes in living marine resources in the Arctic (Bard 1999). Many of these influences provide evidence of the extent of economic globalization on Arctic resources. It is clear that these influences affect demand for living marine resources as well as oil, natural gas, and minerals in addition to transportation services for commerce and tourism. The Arctic region is clearly a northerly expression of the concept of the Anthropocene (Crutzen and Stoermer 2000, Economist 2011).

This examination is focused on the present and future use and management of living marine resources in the Arctic and the impacts of climate change and other forcing mechanisms on Arctic marine ecosystems. I first discuss the physical drivers, and other drivers, that form the context that influences the distribution and abundance of living marine resources in the Arctic Ocean and adjacent northern seas. I next discuss existing marine fisheries and their management and then I examine potential marine fisheries and issues associated with their management. Finally, I focus on the Arctic as a region of marine biodiversity by extending discussion to marine mammals, seabirds, and polar bears and issues relating to management for maintaining and protecting marine biodiversity. Additional topics touched upon briefly include possible aquaculture developments and impacts of changes in the freshwater regimes in the Arctic and their implications for freshwater fisheries.

Most of the discussion to this point assumes a rapid but incremental change in Arctic marine ecosystems. Significant concern and increasing evidence point in the direction of possible abrupt climate change occurring which would alter the incremental change scenarios in ways that are hard to predict. I discuss the implications of abrupt change and conclude with a general discussion of prospects for cooperation in governance of the Arctic in terms of living marine resource management.

This treatment can provide a background for planning by North Pacific Rim and other countries to promote informal consultation and to consider how to convey the results of these consultations into various Arctic forums.

CONTEXT: PHYSICAL AND ENVIRONMENTAL DRIVERS AFFECTING ARCTIC LIVING MARINE RESOURCES

The Arctic Ocean is a unique and extreme environment. It is an ice-covered enclosed sea and its low temperatures, restricted circulation, huge variation in seasonal light, and great depths surrounded by shallow shelves make it a tough crucible for living marine resources (Gradinger 1995). The narrow and shallow Bering Strait in the west and the deep and wide Fram Strait in the east serve as the main connections to the rest of the world's oceans. The land and water of the Arctic region accounts for approximately 17% of the total area of the world. The Arctic Ocean is 4.3% (15.6 million square kilometers) of the world's oceans by area but only 1.4% of the volume because it has the shallowest average ocean depth (1,205m). Its deepest area is 5,567m (http://www.ngdc.noaa.gov/mgg/global/etopo1oceanvolumes.html). The Central Arctic Ocean is outside of currently designated Exclusive Economic Zones (EEZs) of adjacent countries and constitutes an estimated area of 2.8 million square kilometers, roughly the same size as the Mediterranean Sea (www.oceansnorth.org/arctic-fisheries-letter). Freshwater inflow from land plays a large role in ocean structure in the Arctic Ocean—especially the circulation in the Western Bering Sea but also as a result of glacial melting in Iceland and Greenland. The Central Arctic Ocean outside national jurisdictions is a deep basin with extensive, although diminishing, sea ice for all or some parts of the year.

The primary dominating feature of the Arctic has been its ice cover which has been largely seen as a year-round constant. In recent decades the ice dynamics have been studied and there have been significant changes on a timescale much faster than imagined (Stroeve et al. 2007). The summer melting of sea ice, the thinning of sea ice and the melting of glaciers in Greenland has also accelerated (Kjaer et al. 2012).

Arctic marine ecosystems are quite varied and complex. The physical features of the Arctic region include broad areas of continental shelf, narrow passages like the Bering Strait, less prominent areas of the continental shelf in the Arctic Ocean and the deep basin of the Arctic Ocean. There are numerous islands, inlets, bays and passages. These features are critical in understanding the basis for water circulation and potential productivity distribution in the Arctic Region. Atmospheric circulation is also a critical element to understand as a driver of ecosystem processes (Dessler and Parson 2006; Häkkinen, S., P. Rhines, and D. Worthen 2011). Finally the type, extent and variability in sea ice and its progressive loss (Stroeve et al. 2007; Perovich and Richter-Menge 2009; Carmack and Melling 2011) has significantly altered the global view of the future of the Arctic as a potential source of fish production (Grebmeier 2012, and more generally with respect to marine biodiversity, Doney et al. 2012). There is growing consensus on the nature of change in Arctic freshwater and marine ecosystems (more precipitation, warmer temperatures, changes in quantity and timing of productivity). Thus, there is mounting evidence that as a result of the velocity of climate change-shift in isotherms and seasonal timing and productivity in the marine Arctic, "give a complex mosaic of predicted range shifts⋯ that deviate from simple pole ward migration and earlier springs or later falls." These factors "emphasize conservation concerns, because areas of high marine biodiversity often have greater velocities of climate change and seasonal shifts" (Burrows et al. 2011: 652).

Vastly different processes affect microbial (Lovejoy et al. 2011, Poulin et al. 2011), algal and zooplankton processes in the sea ice realm, the under-ice realm, the pelagic realm in terms of species and production processes (Gradinger 1995, Li et al. 2009). The organisms that inhabit the Arctic Ocean have evolved over thousands of years to survive in these harsh conditions. Fundamental change in the amount and timing of ice cover is expected and with it will vary with the rate of change—terrestrial change apparently occurring faster than change in marine environments (Gradinger 1995, Gilg et al. 2009) although in northern subarctic waters change in the marine biota can be as fast or faster (Pinsky 2012). It is not entirely clear how changes in biology will affect the CO_2 pump in the Arctic. To the extent that reduction in sea ice cover happens there may be an increase in biological productivity which would result in biological carbon fixation and increase in sedimentation. Thus, the role of the Arctic in sequestering carbon may increase (Gradinger 1995, Chapin et al. 2000). Concomitantly, the rate of ocean acidification would increase as well although this process and its impacts are not well understood.

Ocean acidification is a growing concern in many parts of the world ocean. The extent to which the Arctic may be affected is unclear and the impacts on Arctic marine living resources is even murkier, although it is not unreasonable to anticipate similar effects for the Arctic as found in other ocean regions. Modeling the likelihood of ocean acidification in the Arctic based on a global coupled carbon cycle-climate model suggests that acidification is imminent (Steinacher et al. 2009). Direct monitoring of upwelling coupled with sea ice melt in the Beaufort Sea indicate that aragonite undersaturation, an indicator of ocean acidification, is occurring (Yamamoto-Kawai 2009).

In fact, the polar regions may be more vulnerable and susceptible to ocean acidification than other regions "because cold water absorbs CO_2 more readily, lowering the pH, added melt-water may force an uptake of CO_2, reduced sea-ice coverage results in more seawater exposure to and uptake of atmospheric CO_2 and expanded ocean-surface area may in turn alter the production and decomposition of organic carbon, a complex process that plays an important role in ocean chemistry" (http://coastal.er.usgs.gov/ocean-acidification/polar.htm). There appears to be scientific debate about CO_2 sequestration processes for the Arctic with some predicting a decrease in the CO_2 uptake capacity in an ice-free Arctic Ocean basin (Cai et al. 2010) and precautionary notes about the ability to generalize about impacts of climate change on how species will respond (Denman et al. 2011).

Release of methane from the sea floor due to sea floor warming is another potential source of increased acidity (Biastoch 2011). Research is underway to assess the impacts of ocean acidification on the Arctic (Robbins 2012, IFM-GEOMAR 2012, Robbins et al. 2011). Despite the high cost of research, especially experimental research in the Arctic, some have recommended that a framework for research be adopted that, "considers the effects of multiple stressors associated with a changing climate on the 'thermal window' of activity of marine animals" (Denman et al. 2011).

Species of marine organisms dependent on a permanently ice-covered region, such as ice seals and polar bears, will likely decrease. Seabirds that occupy rookeries in the vicinity of the ice edge may benefit or lose depending on how the biological foodweb restructures itself with reduced sea ice. Marine mammals highly dependent on the ice edge and the platforms in multi-year ice flows may experience significant harmful effects (Gradinger 1997, Moore and Huntington 2008, Ragen et al. 2007). Arctic freshwater systems are also strongly influenced by weather and climate and the impact differs with respect to flowing water in rivers and estuarine waters, standing water in lakes, ponds and wetlands, as well as the frozen water in permafrost, freshwater ice and snow cover (Prowse et al. 2006).

Critical to the discussion in this chapter is definition of the Arctic domain. There are numerous definitions—geographical, biological, physical and political—that exist as illustrated by Figure 4.1 below (Osherenko and Young 1989). Based on the stated intent to engage with the on-going efforts of the existing entities working on Arctic policymaking, I have chosen to select the most common Arctic Council definition of the Arctic because it illustrates the transition zone from temperate/sub-Arctic to high Arctic. This captures the adjacent seas and existing management efforts for living marine resources. These adjacent seas are all largely within national jurisdictions. For fisheries, these adjacent areas also represent areas with commercial fisheries having the highest harvests and values in the Arctic. In addition, I think it useful to identify separate, delineated Large Marine Ecosystems (LMEs) for the Arctic region as well as their tributary freshwater ecosystems (See Figures 4.2 and 4.3). Seventeen LMEs have been elaborated by the Arctic Council's Protection of the Arctic Marine Environment (PAME) in a multiyear process (PAME 2009).

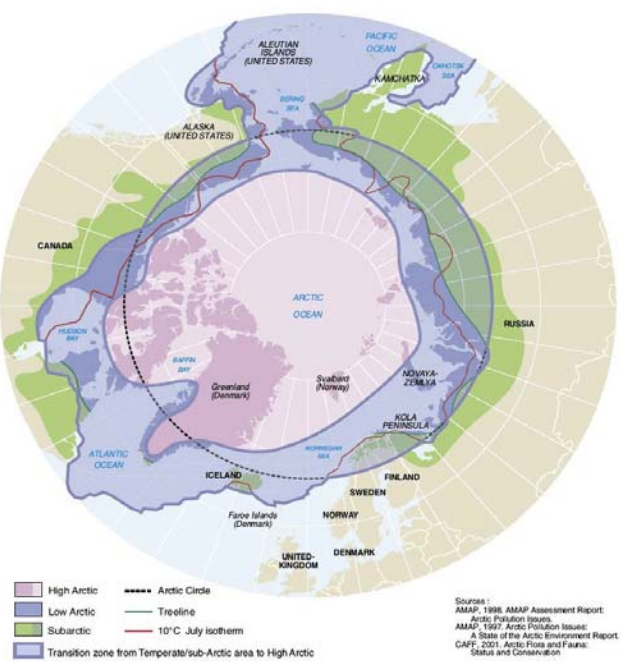

Figure 4.1. Alternative Definitions of the Arctic

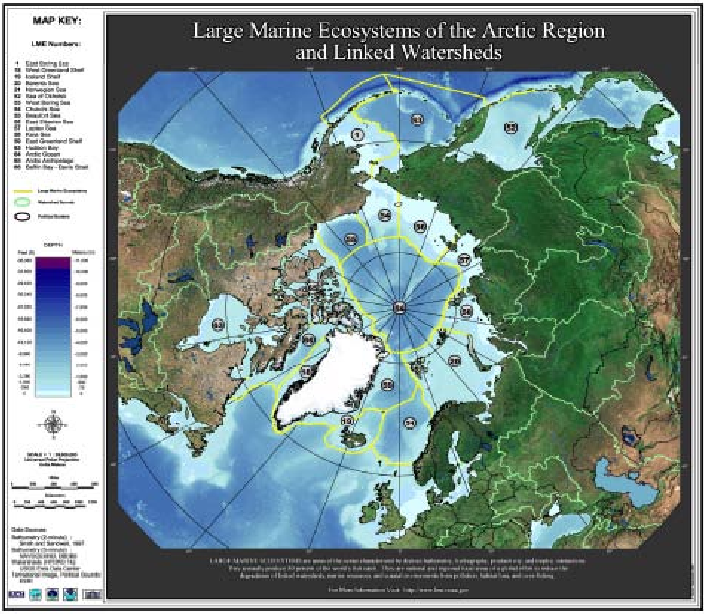

Figure 4.2. The 17 Large Marine Ecosystems and Freshwater Ecosystems of the Arctic

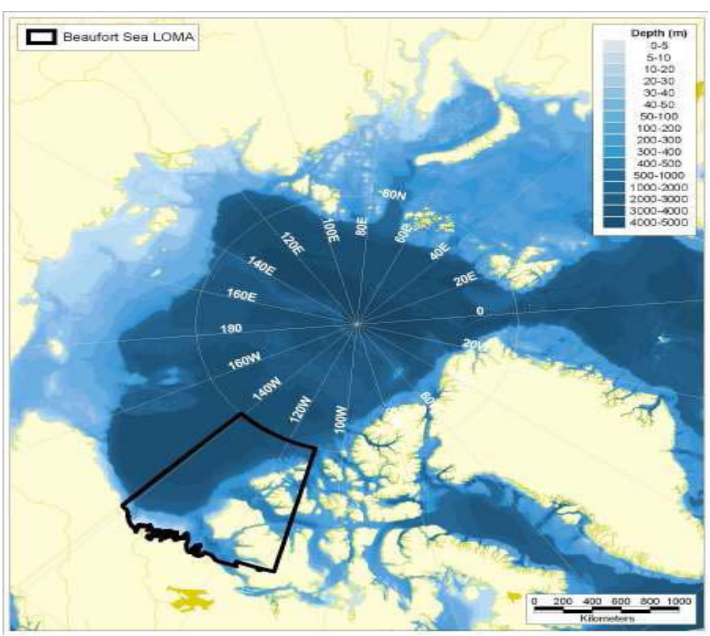

Figure 4.3. Western, Eastern Arctic and Central Arctic Ocean

EXISTING FISHERIES AND THEIR MANAGEMENT

The Arctic Ocean is not known for extensive fisheries per se, however its neighboring subarctic seas are among the sources of the largest fisheries in the world. Despite the fact that large scale commercial fisheries do not exist in the Arctic Ocean is not to diminish the roles that marine and freshwater fish (as well as marine mammals and seabirds) have played and continue to play in the subsistence economies and nutrition of indigenous peoples surrounding the Arctic Ocean (Booth and Watts 2007, Booth and Zellner 2008, Zellner et al. 2011, Pauly and Swartz 2007).

It is useful to understand that there are existing major world fisheries occurring in the northern portions of adjacent seas and the sub-Arctic. Major fisheries are evident in the form of the Russian and United States Bering Sea fisheries. Norwegian, Russian, Icelandic, Canadian and Greenland-Denmark fisheries are significant players in the North Atlantic and Barents and Norwegian Seas. Fisheries regions are characterized by the Arctic Climate Impact Assessment (ACIA) report (2005) as the four ecosystems, i.e., Northeast Atlantic (Barents Sea and Norwegian Seas), Central North Atlantic (Iceland and East Greenland), Northeast Canada (Newfoundland and Labrador Seas) and the North Pacific (Russian and US Bering Sea) for boreal fisheries (Livingston and Tjelmeland 2000). The ACIA Fisheries report did not focus on the Central Arctic Ocean (Food and Agriculture Organization (FAO) fisheries reporting Area 18) which is where current international attention appears to be riveted. This is because there is a dearth of commercial fisheries in the Arctic Ocean basin. For purposes of this article the Central Arctic Ocean (CAO) is a fifth regional ecosystem with an emphasis on the very significant subsistence fisheries, potential fisheries and especially on fisheries considerations for the areas outside limits of national jurisdiction.

There are significant differences between what might be termed the Western Arctic Ocean, the Central Arctic Ocean and the Eastern Arctic Ocean with respect to living marine resources that are important to recognize (See Figure 4.3). The open Eastern Arctic Ocean is already occupied by high latitude large scale commercial fisheries. The species composition of fisheries is considerably greater in the Eastern Arctic Ocean than in the Western Arctic as a result of its openness to the North Atlantic. Subsistence fisheries by indigenous peoples occur around the rim of the Arctic Ocean on shallow continental shelf ecosystems and in tributary freshwater aquatic systems. So far, surveys of fish in the Arctic Ocean show greatest abundance and variety of fish on these continental shelf ecosystems because of the seasonal patterns of ice melt and the ability to retain nutrients in the water column and advection of nutrients from the south through the Bering and Fram Straits. The

Central Arctic Ocean remains ice-covered year round so lack of light and nutrients limits productivity and, of course, ability to fish if there were sufficient abundance of fish (which there does not appear to be).

Quite a few significant fish species in the Arctic Ocean region are diadromous while most of the species of commercial importance are anadromous, e.g., salmon and Arctic char. This justifies developing an understanding the land/sea interface because changes in hydrography as a result of climate change may alter conditions for some species during the freshwater portions of their lives (Finstad and Hein 2012, Prowse et al. 2006).

In addition to the large scale fisheries in the four areas outlined above, there are much smaller scale fisheries occurring in Canada, Greenland, Norway, Russia and the United States as seen in mostly non-commercial subsistence fisheries that are of critical importance to indigenous communities in the Arctic (Zeller et al. 2011). Figure 4.4 shows the various regions of the Arctic Ocean region and displays the commercial fishing intensity in the areas mentioned above.

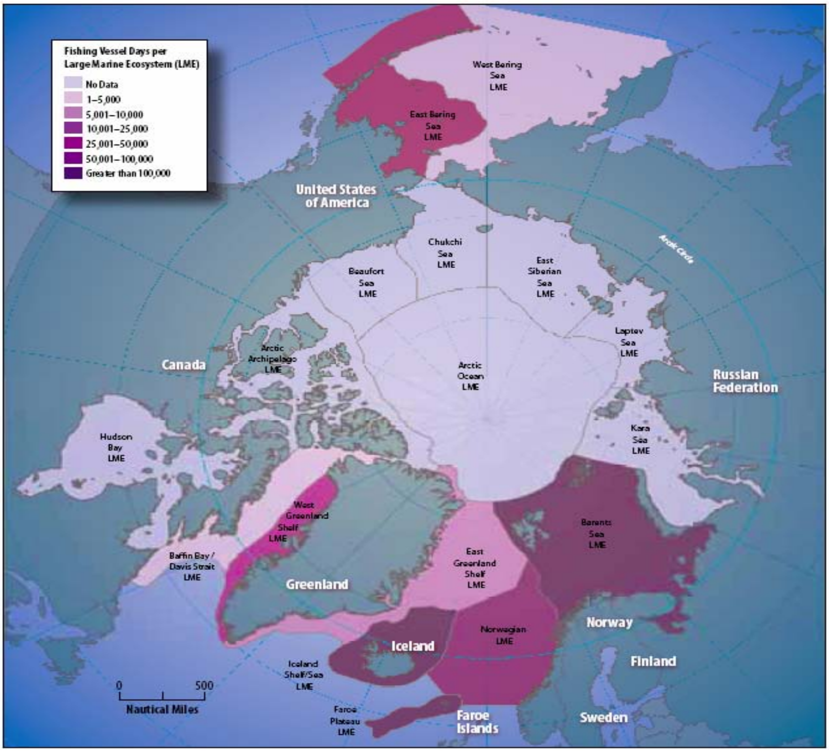

Figure 4.4. Fishing Vessel Activity in the Arctic Region by Large Marine Ecosystem. Source: AMSA

NE Atlantic fisheries by Norway, Russia, Iceland Greenland and Canada focus on Atlantic cod, Greenland halibut, polar cod, northern shrimp, capelin, herring, and blue whiting. Snow crab in Greenland and Canada are a valuable invertebrate species. While many more species are caught these are the principal species of interest.

These fisheries represent well studied species with variability to climate change as evidenced by past variability in stocks associated with shifts in ocean temperature and circulation (ACIA Chap. 13; Schrank 2007, Stige et al. 2006). The key point is that these are, in general, large scale, commercial fisheries that have been prosecuted for extensive periods of time from diverse fishery-dependent communities spaced around the NE Atlantic. Changes in abundance in the past have been much more heavily influenced by fishing pressures and at times overfishing has occurred, however, this practice is abating. The legacy effects of overfishing pressure persist in some stocks.

The fisheries in the Bering Sea are generally of more recent origin than the NE Atlantic. They are also large scale, commercial fisheries; however, the locus of the base of fishing operation involves larger communities often based outside the Arctic region per se. It should be noted that in recognition of the non-coastal nature of these fisheries (except for salmonids), an innovative Community Quota Development program has been devised to provide benefits of the fishery to small fishing communities in Coastal Alaska through six regional organizations. (NRC 2005). Whether or not this model is suitable for Arctic Ocean fisheries would depend on their being large scale commercial fisheries developing in the area which this author deems unlikely.

Principal species harvested in the Eastern Bering Sea are walleye pollock, salmonids, Pacific cod, Pacific Ocean perch, yellowfin sole, rock sole, Pacific halibut, king crab, and snow crab (ACIA 2005). Strong evidence of regime shifts in the species composition and abundance of the catch in the Bering Sea has generated significant interest in the fisheries management communities about the impacts of climate change on fisheries (Mantua et al. 1997, Hare and Mantua 2000, Mantua and Hare 2002, Grebmeier et al. 2006). Access to comparable information and assessments from the Western Bering Sea is acknowledged (Mathisen and Coyle 1996, NRC 1996, ACIA 2005, PICES 2010).

A sense of the quantities and distribution of fish harvests in the Arctic (mostly sub-Arctic) can be observed from Figure 4.5 which summarizes catches by broad categories and location.

Aquaculture, except for Norway's farming of salmonids, does not appear to be a significant factor in other countries at the present but it is conceivable that Arctic char and perhaps other select species might be suitable for consideration. The harvest of marine mammals and seabirds is discussed below. It is acknowledged that pursuit of fisheries in the Arctic may affect the prey base for marine mammals and seabirds (Brown et al. 2010) but these interactions are incompletely known.

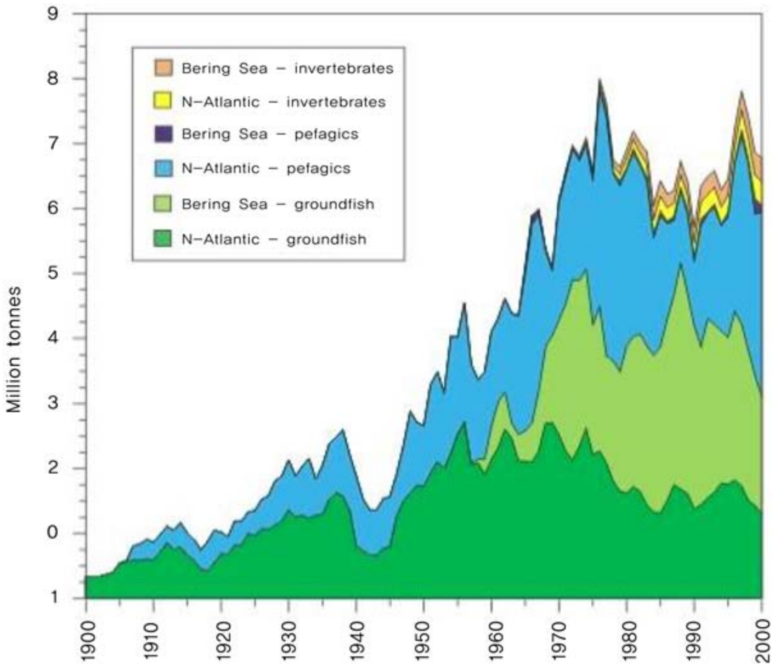

Figure 4.5. Distribution of fish harvests in the Arctic (Source: Encyclopedia of the Arctic, edited by Mark Nuttall, 2004).

In the Western Arctic Ocean, fish harvests have been documented by a series of studies from the University of British Columbia. In a summary paper, Zellner et al. (2011) reconstruct Arctic Ocean catch histories in Russia, Canada and the United States from 1950 to 2006 and find that total catches averaged 24,100 tons per year in 1950 but declined to 10,200 tons per year in 2006. The harvests were predominantly whitefishes in Siberia, salmonids in Alaska and Arctic char in Canada. Zellner et al. (2011) make the point that these catches are not accurately reported in the national statistics for FAO Area 18. While conditions vary across the Western Arctic, the reasons for decrease in these subsistence catches do not include overfishing, rather they indicate changing demographics and technology, most notably the substitution of mechanical transport for dog sleds. Thus, there is a decrease in the need to harvest fish to feed sled dogs. Other factors that affect demand for fish may reflect dietary choices in circumpolar peoples where there is a switch from traditional locally obtained to foods "imported" from outside the area (Pauly and Swartz 2006, Booth and Scott 2008). In the Eastern Arctic, the early openings and late closing of leads have interfered with traditional resource harvesting practices.

These changes in traditional practices and potential fisheries make for a very uncertain future for indigenous peoples of the Arctic. Loss of sea ice and changes in patterns of use constrain hunts in usual and accustomed areas. While some income is garnered from guiding of hunting and fishing as well as providing lodging and meals for tourists, these activities are not part of traditional pattern but are increasing. Most agree that there can be substantial adaptation to new circumstances within indigenous communities and that alternative mechanisms can be substituted to traditional sharing of resources, responsibility of hunting, etc. however it is also agreed that climate change will exacerbate increased interaction among regional and global economies (Berkes and Jolly 2001).

How are existing fisheries managed?

Indigenous fisheries appear to be locally managed by the resource users themselves in Canada and the United States. There is little effective oversight or monitoring by government agencies, i.e., Alaska Department of Fish and Game for Alaska and Department of Fisheries and Oceans for Canada. Stronger engagement between the state and local fisheries exists through co-management institutions in Norway. Commercial engagement of indigenous people in local fisheries is so mixed that this presents a particular case (Hersoug 1997). The Russian management approach is unknown.

Resources of the continental shelves inside EEZs of Arctic coastal states are managed by national entities charged with that responsibility. They consist, as best can be discerned, of modest oversight of subsistence fisheries by traditional communities. There is not a regional fishery management organization (RFMO) for the western Arctic or the Central Arctic Ocean at the present time, whereas one exists in part of the eastern Arctic in the form of Northeast Atlantic Fisheries Commission. This situation is largely as a result of the lack of apparent need for a RFMO given the nature of present bilateral arrangements of the EEZs in the Western Arctic and the ice dominated area of the areas beyond EEZ jurisdiction in the Arctic. Perceptions of the need for and timing of development of a RFMO or other more comprehensive arrangements are discussed later.

In the Northeast Arctic the Atlantic fisheries RFMOs are developed to manage fisheries outside of coastal state EEZs, for example, the

Northeast Atlantic Fisheries Commission (NEAFC) www.neafc.org, and Northwest Atlantic Fisheries Organization (NAFO) www.nafo.org. The International Council for Exploration of the Seas (ICES) provides scientific advice to the North Atlantic (and Baltic Sea) convention areas and provides advice to North Atlantic governments www.ices.dk/. In the North Atlantic Salmon Conservation Organization (NASCO) measures are taken to manage salmon fisheries in the North Atlantic www.nasco.org. The European Union manages fisheries in these areas on behalf of its members. For all practical purposes, coastal states in the northern part of the NEAFC area manage the fisheries because they occupy continental shelf areas inside of EEZs with only small set asides or quotas offered to other states.

By comparison fisheries management organizations in the Western Arctic Ocean area are represented by the EEZs of Canada, Russia and the United States (Molenaar and Corell 2009). In the North Pacific the North Pacific Anadromous Fish Commission (NPAFC) www.npafc.org and the North Pacific Marine Science Organization (PICES) www.pices.int are not management institutions but for fisheries they play a significant role in the development of knowledge of the North Pacific ecosystems and their variability. They are largely focused on the sub-arctic.

There are multiple perceptions of the nature of the central Arctic Ocean basin potential for fisheries outside the limits of national jurisdiction leaving aside the questions of delimitation that remain unresolved. These differences are quite important in terms of understanding engagement in Arctic Ocean fisheries policies and arrangements to be later addressed.

North Atlantic for Atlantic cod and herring and Bering Sea fisheries for walleye pollock constitute some of the world's largest fisheries and arguably they are among the best managed fisheries with Norway, USA, Canada, Iceland and Denmark among the top ten countries in terms of compliance with the FAO Code of Conduct for Responsible Fisheries (Mora et al. 2009). Similarly, these countries are among the most capable when it comes to maintaining and rebuilding fisheries (Worm et al. 2009). Using yet other standards for implementation of ecosystem-based management of fisheries these same countries were rated as among the best in the world (Pitcher et al. 2009). The point in this recitation of capacity is to emphasize that these same coastal states can be expected to apply high standards for any commercial fishery likely to commence in the Arctic region.

Disparate other fisheries not highlighted in the above discussion of groundfish are also important. Fisheries for salmon, multiple species of crab, Pacific cod, Atka mackerel, small pelagics, etc. are important as generating income and nutritional products. In these fishing areas it is safe to say that fisheries are mature, fully developed with strong integration into national management programs. In addition where transboundary or straddling stock fisheries are shared by countries, bilateral and multilateral arrangements for sustainable fisheries have been developed. Eight bilateral boundary areas exist where transboundary fish stocks or other fisheries issues may be important. See Table 4.1.

Table 4.1. Bilateral Boundaries in the Arctic Relative to Fisheries

1. Russia–US: Bering and Chukchi Seas	Unresolved – delimited but not ratified –Donut Hole Convention 1992 [multilateral]
2. US–Canada: Beaufort Sea	Unresolved – active research and discussions to resolve
3. Canada–Denmark/Greenland: Davis Strait	Treaty 1973
4. Denmark/Greenland– Iceland: Fram Strait	Treaty 1997
5. Denmark/Greenland–Norway: Jan Mayen	IJC Decision 1993 – Treaty 1995
6. Denmark/Greenland– Norway: Svalbard	Boundary Agreed–based on equidistance
7. Iceland–Norway: Jan Mayen	1980 Treaty Fisheries/1981 Treaty EEZ
8. Norway – Russia: Barents Sea	Treaty 2011

FAO 1998. FAO's Fisheries Agreements Register (FARISIS). Rome. Updated by Author 2011.

Key to this status is coastal state management of fisheries within respective EEZs. This can be seen in the assignment of levels of fishing effort in the Arctic region in Figure. 4.3 above. While there is no regional fishery management agreement for the Bering Sea, much less the Arctic Ocean, transboundary and shared stocks are, arguably, under adequate management or have not developed into significant management disputes in the area. Norway and Russia, for example, have developed extensive cooperation in the Barents Sea (Hønneland 2012). See Figure 4.6.

Finally, there are arrangements, in some cases multilateral, to deal with the three Arctic areas outside of national jurisdiction (besides the CAO), i.e., the "Donut Hole" in the Bering Sea (Wespestad 1993, Bailey 2011), the "Banana Hole/ Herring Hole" in the Norwegian Sea and the "Loophole" in the Barents Sea (Hoel 2009). In the area termed the "European Wedge" in the Central Arctic Ocean the Northeast Atlantic Fisheries Commission has a mandate over part of the currently ice covered portion of the high seas in the Arctic Ocean (north of 36 degrees north latitude and between 42 degrees west longitude and 51 degrees east longitude) even though at the present time commercial fisheries are precluded by the ice (Molenaar and Corell 2009). This leaves the Western portion of the high seas in the Arctic Ocean, also ice covered, without formal agreement. In this Western region commercial fisheries are almost non-existent in coastal state EEZs and non-existent in the ice covered areas (Booth et al. 2008). The United States has taken formal action to develop a Fishery Management Plan for its Arctic EEZ which closes the area to fishing until adequate scientific understanding of the potential fisheries is obtained (NPFMC 2009). See Figure 4.7.

Figure 4.6. Fisheries management zones in the Northeast Atlantic – Norway/Russia.

Similar actions have been taken for closures of the northeastern Bering Sea in US waters as a Northern Bering Sea. See Figure 4.8.

In the NE Atlantic the Convention on the Protection of the Marine Environment in the North-East Atlantic (OSPAR Commission) and its Annex IV on the assessment of the quality of the marine environment plays a major role (www.ospar.org). The full listing and description of North Atlantic arrangements for the marine environment affecting fisheries and other resources is beyond the scope of this treatment.1 In the broadest sense there are numerous international agreements with respect to regional governance under the Law of the Sea Convention (LOSC) that apply to fisheries and numerous bilateral arrangements among coastal states and with the European Union (Airoldi 2008, Hoel 2009, Molenaar and Corell 2008, Koivurova et al. 2009, Koivurova and Molenaar 2010) that apply to fisheries science and management.

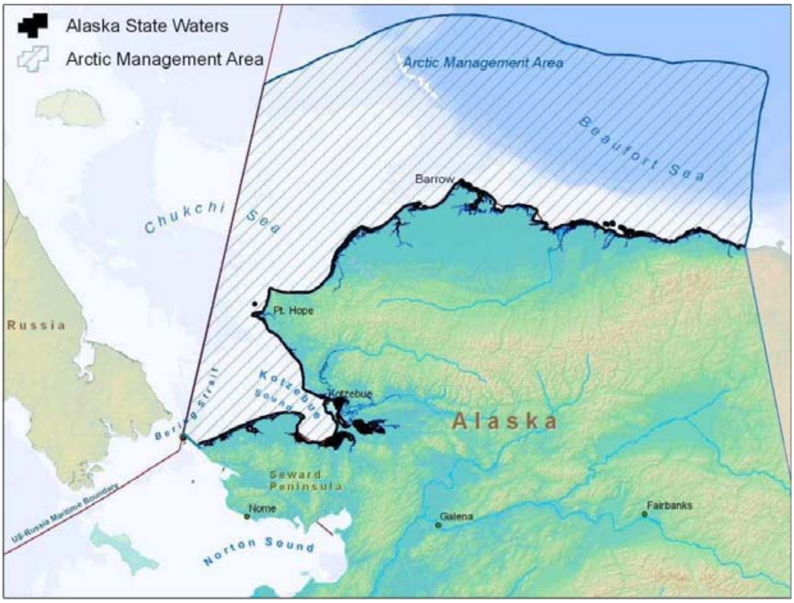

Figure 4.7. Closed to fishing area in US EEZ under Arctic Fisheries FMP

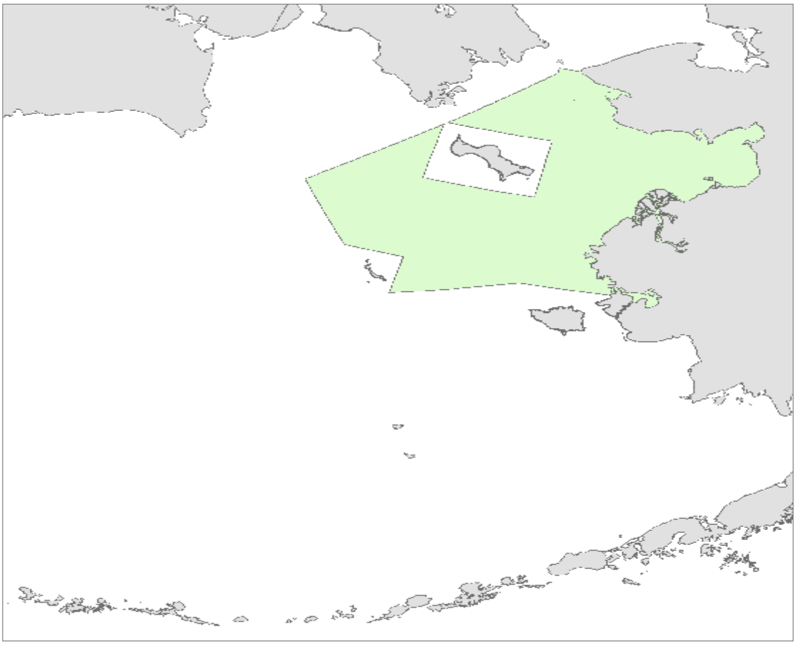

Figure 4.8. Research area where only limited experimental fishing is permitted

What are potential arctic fisheries?

Potential Arctic fisheries are here posited as fisheries that result from 1) projected changes in existing Arctic fisheries, 2) changes anticipated as a result of northward extensions of species ranges, and 3) changes in productivity because of reduction of sea ice and an extended ice free Arctic season. Potential fisheries can result in stock sizes larger and smaller than current fisheries and locations of abundance may shift. Predictability of these changes is low so the uncertainty surrounding these estimates is crucial to recognize. It is likely that the first order of action is to monitor and assess scientifically the potential for fisheries to develop (Fluharty 2010). This precautionary approach has been established by some Arctic coastal states namely the United States and Canada in their respective EEZs whereas other states (Norway, Iceland, Greenland/Denmark and Russia) maintain conservatively managed fisheries which also are subject to scientific research and monitoring.

Besides the biological availability of a commercial size fishery, economic viability of potential fisheries must take into account the extreme distances (8,000-12,000 km. one way) that must be transited by fishing entities from Asia or the United States, the lack of local support infrastructure and processing capacity, the lack of search and rescue and aids to navigation and, last but not least, the relatively low value of the projected resources in terms of the species and type of fishing activity expected especially in the Western Arctic region. A project to perform mid-water and bottom trawling in the Northern Bering and Chukchi was undertaking during the summer 2012.[2] It was funded by the Bureau of Ocean Energy Management and performed by the National Marine Fisheries Service along with a number of other players and sought to determine the nature of the fisheries resources in that region.

Changes in fisheries abundance are likely highest along the continental shelves where existing fisheries are taking place and where subsistence fisheries by indigenous peoples is a high priority in maintaining cultural integrity and livelihoods (Carmack et al. 2012). Potential fisheries of the Arctic Ocean will most likely occur on the continental shelves inside EEZs claimed by coastal states and, therefore, fishery management is expected to remain largely at the discretion of the coastal states. Any potential fishery on the High Seas Central Arctic Ocean is likely to be slow to develop because of the continued presence of sea ice. Sea ice forms again over the continental shelf each winter so fish populations will have to be tolerant of low temperatures because winter wind mixing and brine formation make this area vertically homogenous. Potential fisheries are likely to be pelagic rather than demersal in nature due to the extreme depth of the Arctic Ocean main basin and the nature of wind and water circulation not to mention accessibility under sea ice

(Augstí et al. 2010). Finally, the seasonal low intensity of light to fuel primary production will mean that potential fisheries will be slow growing and with reproductive and evolutionary strategies that are long-lived.

Various authors have noted major shifts in distribution of catches, abundance of fish stocks and changes in the size composition of stocks of fish in the Arctic region. Grebmeier et al. note that "[c]hanges in biological communities are contemporaneous with shift in regional atmospheric and hydrographic forcing. In the past decade, geographic displacement of marine mammal distributions has coincided with a reduction of benthic prey populations, an increase in pelagic fish, a reduction in sea ice and an increase in air and ocean temperatures" (2006:1461). A survey of literature (51 studies) on climate change in the Arctic marine ecosystem revealed that there were examples of range shifts, changes in abundance, growth/condition, behavior/phenology and community/regime shifts (Wassman et al. 2011). The authors lament that evidence of changes in planktonic and benthic systems is low and that losses of endemic species were difficult to evaluate given the paucity of information. Likewise, lack of information on invasive species is limited by the same monitoring problems. There were significant gaps in information from certain regions like Siberia (Wassman et al. 2011). The main conclusion by Wassman et al. (2011) was that considerably more research was needed to document changes occurring in the Arctic region marine ecosystems. Given the expense of Arctic monitoring and research, behavioral models are being developed to provide a common framework to predict impact of environmental change (Satterthwaite and Mangel 2012).

Results of research on modeling and monitoring of freshwater species response to climate change, show potential and actual changes in species distribution and abundance in a northward shift. In northern Canada studies reveal that if the temperature suitable for smallmouth bass, for example, would expand northward (and increase by as much as 18 degrees C by 2100) it would have the potential to alter lake ecosystems significantly (Sharma et al. 2007). Similar studies in Northern Norway point to a change in species distribution between Arctic char and brown trout as lake systems warm because the more aggressive and dominant brown trout may outcompete the more biophysically efficient Arctic char favored in cold water low productivity lakes (Finstad et al. 2011, Finstad and Hien 2012).

Actual estimates of change in climate on potential fisheries production for the Arctic are extremely rare and are full of caveats about the uncertainties of the climate change scenarios, response of the fish to climate change signals, how the ecosystem would evolve, and how to incorporate effects of ocean acidification among other things. I find the work of Cheung et al. (2010) to provide the most compelling effort to model these responses on a consistent global basis. Their results for potential maximum fisheries catch potential for the EEZs of Arctic coastal states show increases ranging from Canada at 5% to Norway at about 45% (Table 4.2).

Table 4.2. Projected changes in 10-year averaged maximum catch potential from 2005 to 2055 in Arctic nation EEZs

Norway (95)	45% increase
Greenland (37)	27% increase
US (Alaska) (43)	25% increase
Russian Federation (Asia) (75)	21% increase
Iceland (54)	20% increase
Canada (125)	5% Increase

These changes in maximum catch potential do not identify which species gain or lose in abundance or range to produce the net effect although these details can be teased from the model. One caveat should be made. It cannot be presumed that the increases are necessarily in high value fish or the species preferred in the market. Note that these values are for EEZs (more or less corresponding to the LMEs in Figure 4.1 above). There is no estimate of a maximum fish catch potential in the Arctic Ocean high seas area. Fisheries development in this area is generally considered small at this time and, in the view of many, the international interest in this area is misplaced at best in terms of potential fisheries.

Cheung et al. (2010) have attempted to project impacts of change on global ocean fish stocks. Their regional results for Arctic Ocean fish stocks distribution by decade from 2010-2050 have been presented at the International Arctic Fisheries Symposium (IAFS) held in Anchorage, Alaska, 19-21 October 2009 and available at (www.nprb.org/iafs/2009—last accessed January 20, 2012). They found polar cod distribution, for example, does not appear to change significantly, however its abundance decreases over its whole current range by 2055. Greenland cod appears to increase in distribution in limited areas, however, there are both increases and decreases in local abundance estimated.

Field research and monitoring results as reported by Logerwell at IAFS (www.nprb.org/iafs/2009) appear to provide evidence of the kinds of changes consistent with the Cheung et al. (2009, 2010) early model results. Logerwell (see above) reviewed the US portion of the Arctic using expert opinion to preliminarily assess the likelihood of range extensions and increase in abundance of fisheries for 30 the major species of groundfish, shellfish and anadromous species, salmon, herring, and forage fish in the Arctic as shown in Table 4.3.

On top of all the previously described impacts, ocean acidification is expected particularly to be an issue in the Arctic due to the ability of cold water to absorb carbon dioxide. The Arctic is expected to be one of the regions most vulnerable to effects of ocean acidification although the mechanisms and processes are yet to be determined (Doney et al. 2009, Mathis et al. 2011, Duarte et al. 2012).

MARINE BIODIVERSITY AND MANAGEMENT

This section reviews potential shifts in seabirds, marine mammals, polar bears and marine biodiversity in general. For each of the four elements, I consider the best available information on the processes of climate change that are likely produce impacts on each and I report overall management approaches at the national and international levels.

Seabirds

Seabirds are an important component of the Arctic and sub-arctic. Because of the extreme seasonality of the Arctic most birds exhibit a strong migration northward in the spring and southward in the fall. Research has shown that some species of seabirds (thick billed murres and common murres) show strong neg ative trends with respect to large temperature shifts both warmer and cooler than average (Irons et al. 2008). While conditions along seabird wintering areas and flyways are critical (e.g., Wilson 2010), the strong pulse of productivity in the Arctic permits feeding for all and breeding for many. It appears that the start of marine productivity and processes associated with presence of sea ice are changing, causing the opening of much larger areas in the Arctic for seabird access which may affect seabirds positively and negatively depending on species (Van Der Jeugd et al. 2009). The North American brant, for example, experience a strongly degraded wintering habitat which makes their Arctic habitats extremely important with respect to breeding and nutrition (Ward et al. 2005).

In contrast, the European pink-footed geese which has expanded in population size due to conservation and land use measures in the temperate zone may actually reduce carbon stocks and sink strength in tundra systems in Svalbard where they spend their summers (Van Der Val et al. 2007). Prey and forage availability in freshwater can be important as well [likely in offshore areas too] and this has differential impacts according to species (Tulp and Schekkerman 2008, Renner et al. 2012).

Table 4.3. Major species of fish and shellfish in trawl samples in the US Arctic EEZ and Preliminary Expert Assessment of Fishery Potential

Common Name	Present	Unlikely	Maybe
Coho salmon		X	
Chinook salmon		X	
Chum salmon	X		
Sockeye salmon		X	
Pink salmon	X		
Broad whitefish	X		
Least cisco	X		
Doll varden	X		
Arctic char	X		
Arctic grayling	X		
Pacific herring	X		
Capelin	X		
Arctic cod	X		
Walleye pollock		X	
Pacific cod		X	
Saffron cod	X		
Yellowfin sole			X
Greenland turbot (halibut)	X		
Arrowtooth flounder		X	
Kamchatka flounder	X		
Bering flounder	X		
Rock sole		X	
Flathead sole		X	
Alaska plaice	X		
Pacific Ocean perch		X	
Northern rockfish		X	
Snow crab	X		
Red king crab			X
Tanner crab		X	

Logerwell, E. 2009. Arctic Fisheries Research. NOAA Fisheries Service. Presentation to the IAFS Anchorage, AK, October 19 ppt. presentation (www.nprb.org/iafs/2009).

How seabirds (Arctic terns) disperse has been shown to be associated with changes the North Atlantic Oscillation such that natal dispersal may influence gene flow (Møller, Flensted-Jensen and Mardal 2006).

It has proven to be difficult to obtain a synoptic view of how seabird dynamics are affected by climate change in the Arctic. Given the vastly different life histories and adaptations, seabirds present an uncommonly difficult group of species about which to generalize. Suffice it to say that across all species there is considerable diversity. Modelers are attempting to construct frameworks that can help sort through the myriad scenarios (Satterthwaite and Mangel 2012).

This makes efforts for management of seabirds in light of climate change particularly problematic. All of the major flyways converge for certain species in the Arctic, especially the continental shelf areas, as the ice covered center is inhospitable (see Figure 4.9). These highly migratory species receive various degrees of national and international protection (CMS 2011). For the Arctic seabirds the Arctic Council's Conservation of Arctic Flora and Fauna (CAFF) group provides the principal forum for cooperation through the CAFF Circumpolar Seabird Group.[3] European treaties like the Convention for the Protection of Birds Useful to Agriculture (Paris 1902) and the International Convention for the Protection of Birds (Paris 1950) are still in force but the European Union (EU) Habitat Directive and Birds Directive are the primary ways the EU implements the Convention on Migratory Species

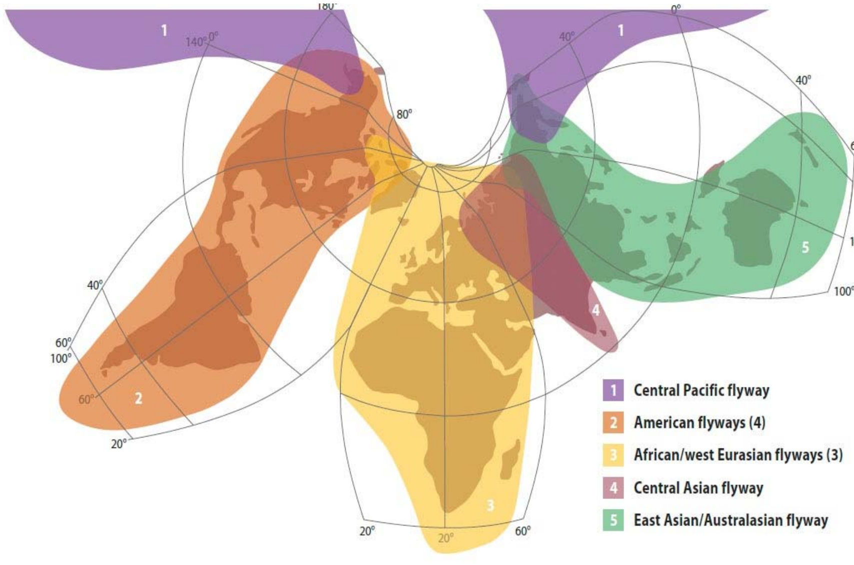

Figure 4.9. Major Flyways for Arctic Birds. Source: International Wader Study Group. 1998.

1979 and the Agreement of Conservation of African-Eurasian Migratory Waterbirds 1995. However it should be remembered that the CMS builds off of the Ramsar Convention for Wetlands of International Importance especially as Wildfowl Habitat 1971. Now the Convention on Biological Diversity provides the global overarching framework for migratory bird management. In North America, Mexico, the United States, and Canada have agreed in the Migratory Bird Treaty Act (1918) to cooperate in the management of the full migratory corridor. A similar bilateral agreement has been agreed between Japan and Russia, Russia and South Korea, US and Japan, US and Korea, for the Asian-Pacific Flyway.

Marine mammals

The constellation of year round Arctic marine mammals includes three species of whales (narwhal, beluga, and bowhead) and three seal species (walrus, ringed, and bearded seals) and the polar bear (in a separate section below). In addition, there are five whale species (fin, humpback, minke, gray and orca) and four seal species (harp, ribbon, hooded and spotted) that occupy the Arctic Ocean seasonally. Sea ice is a critical component for the survival of each of these species whether it is as a platform, an environment for ice-adapted species or simply as a seasonal barrier to certain migrant species (Moore and Huntington 2008). While it is extremely difficult to predict, it appears that some ice-obligate species can survive through 2050 in refugia, but others may adapt to ice free conditions. Some ice-associated species may be able to shift locations and prey and therefore adapt to expanded foraging opportunity afforded by a longer season. Finally, Arctic resident species may face increased competition from seasonally migrant species (Moore and Huntington 2008, Huettman et al. 2011). Killer whale sightings in the eastern Canadian Arctic increase in periods with low ice cover possibly generating predator-prey trophic cascades across the region (Higdon and Ferguson 2009).

The marine mammal complex that exists year round in the United States Arctic waters may be vulnerable or challenged by habitat modifications (Laidre et al. 2008) ecosystem alteration, i.e., change in food composition (Bluhm and Gradinger 2008), organismal health (Burek, Gulland and O'Hara 2008) and human impacts (Hovelsrud 2008) according to Moore and Huntington (2008). Systematic estimation of the sensitivity to climate induced change for resident marine mammals is problematic (Laidre et al. 2008). The regional availability of food for resident marine mammals is derivative of many physical and biological processes and therefore difficult to specify although scenarios can be built using existing information to partially inform and predict which species might be advantaged or disadvantaged (Bluhm and Gradinger 2008). These concerns can be summarized as shown in Table 4.4. Health of any marine mammal is a complex interaction with physical and biological factors and some may be direct via air and water temperature, amount of sea ice and human harvests, and indirect via changes in pathogen transmission, shifts in the prey base, and exposure to toxicants (Burek, Gulland and O'Hara 2008). As economic activities like oil and gas exploration and development and shipping expand, these activities can have direct and indirect effects as well. Direct management actions taken to utilize a precautionary approach as has been done in the US Arctic for fisheries (Stram and Evans 2009) and other activities can be compromised by the lack of similar actions in other sectors (Reeves et al. 2012).

Management of pinniped populations is relegated to national governments. While management for conservation can take action with respect to restrictions on hunting, protection of habitat, and reduction of incidental take is possible these efforts are a stopgap effort if there are not ancillary actions to stop the loss of sea ice (Ragen, Huntington and Hovelsrud 2008). The North Atlantic Marine Mammal Commission (NAMMCO) established by agreement among North Atlantic nations in 1992 focuses on the marine ecosystem and the roles of marine mammals in it. It provides a regional forum for exchange of scientific information on marine mammal management including hunting practices and makes recommendations on conservation measures. Global management of cetaceans fall in large part under the International Whaling Commission Treaty (1946)[4] and the IWC. Most of the IWC attention in the Arctic is focused on setting quotas for harvests by indigenous peoples because of the global moratorium on whale harvests, allowing a certain number of bowhead whales to be taken by Native Alaskans and gray whales by indigenous people in Russia. Norway currently sets a quota of 700 minke whales for its commercial harvests under its formal and legal objection to the moratorium under section V(3) of the International Convention for the Regulation of Whaling. Iceland harvests minke whales as well.

Polar bears

Polar bears have become the iconic species of charismatic mega-fauna for climate change in the Arctic (O'Niell et al. 2008). They are circumpolar located in the nearshore ice shelf where the rate of disappearance of seasonal ice is most rapid. The polar bear's preferred prey is seals. Shifts in the pattern of sea ice are likely to make them less accessible to predators in several ways. A decline in the abundance of ice seals and greater dispersal of pack ice will likely make polar bear movement more difficult. While life history traits demonstrate a fair amount of plasticity, that is, adaptability to change, it is expected that polar bears in a warming climate will not fare well (Derocher, Lunn and Stirling 2004). However, predicting the rate of decline is difficult and even experts vary in their perspectives (O'Niell et al. 2008, Stirling and Derocher 2012). Most would agree that the rate of ice loss in the Arctic sets the pace for decline in polar bear abundance (Stirling and Parkinson 2006).

Table 4.4. Ice-associated marine mammals, linkages to sea ice and sensitivity to sea-ice conditions

Species	Linkages	Sensitivity
Pinnipeds		
Walrus	Mate, Birth, Rearing, Forage far from shore	Broadens feeding distribution/ Possible increase in abundance
Ringed seal	Needs ice for breeding, pupping, resting, ice–associated prey/ summer ice for resting	Stable snow on ice for lairs
Bearded seal	Same as above	Sea ice over shallow water rich benthic community
Ribbon seal	Breeds in ice pack	Pack ice in late winter early spring in regions where food is available for young.
Spotted seal	Breeds in pack ice	Lack of pack ice
Harp seal	Breeds in pack ice	Lack of pack ice
Hooded seal	Breeds on heavy large floes of pack ice late in season	Lack of pack ice
Cetaceans		
Bowhead	Highly ice adapted	Sea ice structures ecosystem and influences prey availability
Beluga	Associated with ice year round	Noise from seismic operations
Narwal	Associated with ice year round feed in pack–ice on benthos in winter	Noise from seismic operations
Polar bear	Principal hunting platform/ transportation for females with cubs	Short ice season means longer period of fasting

Polar bears are managed by national governments under the 1973 Agreement on Conservation of Polar Bears. The coastal state signatories to the agreement have obligated themselves to protect the ecosystems of which polar bears are a part and to manage those ecosystems consistent with conservation and use of the best available scientific data (Stirling and Parkinson 2006). Polar bears are also subject to bilateral agreements between the United States and Canada (Inuvialuit-Inupiak) and United States and Russia (Alaska Chukotka). The latter agreement called for a commission to be established for coordination of measures taken and one was set up in 2008. Greenland, Canada, and Nunavut signed a Memorandum of Understanding for polar bears in 2009. The Convention on International Trade in Endangered Species under Annex II covers species which are not threatened with extinction but may become so if international trade is not restricted. Polar bears are both revered and feared by native peoples in the Arctic. They are also valued by big game hunters as trophies and guided hunts for them produce substantial revenues in regional economies.

Marine ecosystem biodiversity

Understanding how the Arctic marine ecosystem is structured and functions at a time of rapid climate change is a daunting enterprise. Ecological and evolutionary responses to recent climate change are of critical interest (Parmesan 2006, Hop et al. 2011). Besides their scientific interest Arctic living marine organisms may have unusual adaptations to cold and other factors and these genetic inheritances may have commercial values as well (Leary et al. 2009). "Effects of climate change on future biodiversity operate at the individual, population, species, community, ecosystem and biome scales, notably showing that species can respond to climate change challenges by shifting their climatic niche along three non-exclusive axes: time (e.g., phenology), space (e.g., range) and self (e.g., physiology)" (Bellard et al. 2012, p 183). Polar regions have been generally considered to be depauperate in species compared to the tropics and this seems to be a fairly constant feature (Yasuhara et al. 2012). Only recently have we realized that micro algae are a significant part of the ecosystem and have barely begun to chart their role in the Arctic ecosystem (Lovejoy et al. 2006, Lovejoy et al. 2011). Thus, understanding the Arctic marine ecosystem from its physical and chemical constituents and how they translate into biological productivity and eventually into resources available for human use and or protection is a critical task. Some progress is being made with understanding the patterns of zooplankton (Kosobokova, Hopcroft and Hirche 2011) and benthic (Bluhm et al. 2011) diversity in the Arctic Ocean's central basins but there remains much to be learned.

Recent discoveries are being made that may significantly alter our understanding of productivity in the Arctic. Researchers from the US National Aeronautics and Space Administration have reported massive phytoplankton blooms under the sea ice that apparently have not been observed previously and whose mechanism is not understood (Arrigo et al. 2012). Foodweb changes in response to climate warming are little understood (Quinlan, Douglas and Smol 2005). We are seeing evidence of rapid biogeographical plankton shifts in the North Atlantic (Beaugrand, Luczak and Edwards 2009). The timing of phytoplankton blooms appear to be occurring earlier in the Arctic (Kahru et al. 2011) in some cases affecting algal food quality (Søreide 2010). Climate shifts the interaction web in marine plankton communities and they lead to further changes (Francis et al. 2012). These changes in fundamental primary production processes may be having impacts terrestrially as well as marine through predator-prey relationships (Gild, Sittler and Hanski 2009).

If the Cheung et al. (2009) scenarios are borne out over the next decades, the Arctic will be gaining species and the ecosystem will be adjusting to these new circumstances in contrast to the projected losses of biodiversity in most other global systems (Reich et al. 2012, Naeem, Duffy and Zavaleta 2012). As discussed earlier, potential fish assemblages are likely to shift and we expect loss in abundance of most seals, cetaceans and polar bears. What are the consequences for marine ecosystem-based management in terms of scientific and governance challenges (Ruckelshaus et al. 2010)? What are the roles of refugia (Stewart et al. 2010)?

A key factor is the rate of change in the marine ecosystems (Lenton et al. 2012). Hitherto we have tacitly assumed that the change occurring will be gradual and incremental. Review of the emerging literature shows that climate change can be abrupt as a result of such processes as rapid melting of glaciers and ice sheets, changes in hydrology, change in the Atlantic meridional overturning circulation and increased release of methane from clathrate hydrates due to sea floor or terrestrial warming (US Climate Change Science Program 2009).[5] Abrupt climate change has been defined as "A large-scale change in the climate system that takes place over a few decades or less, persists (or is anticipated to persist) for at least a few decades, and causes substantial disruptions in human and natural systems" (US Climate Change Science Program 2009:1).

Applying the US Climate Change Science Program definition of abrupt climate change, others have started to focus on what might be termed Arctic tipping points exceeded by anthropogenic global warming (Lenton 2012, Duarte et al. 2012, Wassman and Lenton 2012). A tipping point in an ecosystem context occurs when a small change in a parameter leads to a qualitative change in its future state. Lenton (2012) regards sea ice loss, permafrost thawing, and insect outbreaks as evidence that abrupt climate changes are already taking place and that they are irreversible. What flows from this high level statement in practical terms is almost unimaginable. We are only beginning a discourse on the implications, however, the Arctic ecosystem is probably among the ecosystems most susceptible to abrupt change (along with coral reef ecosystems in the tropics). Still, when extreme events are factored in, such as unprecedented rainfall, winds or temperatures the impact on society as a whole might be more costly and widespread than what might be imagined in the Arctic (Martens et al. 2010).

The implications for governance of the kinds of abrupt change or "surprises" observed so far call for anticipatory responses (Young 2012). This means monitoring to develop an early warning to both physical and biological shocks but also to shocks to society (Carmack et al. 2012). For society, this "prompts discussion characterized by a nervous anticipation of a future shaped by dramatic, far-reaching, and irreversible climatic, environmental, economic, political and social change" (Nuttall 2012: 97). Failure to think about, respond to, adapt to, or avoid tipping points is seen as increasing the cost of impacts and reducing the options for Arctic and global society (Huntington, Goodstein and Euskirchen 2012).

Cheung et al. (2009) explored impact of climate change scenarios on intensity of species extinctions and species invasions in the global oceans for 1066 species of fish world-wide. Their results for the Arctic and Subarctic regions (latitude equal to or greater than latitude 65 degrees N.) found there were 160 species from 68 families with landings data out of 420 species from 100 families in the total area as reported by FishBase. A recent review of the taxonomy and zoogeography of arctic marine fisheries found 242 species (Mecklenburg, Møller and Steinke 2011). Species richness is higher on continental shelves in the Arctic than in the Arctic Ocean basin and is considerably higher in the Eastern Arctic than the Western Arctic (www.nprb.org/iafs/2009). Cheung et al. (2009) projected invasions, primarily from the Northeast Atlantic could raise the species richness in 2050 to twice the current status despite a number of species going extinct as a result of the poleward shift and other factors. Others have reported on the invasion potential of mollusks from the Bering Sea into the Arctic and eventually to the Atlantic (Vermeij and Roopnarine 2008). These incipient trends are consistent with the evidence of Arctic biodiversity trends being monitored (CAFF International Secretariat 2010, Reid et al. 2007).

The management of living marine resources in the Arctic is difficult enough as it is due dynamic change in many components. However, living marine resource management can be affected by other economic activities new to the Arctic, especially oil and gas exploration and development (see chapter by Arild Moe this volume), and shipping (See chapters by Sung-Woo Lee and David VanderZwaag this volume). Marine tourism and associated transportation requirements present additional concerns especially with the increase in cruise ship activity without sufficient search and rescue capabilities. National security and defense activity is of continuing interest although the shape of activity may be shifting from Cold War capabilities to other operational patterns and open areas where there was once heavy sea ice. These activities are ramping up quite rapidly, and while there may be management capacity and regulations to deal with interaction and conflict between industrial uses and living marine resource management at the national level, it is not clear how well these arrangements can serve in the extremes of the Arctic environment and with the challenges the Arctic presents in terms of infrastructure and accident response in the case of oil spills, scientific monitoring of impacts, etc.

PROSPECTS FOR COOPERATION IN LIVING MARINE RESOURCE DEVELOPMENT AND PROTECTION

The treatment so far has focused on the nature of the Arctic ecosystem, management of its marine living resources and biodiversity and discussion of how these may respond to a changing Arctic climate. What is next is to review that information in light of concerns and interests of coastal and non-coastal states in Arctic fisheries, especially North Pacific Rim countries. Hoel (2009) reviews fisheries among other uses in asking if a new legal regime is needed for the Arctic Ocean. His perspective is that the immediate need in fisheries is for continued improvement in domestic management of fisheries and in developing appropriate arrangements for transboundary fisheries among coastal states where these presently do not exist. Similar views are expressed by Molenaar and Corell (2009) who observe that in some of the bilateral arenas development of bilateral and multilateral arrangements has not been necessary due to the presence of sea ice and the lack of fishery development. These authors recognize the potential need for intra-sectoral bilateral arrangements for fisheries in the near term and, over the longer term, the need for multilateral agreements with respect to the Arctic Ocean basin. In addition, these authors all recognize that the regime for a summertime ice-free or mostly ice-free Arctic involves issues other than fisheries. In order to protect potential fisheries from possible negative externalities generated by shipping, oil and gas development, tourism, etc. it may be necessary to consider a broader framework for action taking.

Others, such as Potts and Schofield (2008), argue that now is the time to deal comprehensively with Arctic Ocean issues. Similarly, the WWF and other environmental non-governmental organizations with concerns about protecting the vulnerable Arctic ecosystems are particularly interested in comprehensive environmental protection agreements for the Arctic and have assessed the gaps in the current management approaches in the region (Koivurova and Molenaar 2010). They argue that comprehensive environmental protection agreements would reflect the broad international interests in the Arctic and would mirror the agreements for the Antarctic while respecting the different conditions imposed by coastal state interests and presence of indigenous peoples. However, their perspectives would necessarily constrain economic development relative to fisheries, oil and gas, shipping, etc. in favor of protecting marine biodiversity and a functioning Arctic Ocean ecosystem.

The Arctic Ocean is an enclosed sea with adjacent subarctic seas where the living marine resources are under the EEZ jurisdictions and management of coastal states. While the multilateral Northeast Atlantic Fisheries Commission has modest jurisdiction into the Arctic no similar regional fisheries management body exists in the western Arctic. The Convention on the Conservation and Management of Pollock Resources in the Bering Sea does play an international role but one that does not extend north of the Bering Strait. The differences between the Antarctic and the Arctic make for widely different management circumstances. The Antarctic is a continental system with a terrestrially dominant core surrounded by the Southern Ocean, while the Arctic is an oceanic system with a deep central basin. The presence of inter-annual sea ice over the Central Arctic Ocean and strong seasonality of sea ice extent in its coastal margins is a major difference from the Antarctic system.

What is to be managed, how to manage, and who to manage are also important differences between the Antarctic and Arctic situations. Management for the Southern Ocean living marine resources is outside the national jurisdiction of any country (leaving aside putative interests of Antarctic claimants). In the Antarctic an inclusive approach is taken with respect to participation and resources are shared under conservative management guidelines. In the Arctic more than 80% of the area falls under national jurisdictions of five coastal states. The CAO basin outside of national jurisdiction is currently covered with ice year round and not subject to exploitation. In fact, it is not clear when ice conditions would allow fishing to take place assuming that there would be commercial quantities and values of fish to catch.

The five coastal states have signed the Ilulissat Declaration (2008) asserting their sovereign rights and affirming their intent to maintain coastal state jurisdictions over their EEZ under the 1982 United Nations Convention on the Law of the Sea (Berkman and Young 2009). In view of the approximately 20 per cent of the Arctic Ocean ecosystem that lies beyond limits of national jurisdiction, the parties to the Ilulissat Declaration state their view that, “This framework (of existing national and international laws) provides a solid foundation for responsible management by the five coastal states and other users of the Ocean⋯” and continues, “We therefore see no need to develop a new comprehensive international legal regime to govern the Arctic Ocean. We will keep abreast of the developments of the Arctic Ocean and continue to implement appropriate measures.” Thus, there is confidence that for living marine resources, the components of the existing framework (LOSC, CITES, CBD, FAO Agreements, etc.) are, taken together, an adequate framework for management.

It is possible to construct multiple scenarios on how to manage marine living resources in the Arctic Ocean (e.g., Brigham 2007). Certainly, coastal states with their extensive EEZs will want to have a very strong say in whatever arrangements are proposed for the CAO and they are not likely to be receptive to non-coastal state involvement in their EEZs unless there is a clear scientific, economic, or political advantage. Besides their proprietary interests and other obligations under international law (which also reserves their rights in the EEZ) it is unlikely that coastal states will welcome other nations to their waters. Indeed, as is seen in the approaches to the other areas of high seas areas in the Arctic surrounded by coastal state jurisdictions, there is a very strong interest to restrict “foreign” activities for purposes of conservation and allocation.

Do non-coastal state interests want direct access to fisheries resources? The answer is probably no for a number of very practical reasons. First, the likely cost of participating in Arctic Ocean fisheries is high and so are the risks. Second, there is high uncertainty about the nature of the resources to be exploited and their abundance. Indirectly, it is possible that non-Arctic coastal states may want to assert their readiness to participate in Arctic living marine resource management from a scientific perspective as contributing to the acquisition of knowledge about the global oceans as is evident in contributions by such states in Antarctic affairs.

It might be appropriate to view the interest of North Pacific Rim states in potential fisheries as quite logical in terms of current fisheries in the Bering Sea and how they might change as a result of climate change. China, Japan, and Korea are major markets and consumers of the current suite of fisheries harvests in the Bering Sea, for example. In addition, it is entirely appropriate for them to want to anticipate changes in abundance or distribution from potential new fisheries that would affect consumption and economic activity. It is not clear that Pacific Rim nations expect opportunities to develop that would allow direct harvesting of living marine resources. However, it is likely that they might be willing to contribute to scientific research and monitoring in the Arctic and to the provision of equipment and infrastructure to track changes in availability of fisheries resources for consumption. Within the realm of accepting the roles of engagement in developing scientific understanding of the interacting Arctic ecosystem, Pacific Rim states could have considerable roles to play.

With respect to the development of scientific understanding, North Pacific Rim states have demonstrated significant commitments and resources to attempting to understand the change in walleye pollock abundance in the "Donut Hole" area in the central Bering Sea (Bailey 2011). Hokkaido University's R/V Hakuho Maru representing Japan has been a consistent and innovative research and monitoring partner in the Eastern Bering Sea for many years. There have been important official and informal arrangements for marine research that have benefited scientific understanding in the western subarctic and Arctic. The Pacific Arctic Group (PAG) notes members from North Pacific states and documents scientific contributions including the construction of icebreakers for research by Japan (RV Mirai Maru) Korea (RV Araon) and China (RV Xuelong) and Japan's investment in a four-year Arctic ecosystem program.[6] The PAG has been working collaboratively with the Marine Working Group of the International Arctic Science Committee (IASC) has been linking international Arctic programs for the past decade, with recent connectivity with PICES through the Ecosystem Studies of Sub-Arctic Seas (ESSAS) program.

The formation of PICES through the efforts of North Pacific Rim nations has brought significant focus on North Pacific ecosystem research and attention is shifting to the Arctic as well through joint engagement among PICES scientists and their ICES counterparts (ICES/PICES 2010).

An important question needs to be answered with respect to North Pacific Rim engagement in marine science in the Arctic. That is, should the North Pacific Rim be the focus or should the focus be broader as seen in the previous Arctic Ocean Sciences Board (now the Marine Working Group of IASC) where all Pacific Rim nations are represented along with their European counterparts? Similarly, are there other countries, namely Brazil and India who want to be players in the Arctic but are not part of any of these endeavors so far? How should they be engaged? The point here is that it is unlikely that participation in scientific and other enterprises can or should be limited to any particular suite of states. If open to all, what framework is productive and equitable for scientific progress irrespective of access to any commercial resource?

One approach for non-coastal states is to apply for status as an observer for the Arctic Council. Observer status is available to non-Arctic states, inter-governmental and inter-parliamentary organizations, global and regional as well as non-governmental organizations. In addition, an observer role is available if the governments or organizations meet certain criteria and this status allows them certain limited roles. Nine intergovernmental organizations have been granted observer status as well as eleven non-governmental organizations. So far there are six non-Arctic countries that have observer status however not one of them is from the North Pacific rim. North Pacific states have applied for this status but have not been approved to date.

North Pacific Rim nations are members of PICES and have had significant roles to play in development of scientific understanding of the North Pacific (Bering Sea) and the Arctic Ocean (PICES 2010). Similarly, all Pacific Rim Nations are members of the Arctic Ocean Sciences Board (AOSB) (now the Marine Working Group of IASC). Through actions of the (AOSB) Pacific Rim Nations are able to join their European counterparts in developing scientific proposals, research and action to influence scientific considerations.

It goes without saying that Pacific Rim Nations can take initiative individually or as a group to organize scientific enterprise in the Arctic Ocean High Sea area or to collaborate with coastal states in performing research and assessments within coastal state jurisdiction. Regardless of any official sanction, Pacific Rim States can advocate for specific issues [to be determined] in any Arctic forum to which it is invited or has a stake.

Within fisheries management, sectoral management at the national level is likely to remain critical. It can be argued that coastal state and international arrangements under the Law of the Sea Convention III are adequate for dealing with future management needs in the near term and possibly the long term. Some initiatives are being taken, e.g., the United States (not a signatory of the LOSC) is promoting a coastal state regional fisheries management organization for highly migratory and transboundary fish stocks in the Arctic (Senate Joint Resolution 17 110th Congress, 1st Session, August 7, 2007). The European Union and others have suggested that NEAFC could be expanded into an International regional fishery management organization for the Arctic. There has been talk of a UN General Assembly resolution on the Arctic Ocean as well as suggestions that a regional seas approach (broader than just fisheries) could be considered. Thus, the field is broadly open for discussion and debate over the pros and cons of different approaches for management in the fisheries sector.

The views expressed above by the five coastal states in the Ilulissat Declaration are not shared universally. Young (See chapter 6 by Young this volume) terms the stance of the Arctic States as untenable. Potts and Scholfield (2008) and the World Wildlife Fund (Koivurova and Molenaar 2010) argue along other lines that there are serious gaps in the management approach to the Arctic in the different national regulations and in necessary international cooperation. Besides, the interests of non-Arctic states in protection of the Arctic from inappropriate development are not considered.

There is no objective answer to this divide over whether a new comprehensive Arctic Convention is needed or if existing arrangement and modifications to them would suffice. Proponents of the comprehensive-inclusive approach state that such an approach is proactive in light of the rapid environmental change occurring in the Arctic Ocean and the surge in new resource uses. They argue that such a treaty would lead to a better balance of interests and avoid conflicts. More philosophical claims are made about the Arctic Ocean being part of the common or natural heritage of mankind.

To these claims others reply that the transaction costs of reaching agreement would be too high, that national sovereignty would be diminished, that all problems and conflicts cannot be anticipated or resolved, etc. Further, much of the high-level debate moves forward without recognition of the engagement of indigenous peoples and the impacts of proposed measures, such as development or protection, on their livelihoods and communities. I think it fair to observe that the more closely one is engaged in day-to-day management of any Arctic resource, the less excited one is a bout comprehensive management approaches and the less one has to do with management, the more attractive comprehensive solutions appear.

One very interesting development along the lines of comprehensive or integrated management is the development at a national or sub-national regional level of marine spatial plans. Norway has marine spatial plans for the Barents[7] and Norwegian Seas[8] and Canada has recently instituted a Large Ocean Management Area for the Beaufort Sea[9]. The United States is embarking on ecosystem-based management framework for the Alaska Arctic[10] (ELI 2008). It is not known to the author if such plans are being developed in Russia or Greenland. These planning processes are consistent with the development of the necessary Arctic Ocean regime that is being advised (See chapter by Young this volume). Would the sum of the parts of a national marine spatial plan equal a successful national or coupled-international regime for Arctic management? That is an interesting question which can be answered in many ways. In any case, such an approach would appear to be movement in the direction of more coordinated management of different sectors in the Arctic than at present.

When considering more comprehensive type arrangements for development and conservation in the Arctic Region, the Arctic Council is frequently examined as a core institution to "grow" into larger roles. Even its strongest supporters are not sanguine about it being able to move from a convener and consensus building advisory body into a regional management authority. That would require amendment of its fundamental agreement. Others suggest it necessary to jettison the Arctic Council and to develop a new legal and institutional authority legally binding across multiple sectors and involving a broad international community of states in decision making (Koivurova and Molenaar 2010).

If comprehensive management approaches are not agreed upon as either desirable or necessary by all parties, can there be agreement on measures taken at the sector level and across sectors that will improve management by implementing a long-term sustainable ecosystem-based management approach? Berkman and Young (2009) offer the 1980 Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR) as a partial precedent for the Arctic Ocean ecosystem because of the applicability and interest in ecosystem-based management and precautionary approach. The goal and commitment of parties to scientific cooperation under CCAMLR is seen as appropriate but other factors appear to mediate against fully adopting the CCAMLR approach for the Arctic Ocean. Therefore, Berkman and Young (2009) advocate that, "One useful approach in developing effective governance for a rapidly changing Arctic may be to treat the Central Arctic Ocean as an international space and to draw a clear distinction between the overlying water column and the seafloor. Ecologically and legally distinct from the seafloor, the overlying water column and sea surface of the central Arctic can remain an undisputed international area in which the interests of Arctic and non-Arctic states alike play a role in effective governance" (340).

In this way, it would appear that recognition of an emerging regime complex as defined by the number of issues being addressed through different but related governance arrangements could increase participation, transparency, and coordination but would not engage in management decisions per se. Important official and informal arrangements for marine research, for example have benefited scientific understanding of living marine resources and their management in the Arctic Ocean. Perhaps the best documentation of such progress across the Arctic Ocean is in the report "Best Practices in Ecosystem-based Oceans Management in the Arctic" (Hoel 2009). The Pacific Arctic Group (PAG) is another example where its members are from North Pacific states that engage in scientific contributions including the construction of icebreakers for research by Japan (R/V Mirai Maru, Korea (R/V Araon) and China (R/V Xuelong) as well as Japan's investment in a four-year Arctic ecosystem program.[11] The PAG has been working collaboratively with the Marine Working Group of the International Arctic Science Committee (IASC) which has been linking international Arctic programs for the past decade, including the recent connectivity with PICES and ICES through the Ecosystem Studies of Sub-Arctic Seas (ESSAS) program.

As noted by Young (See chapter by Young this volume) informal consultation mechanisms might be used to foster the dialogue required to engage a broad spectrum of users, managers, scientists and interested citizens in the development of the conditions for a regime complex. A formal Arctic Ocean Forum could serve to promote and accommodate this function. The analytical and pragmatic question that continues to nag is whether or not the Arctic five states (A5) would be willing to participate in such an inclusive forum as opposed to designing its own forum centered on national sovereignty in living marine resource management. With the Ilulissat Declaration it appears the A5 group has indicated its preference.

If comprehensive new arrangements are not seen as feasible and an inclusive participatory approach to developing a complex regime is not accepted by the Arctic Ocean coastal states, it is useful to review how existing arrangements are working for the management of living marine resources in the Arctic Ocean and subarctic seas.

Relative to fisheries, it should be recalled that coastal state management of EEZ fisheries among the A5 shows that in general management is ranked highly on a global standard. This is not to say that there is no room for improvement. Presently there is evidence that fisheries managers in areas where sea ice is receding are adopting proactive measures to limit or prohibit fisheries until scientific research is available to identify appropriate management measures. This is consistent with the goal and approach identified as desirable under CCAMLR even though developments may be more ad hoc and uncoordinated across Arctic Ocean states. Existing subsistence fisheries and hunting are likely to continue to the extent they make sense as traditional practices, climate change does not significantly impact them, and globalization does not alter local economy. Local knowledge of these hunting and fishing practices is needed to assess their status and likelihood to change across the Arctic region.

Three examples of how a living marine resources portfolio regime might evolve have been proposed including negotiation of a Central Bering Sea pollock conservation type approach for long term precautionary management of the Central Arctic Ocean high seas area; a community development quota approach for coastal indigenous peoples and; bi—or multilateral fisheries agreements in the Western Arctic.

Central Arctic Ocean high seas

It is fairly clear that Arctic Ocean coast states are unlikely to invite others to participate in their EEZ fisheries. Whether or not there will be commercial quantities of fish in the CAO is a matter of considerable speculation. If it is decided that some kind of international mechanism is useful in terms of conservation of fish stocks in the area outside of national jurisdiction in the Arctic it might be seen that a Central Bering Sea "Donut Hole" agreement might emerge where coastal states agree to regional management subject to shared and straddling stock agreements under the LOSC and FAO arrangements. While the EU has suggested an expansion of NEAFC as a management entity in the CAO, I doubt that expansion of NEAFC authority would be considered appropriate—especially by Western Arctic interests. The starting point for such a CAO agreement would be quite different from other similar arrangements in the subarctic because the incentive to conserve existing transboundary fish stocks does not exist. Should a modified form of the Central Bering Sea agreement be considered, the main point would be the incentive to participate in and funding for research and monitoring of a changing Arctic Ocean to determine when commercial fisheries could be opened, if at all. Such an arrangement would ensure transparency in the science and allow participation by any state willing to assume certain scientific responsibilities.

The Central Bering Sea pollock convention is predicated on the idea that the super abundant pollock stocks in the region prior to the time of negotiation will eventually reappear. This hope has persevered and the annual scientific meetings have been a principal way international science has been focused on that area. A strength of the Central Bering Sea convention is that it sets forth decision rules about when there is sufficient resource abundance for a fishery to take place. How this could be done under the uncertainties of climate change is daunting.

If purposive scientific research on the potential fisheries in the CAO is to the primary intent of a high seas agreement, one must ask if that is the best way to organize scientific collaboration. Given the circumpolar ecosystem interaction, the Arctic Council and other organizations with longstanding roles and working groups may provide a better institutional structure than a separate scientific agreement on the CAO. Continued investment in Arctic Ocean ecosystem science might be more successful if the fisheries questions—especially transboundary and emerging fisheries—are a "bycatch" of more integrated scientific cooperation across scales.

Community development quota-inspired indigenous fisheries

The Community Development Quota (CDQ) Program is a place-based approach to fishery management that links the interests of small coastal communities along the Bering Sea coast with commercial fishing enterprises for the large scale fisheries of the Bering Sea. At present, this quota is 10% of the total allowable catch for each managed species in the Northeast Bering Sea. This program is seen as highly successful (NRC 1999b). However, to apply this to the Arctic is unrealistic for a number of reasons. The short answer is that there are no commercial fisheries in the Arctic Ocean at present. However, a dedicated anticipatory approach for fisheries that allows coastal communities a preference in development of commercial fisheries might be contemplated. The place-based and subsistence nature of current fisheries and the local knowledge of Arctic communities would be invaluable if significant fisheries abundance develops in coastal areas. In addition, if opportunities to develop guided and chartered operations for recreational fisheries and tourism occur, consideration of a place-based preference might work to the benefit of indigenous communities.

Bilateral-multilateral agreements for the Western Pacific

Transboundary and straddling stocks of fish in the Arctic Ocean are poorly known–largely due to the difficulty of performing research in the Arctic and the short seasonal nature of the window for research cruises. Cooperative research is underway between the US, Canada and Russia to better understand these relationships. The open Arctic sea areas between Norway and Russia and the significant and well-documented transboundary movements of fish have produced effective bilateral management under treaties. Should a need arise, the Norway-Russia model could be useful for similar arrangements in the Western Arctic.

Other living marine resource management approaches

Other living marine resources like seabirds, marine mammals and polar bears and the other components of marine biodiversity illustrate other ways that Arctic Ocean coastal states working with others might evolve an effective regime.

From the standpoint of seabirds, there appears to be a loosely organized and somewhat effective system of protection of feeding and breeding habitat throughout their international flyways. Current international agreements link northern countries with southern countries largely incorporating the flyways as an organizing principle, e.g., Migratory Bird Treaty (US/Canada/Mexico). Already, national and international monitoring of seabirds is well-organized for the Arctic in the Circumpolar Biodiversity Monitoring Program as part of the biodiversity working group Conservation of Arctic Flora and Fauna (CAFF) of the Arctic Council. However, I am not confident that monitoring is adequate for the southern portion of the range. The critical question appears to be how well states adhere to their obligations–especially the commitment to protect important habitats for feeding and breeding and areas along migratory corridors. It is not apparent that new agreements are necessary at this time as much as ensuring the capacity and engagement of countries along the flyways to maintain and monitor the habitats. While the climate changes affecting seabirds in the Arctic may be dramatic, they may be less of a threat to seabird survival than other drivers of habitat change in other parts of the range like pollution and loss of habitat.

Marine mammals receive significant protections by Arctic Ocean coastal states and harvests are strictly controlled. In the North Atlantic, NAMMCO provides a forum for international engagement whereas no similar organization exists in the Bering Sea or Western Arctic. Scientific research and monitoring is performed at the national level and internationally through CAFF. Some of the results of this monitoring point to serious declines in some species, such as walruses, Steller sea lions, and ice dependent seals. Management action at the national level appears capable to address the impacts of direct harvest and harassment, but indirect impacts from climate change and toxic contaminants require international attention. While the proximate drivers of marine mammal populations may be adequately managed by the existing national regime, a broader international interest in protection of the Arctic marine mammals might not be welcome if it would interfere with continued harvest of seals for fur and other commercial uses, the culling of seals as a fishery management measure, or the determination of what constitutes optimum populations.

Cetaceans in the Arctic Ocean are more mobile than the seals and with changing climate more northern species of whales may migrate into the Arctic Ocean. The IWC was set up to manage these species throughout their range and perform that function for indigenous whaling in the Bering Sea. Commercial whaling by Norway and Iceland is managed by those countries. The IWC quota management system appears to be scientifically robust with respect to the Arctic whales. In the Southern Ocean, IWC is involved in efforts to establish whale sanctuaries and other large marine protected areas but because of the EEZs of Arctic Ocean coastal states such protection areas fall under national jurisdictions. Thus, there does not seem to be a specific need for a comprehensive treaty in the Arctic Ocean to manage whales although as with seals potential differences among risk tolerance or value preferences in the broader international community may exist.

Polar bears are protected in Arctic Ocean coastal states by international convention. While polar bears are seen internationally as icons of the Arctic and there is great concern being expressed about their fate as a result of climate change, there does not appear to be a strong demand for changing the polar bear treaty or substituting some other form of management. The Arctic Ocean coastal states would assert that this shows that polar bears are well-managed. Of course, it is also possible to think that under a comprehensive international treaty there could be differences of opinion over harvest management.

With respect to marine biodiversity in the Arctic Ocean it is possible to examine management from at least two perspectives. First, and the one with which we are the most comfortable, is a static view of the Arctic and its living marine resources. The second, with which we have not come to terms, is what research and modeling is insisting will be the future of Arctic biodiversity, i.e., vast changes in the species and the populations of existing species. From either standpoint, Arctic Ocean coastal states are not in much of a position to manage these changes by management measures to maintain the status quo. However, management must adapt to changes. The largely nation-based management of marine biodiversity among Arctic Ocean coastal states incorporates specific conservative measures and monitoring for fisheries, marine mammals, seabirds, and cumulatively for marine biodiversity. Such measures make for a more resilient approach to detecting and coping with rapid change in the Arctic Ocean.

In wrapping up this section, it is critical to understand that management measures for living marine resources are not adequate to protect marine biota from a catastrophic oil spill or other pollution associated with increased economic activity in the Arctic. Thus, the question of how to ensure protective and balanced management across all sectors is why some advocate for a comprehensive Arctic Ocean agreement. Earlier, we discussed the response of Arctic Ocean coastal states to utilize marine spatial planning within their EEZs to accomplish this purpose. It seems a more likely response by these countries than agreement on a new comprehensive treaty.

In conclusion, the purpose of this chapter is to provide a background for planning for North Pacific Rim countries to promote informal consultation and to consider how to convey the results of these consultations to other Arctic forums. In this examination, the opportunity for coastal and non-coastal states to perform research and monitoring of the Arctic Ocean ecosystem is clearly a most active and productive way to engage. Major changes are likely in the subarctic seas and the Arctic Ocean in ways that affect fisheries production, seabirds, marine mammals, polar bears, and marine biodiversity. Active monitoring is a good way to provide transparency in developments in the Arctic ecosystem with respect to commercial uses however the likelihood of major new fisheries developing is marginal especially within the CAO.

With respect to management of the living marine resources in the Arctic, coastal state signatories of the Ilulissat Declaration have sought to inform the international community that it can trust in the management measures they have and can further develop. Promoting formal and informal mechanisms for performing research and monitoring is a good way for the international community to evaluate whether or not that trust is warranted. When over 2,000 scientists from 67 nations signed on to a letter calling for the international community to develop an international fisheries agreement to protect the CAO in advance of prospective fisheries[12] the high level of scrutiny and interest was clearly communicated. Some saw this as a building block toward broader protection measures for the Arctic regions (Rogers 2012). The response from governments has been slow and muted.

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Notes

1. See Koivurova and Molenaar (2010) for a recent detailed accounting and Brander (2007) for a global context
2. http://www.commerce.state.ak.us/dca/planning/cciap/ArcticEcosystemintegrated Survey.htm
3. http://caff.arcticportal.org/expert-groups/seabird-group-cbird
4. www.iwcoffice.org
5. Natural disasters like a huge volcanic eruption or comet impact could also precipitate abrupt climate change.
6. http://pag.arctiporal.org/
7. www.regjeringen.no/../updated-version-of-the-integreatee-management-plans.html/
8. www.fisheries.no/resource-management/Area-management/Integrated-management-plan/
9. www.beaufortseapartnership.co/
10. www.doi.go/new/pressreleasesMarch 6, 2012
11. http://pag.arctiportal.org
12. Pew Environmental Group www.oceansnorth.org/arctic-fisheries-letter, last ac cessed August 1, 2012

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Comments on Chapter 4: Scientific perspective

Alf Håkon Hoel

INTRODUCTION

There are currently no fish stocks of commercial interest in the Central Arctic Ocean. The reasons for this include ice cover, low water temperatures, and low primary production. In the sub-Arctic seas surrounding the Arctic Ocean, there are commercial fisheries of global importance (Hoel and Vilhjamsson 2005). These areas comprise the Bering Sea and the Aleutian Islands, the Northwest Atlantic between Canada and Greenland, the waters around Greenland and Iceland, the Norwegian Sea, and the Barents Sea. The marine ecosystems in these oceans are subject to substantial natural variability (Arctic Ocean Review 2011), as well as to major fisheries. In a global perspective, most of the major commercial fisheries in these areas are currently well managed.

There are six littoral states to the Arctic and the sub-Arctic oceans: Russia, the US, Canada, Denmark/Greenland/Faroe Islands, Iceland and Norway. Except for areas of high seas (areas beyond national jurisdiction), the northern oceans are under the jurisdiction of these countries. The high seas areas are in the Bering Sea, the Northwest Atlantic, the Norwegian Sea, and the Barents Sea. There is also an ice-covered area of high seas in the central Arctic Ocean, where the coastal states are the US, Canada, Denmark/Greenland, Norway and Russia.

THE FISHERIES

Some of the world's largest commercial fisheries take place in the oceans surrounding the Arctic. Alaska (walleye) pollock Theragra chalcogramma in the Bering Sea and Aleutian Islands has TAC levels in 2012 of approximately 1.2 million tons. In the Barents Sea, North Atlantic cod Gadus morhua have a TAC in 2012 of 750,000 tons, with up to 1 million tons indicated for 2013. Herring Clupea harengus in the Norwegian Sea has a TAC in 2012 of 833,000 tons. Other important species include redfish Sebastes spp., saithe Pollachius virens, and haddock Melanogrammus aeglefinus. There are also important crab, shrimp and shellfish fisheries in these oceans, as well as a number of marine mammal species.

Due to the warming influence of the Atlantic current, commercial fisheries in the Northeast Atlantic occur up towards the Svalbard Archipelago. In the northwest Atlantic cold currents from the north keep fisheries at more southerly latitudes, while the commercial fisheries in the Bering Sea are limited to the area south of the Bering Strait at 65° N. The fisheries are regionally concentrated and occur mostly in the waters under the jurisdiction of coastal states.

It has been estimated that in the four last decades of the 20th century, the annual average landings of fish from Arctic and sub-Arctic waters were about six million tons (Hoel & Vilhjamsson 2005). In comparison, the total for global marine capture fisheries is now about 80 million tons (FAO 2012). Commercial fisheries in the seas surrounding the

Arctic are therefore globally significant. These fisheries constitute a major economic activity in the high North of these countries, and in many regions they are critical to the economy of local communities (ACIA 2005). The fisheries in the Bering Sea and the Aleutian Islands, for example, provided a value of two billion USD in 2008 (Plan Team 2009).

Commercial and indigenous exploitation of marine mammals takes place in several Arctic countries. In Norway, minke whales and harp seals are exploited, in Iceland minke whales and fin whales are hunted, and in Canada in the Northwest Atlantic harp seals are hunted. In Russia harbor seals in the White Sea are harvested. Inuit in the US, Russia, Alaska, and Greenland hunt a number of whale and seal species.

Aquaculture is of increasing importance in the North. Globally, aquaculture will in the course of the next few years produce more fish than capture fisheries. In Norway, the export value of aquaculture products (mostly salmon) is now larger than those of capture fisheries. With warming oceans and increasing global demand for seafood, we are likely to see an expansion of aquaculture in the North (ACIA 2005). Similarly, marine bioprospecting is likely to increase substantially in importance over the coming years.

THE MANAGEMENT REGIMES

Living marine resources are subject to a comprehensive management regime, with global, regional and national components.

The international legal foundation for fisheries management is the 1982 United Nations Convention on the Law of the Sea (United Nations 1982). The Convention gives coastal states sovereign rights over the natural resources in an Exclusive Economic Zone (EEZ) of 200 nautical miles (370 km), a duty to conserve and the right to utilize fish stocks, and a duty to cooperate with other countries on the management of transboundary fish stocks.

The global fisheries regime has been enhanced by the 1995 UN Fish Stocks Agreement (United Nations 1995), which provides for a precautionary approach in management, improved regional cooperation in the management of fisheries on the high seas, and stricter enforcement of regulations. Also, the UN Food and Agriculture Organization (FAO) has adopted a number of binding as well as non-binding global instruments pertaining to various aspects of fisheries and their management. The most recent is the 2009 Port State Agreement which aims to stop illegal fishing though prevention of landings from such fisheries (FAO 2009). For large cetaceans the International Convention for the Regulation of Whaling has a global application. A number of other global instruments are also relevant for the management of living marine resources in the

Arctic (Arctic Ocean Review 2011).

This global framework applies also in the Arctic, and is implemented by all Arctic Countries (the US, though not a party to the Law of the Sea Convention, nonetheless implements its provisions). The global framework provides principles for management, as for example Maximum Sustainable Yield (MSY), guidelines for deep water fishing, the precautionary approach, the ecosystem approach to fisheries, and more.

At the regional level, a number of important fish stocks in the sub-Arctic are transboundary and shared by two or three countries. In such instances countries cooperate through bilateral agreements on fisheries management, as for example Norway and Russia do in the Barents Sea (Hønneland 2012). Such bi- and trilateral cooperation is a very important feature of the regime complex, and critical decisions on management strategies and annual TAC levels are decided in these bodies.

Where fish stocks also occur on the high seas, regional fisheries management organizations or arrangements (RFMOs/RFMAs) have to be established. In the Northeast Atlantic, the Northeast Atlantic Fisheries Commission (1963/1982) has authority over the high seas areas, including areas beyond national jurisdiction in the European sector of the Arctic Ocean. Salmon fisheries are regulated by the North Atlantic Salmon Organization (NASCO) and marine mammals are managed by the North Atlantic Marine Mammals Commission (NAMMCO). Other regional fisheries arrangements or bodies in the Arctic/sub-Arctic include: The Northwest Atlantic Fisheries Organization (NAFO), and the agreement covering the so-called "Donut Hole" in the Bering Sea.

Fisheries management essentially entails three functions, the implementation of which is critical to the success of resource management:

a) the development of scientific understanding of the stock in question, so as to be able to estimate stock size, assess impacts of the fishery, and provide scientific advice on catch levels,
b) the establishment of regulations in a fishery, so as to limit the impact of the fishery on the resource and the ecosystem, and
c) the enforcement of these regulations.

The ways in which these three functions are institutionalized vary greatly between countries, depending on political systems, whether fish stocks are owned by one state or are transboundary, and regulatory traditions in the coastal states.

In the north Atlantic, the International Council for the Exploration of the Sea (ICES) (1902) plays a critical role in the provision of scientific advice. Based on the work of the marine science institutions in its member states, the North Atlantic coastal states, it provides an international scientific review process and scientific advice on management of the marine environment and its living marine resources to its members, the EU Commission, and the regional fisheries management organizations in the region. (The corresponding organization in the North Pacific, the North Pacific Marine Science Organization, or PICES, does not provide management advice for fisheries.)

As to the regulation of fisheries, the total allowable catches (TACs) are set by the coastal states in the case of exclusive fish stocks (found in the waters of one state). In the case of transboundary fish stocks TACs are set by the various arrangements for international cooperation, as pointed out above. The most important in the oceans surrounding the Arctic Ocean is the Norway-Russia bilateral fisheries commission, which sets quotas for cod, haddock, and capelin (Hønneland 2012), as well as Greenland Halibut. There are a number of such arrangements among the coastal states in the region, as well as regional fisheries management organizations for the high seas areas.

The actual regulation of fisheries is carried out by the coastal states, by regulations limiting participation fisheries, restricting quantities that can be caught, and by providing restrictions on how, when and where a fishery can occur. All Arctic states have comprehensive legislation pertaining to their living marine resources and their management.

The enforcement of fisheries regulations is carried out by the coastal state in the waters under their jurisdiction and by the state whose flag a vessel is carrying on the high seas. Generally enforcement systems have been much strengthened over the last decade, with increased international collaboration and the introduction of satellite-based vessel monitoring systems. Illegal, unregulated, and unreported (IUU) fisheries have in the past been significant in the Arctic, in particular in the high seas areas. Following developments in the Law of the Sea and a substantial improvement in international cooperation, as well as in domestic implementation, IUU fishing now appears to be on the decline in the oceans surrounding the Arctic Ocean. In the Barents Sea, for example, estimated unreported catches have fallen from 90,000 tons in 2002 to 15,000 tons in 2008, and has been close to zero since 2009.

These three management functions of science, regulations, and enforcement are well institutionalized in the Arctic coastal states. While the effectiveness in implementation may vary over time and from country to country, each has developed the institutional structures associated with effective resource management. In particular, each has devised arrangements for rights-based management, providing for allocation of fishing rights among the participants in a fishery. In a recent global study this was found to be a critical determinant of effective fisheries management (Costello et al 2008).

In a global perspective, the major Arctic commercial fisheries currently appear to be relatively well managed. While the status for many commercial stocks (about one third) globally leaves a lot to be desired (FAO 2012), the status of the major sub-Arctic fish stocks is generally good. The reports of the International Council for the Exploration of the Sea in the case of the Barents Sea and Norwegian Sea demonstrates this for major fish stocks such as cod, and haddock (ICES 2012). For the Bering Sea and Aleutian Islands the report of the Plan Team preparing the scientific groundwork for the North Pacific Fisheries Management Council states that “Overall, the status of the stocks continues to appear relatively favorable. No groundfish stocks are overfished” (Plan Team 2009). Also, several major fisheries (e.g., Alaskan pollock and Norwegian spring-spawning herring) in the oceans surrounding the Arctic Ocean are certified by the Marine Stewardship Council, which provides an independent, science based assessment of fisheries.

There are, however, also examples of management failure in the seas surrounding the Arctic Ocean. In the late 1960s Norwegian spring-spawning herring was heavily overfished, necessitating a more than 20-year re-building period before the stock recovered. Today it is one of the world’s largest fish stocks and sustains one of the world’s largest fisheries. Another example of management failure is that of northwest Atlantic cod, which collapsed in the early 1990s and has not since recovered. In the Barents Sea, for example, cod was severely overfished in the 1980s, leading to an extended rebuilding period.

The lesson learnt from this was that fishing pressure had to be reduced, by employing a precautionary approach to management and reducing the catch capacity of the fishing fleet. A recent challenge to management regimes are alien species. One example is king crab, which is not an endemic species in the Northeast Atlantic. It was introduced into Russian waters in the 1960s and in recent years the stock has expanded vastly, providing for a substantial coastal fishery as well as causing changes in near-shore ecosystems.

FUTURE DEVELOPMENTS

The Arctic Climate Impact Assessment (ACIA 2005) had two broad conclusions regarding the future development of living marine resources and fisheries in the Arctic: one was that of a general expansion of fisheries due to increased growth, including a northward expansion. The other was that the critical factor in determining the future development for fisheries was fisheries management.

In the years that have passed since, the research into these issues has grown exponentially, and the understanding of our ignorance has grown correspondingly. Uncertainties abound, and the complexity of the questions involved is substantial. It is therefore simplistic to assume that there will be a simple, linear response in fish stocks to increased temperatures. The effects of climate change on marine ecosystems are manifold and complex. Major changes in density and distribution of species can trigger significant changes in ecosystem structures, with positive or negative consequences for commercial fisheries (Loeng 2008). In the Arctic, marine ecosystems are subject to large natural variability. This variablity, and the added stress induced by anthropogenic influences such as climate change, affects plankton, fish, and marine mammals. So not only fish, but also the prey fish feed on as well as those animals that feed on fish are affected. The effects of such pressures on the geographic distribution of living marine resources depends upon a number of factors, such as bottom topography (see the map, below), climatic parameters as temperature, salinity, and ice distribution, the availability of food, distance to spawning grounds, and others.

In the face of such complexities, robust predictions of future developments are difficult. What we do know, based on past experience, is that the geographical distribution of fish stocks tend to change over time, and we know that climatic factors are associated with such changes (Toresen and Østvedt 2000). One example, discussed in the fisheries chapter of the Arctic Climate Impact Assessment (Vilhjamsson and Hoel 2005), is from Greenland. A warm climate during the 1930s and 1940s led to a substantial cod fishery off Greenland. With the onset of a cooling climate in the 1960s this fishery disappeared. Another example of a fish stock with major changes in its geographical distribution over time is Norwegian spring spawning herring (Holst et al 2004). We do expect that such changes will continue. All major stocks are fully exploited and likely to remain so even though their geographical distribution changes.

As regards the other ACIA prediction, that the critical factor in the future development of fisheries in the North will be the robustness and performance of management regimes, the current development towards ecosystem-based management of the marine environment in general, and towards ecosystem approaches to fisheries in particular, are important. At the general level, ecosystem-based management holds considerable promise as a strategy to confront the challenges to oceans management associated with climate change (Hoel and Olsen 2012).

The development towards an ecosystem approach to fisheries (FAO 2003) essentially means that its management has to be considered in relation to its environment: how the environment affects the fish stock in question, and how the fishery affects the environment (Pikitch et al 2004). Ecosystem-based fisheries management is a process of developing new practices on the basis of existing ones, rather than devising entirely new approaches in a short time. Many countries are now in the process of developing their policies in this regard and implementing them (Murawski 2007).

In the Arctic countries, fisheries management is therefore gradually being developed to take ecosystem considerations into concern. This has implications for the management functions addressed above:

The science underlying the management of a fish stock are expanded so as to include information on how environmental factors are likely to affect a fishery, as well as information on how the fishery will impact on its environment. Research surveys, which used to be oriented towards monitoring the status of specific commercial fish species, nowadays routinely monitor a whole suite of environmental parameters, non-commercial species, as well as commercial species. The Norway-Russia annual ecosystem surveys of the Barents Sea are a case in point.

For the regulation of a fishery, an ecosystem approach likewise entails that the restrictions set on a fishery have to be configured so as to take the impact of environmental factors into account, as for example changes in water temperatures. At the same time, the impacts of the fishery on the ecosystem have to be minimized, for example by placing restrictions on the type of gear that can be employed in a given area. For bottom trawling, for instance, this means that its impact on benthic communities has to be considered when establishing management measures. An example of how this is done in practice can be found in the scientific background material for the Bering Sea, which contains explicit ecosystem considerations (Witherell et al. 2000, Plan Team 2009). Also, countries are becoming increasingly restrictive with regard to trawling in vulnerable marine ecosystems (VMEs). The Northeast Atlantic Fisheries Commission, for example, has introduced a series of measures to protect VMEs in the high seas in that region the last decade.

These developments in management approaches take place in the context of ambitious schemes to develop ecosystem-based oceans management. This is a global process, and the Arctic countries are at the forefront of these developments (Hoel 2009). At the ministerial meeting of the Arctic Council in April 2009, a set of "Observed Best Practices in Ecosystem-based Oceans Management in the Arctic Countries" was endorsed. At the 2011 ministerial an ecosystem management expert group was appointed, to look into ways to develop ecosystem-based management in Arctic regions further.

The reduction of sea ice in the Central Arctic Ocean has brought speculation that substantial fisheries may develop there. In discussing such a scenario, the following elements should be borne in mind:

- The Central Arctic Ocean will remain ice-covered for most of the year.

- Most of the Arctic Ocean is under the jurisdiction of the coastal states, and subject to an extensive management regime complex.
- The high seas area beyond national jurisdiction is subject to the law of the sea as well as a number of global instruments, both legally binding and non-binding. The European sector of the high seas is a NEAFC regulatory area, while the western Arctic high seas area does not have a regional fisheries management body.

In 2009, in the margins of the biannual meeting of the FAO Committee of Fisheries, a meeting was held to discuss Arctic fisheries upon the initiative of the US. The US also hosted a conference on Arctic fisheries in the fall the same year. In 2010, the five Arctic coastal states to the Central Arctic Ocean met in Oslo to discuss the future of the management of living marine resources in the Arctic, in light of their responsibilities as coastal states. The main conclusion of that meeting was it was necessary to have a better understanding of the status of marine ecosystems in the Central Arctic Ocean and the living marine resources there.

As a follow-up of the Oslo meeting, a scientific workshop was convened in Anchorage in 2011 to discuss the status of knowledge of these issues, on-going scientific efforts, and research priorities. The workshop demonstrated that while some areas in the sub-Arctic have been subject to intensive scientific research for many decades, others are not as well covered. As regards the Central Arctic Ocean to the north of the continents, the status of scientific understanding is limited. The number one priority identified by the workshop was the establishment of baseline data (at a pan-Arctic level) on plankton, fish, invertebrates, and marine mammals as well as associated physical factors. The scientific cooperation on such issues will be pursued in a number of forums. ICES and PICES will be the most prominent, ICES in particular given its advisory role in the management of living marine resources in the Northeast Atlantic and the role of its Arctic Fisheries Working Group in that regard. There are also a number of other forums where the scientific aspects of climate and fisheries in the Arctic is pursued, such as ESSAS program,[1] as well as others.

CONCLUSIONS

We have reviewed the status of fisheries in the Arctic, and pointed out that while there are virtually no commercial fisheries in the Central Arctic Ocean, the sub-Arctic seas have globally significant commercial fisheries. These fisheries are subject to comprehensive management, through a regime complex consisting of global, regional and national components. The performance fisheries management in the Arctic and sub-Arctic is generally good, and stands out in a global perspective.

Future developments are difficult to predict, but possible changes in geographic distribution of fish stocks are likely–such changes have been occurring throughout known history. The ability of the Arctic states to meet such challenges in the future will require further development of management regimes. Further development of the ecosystem approach to fisheries is critical in that regard. The Arctic coastal states have also initiated a process to study the developments of living marine resources and associated elements of marine ecosystems in the Central Arctic Ocean, and ICES and PICES as well as other scientific forums will have important roles in that regard.

Beyond this, the future of Arctic living marine resources management is likely to be increasingly affected by the growing importance of aquaculture, which may well at some point become more important than capture fisheries in terms of economic value. This would be a reflection of a global trend, already evident in Norway. Also, marine bio-prospecting is growing in economic importance and may well become the third, major area of living marine resources management in the North.

Notes

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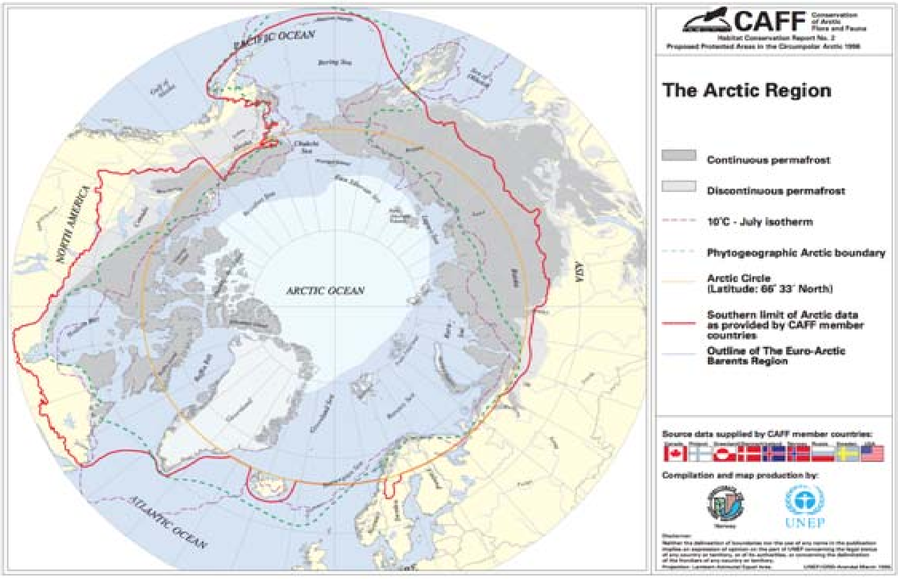


Comments on Chapter 4: Ecosystem and Inuit perspective

Trevor Taylor

Since the advent of the factory freezer trawler in the late 1940s, the development of the industrial deep-sea fishing fleets has left few areas of the world's oceans off limits. The transformation was rather swift for fisheries that were for the most part prosecuted by fixed gear, primarily in the shallower water areas of the continental shelves. Those somewhat seasonal fisheries in northern regions were available to access during that part of the year when the ocean was not covered by ice, but are now fisheries prosecuted to the depths of fish habitation, limited only by the determination of the vessels masters.

Most fisheries conducted during the 1950s, 1960s and 1970s took place in the absence of significant scientific research of the sort that provides accurate stock abundance estimates, recruitment projections and interspecies dependencies. They also took place in the absence of almost any effective management and regulatory oversight.

In the late 1970s as many coastal states declared their 200 mile exclusive economic zones (EEZ's), the situation started to change. With a few notable exceptions the 200-mile EEZs captured most of the continental shelves adjacent to the coastal states and increased regulation, scientific research and management began to take shape.

The areas outside the EEZs however continued to be subject to little research and regulation. Deep sea distant water fleets continued their unregulated fishing in these international waters with little regard for stock status or conservation. In many cases stocks were depleted before adjacent coastal states could convince the offending parties of the need for catch limits aimed at the long term preservation of the stock and thereby the fishery. In this region we need look no further than the Bering Sea Donut Hole between the USA and Russia to see the effects of unregulated fishing on pollock in international waters. Only after the stock was depleted could the various nations involved agree to put a management regime in place to protect what was left of a once great stock of fish.

Fortunately, during this period of intense unregulated fishing in international waters one region of the world's oceans has remained off limits. Covered by permanent sea ice for most of the last 800,000 years, the international waters of the Central Arctic Ocean have been protected from incursion by fishing fleets in search of new grounds and new stocks of fish. The protection of permanent sea ice has allowed an ecosystem to survive and produce some of this world's most fascinating and awe inspiring animals. The abundant Arctic cod have provided the narwhal, bowhead, beluga, humpback and polar bears with the nourishment to survive in one of the world's harshest environments. In turn, these marine mammals have provided sustenance, clothing, shelter and means of transportation for the Arctic marine peoples, the Inuit of Northern Canada, Alaska, Greenland, Russia and Siberia. It is hardly an overstatement to say that the Inuit of the Arctic could not have survived in this region without the continued health of the living marine resources of the Arctic Ocean.

The Arctic and its ocean, however, are changing. The high seas area of the Arctic Ocean, (that is, the area outside the northern maritime boundary of the five Arctic coastal states), encompasses 2.8 million square kilometers, an area the size of the Mediterranean Sea. Over the course of a decade, the international waters of the Arctic Ocean have gone from a virtually impenetrable block of multi-year sea ice to a low point in 2007 where 40% of the area was open water. That area of open water was 1.1 million square kilometers, roughly the size of the Norwegian Sea. The trend towards more open water in this area is expected to continue into the future. Significant areas of fishable depth, particularly the Chukchi Plateau, north of the territorial waters of Russia, the United States, and Canada have seen the most open water at the end of the summer melt season. At its low point in 2007, the open water area included 476,000 square kilometers of ocean that could be considered of fishable depth, (less than 1000 meters depth). Most of this area is adjacent to the rich fishing grounds of the Bering Strait and it is reasonable to expect that in the future, fishing fleets will explore these depths for fishing opportunities. Already, at the other end of the globe, fishing fleets are pursuing fisheries for the bottom of the food chain, fishing for krill in the waters off Antarctica.

While the rapid deterioration of the polar sea ice raises somewhat abstract concerns for many in the south, more direct concerns emerge for Inuit. What effect would a commercial, industrial fishery in Arctic waters have on the ecosystem? Who would, who should, and should anyone pursue this type of endeavor in this fragile area? Is there any surplus biomass for fleets to harvest over and above that which is needed to support the marine ecosystem? Under whose oversight would fisheries be conducted, whether experimental, exploratory, or fully commercial? These are but a few of the many questions that should be answered prior to the advent of high seas fishing in this area.

Many have hypothesized, and the evidence thus far confirms, that environmental change as a result of climate change will be most visible and most dramatic in the polar regions. There is no consensus on what effect a melting ice pack will have on the productivity of the Arctic Ocean generally and there is even less agreement on what will happen in the international waters of the Arctic Ocean. What will be the effect on plankton bloom? Will there be more or less? Will the occurrence of Arctic cod increase or decrease? Will new species move north to the area from adjacent fishing grounds?

Of all the questions that can be asked however, from a fisheries perspective arguably the biggest one is this: Can the Arctic Ocean ecosystem sustain an unregulated, unscientific, unmanaged, industrial fishery in the midst of the tremendous uncertainties associated with the climate change that will allow the area to be opened to commerce?

I propose that the answer to that question is quite easily found by reviewing our record in other oceans. Almost without exception where the fishing fleets of the world have engaged in unregulated, industrial, high seas fisheries the result has been overfishing, followed by stock depletion and in many cases collapse. All evidence suggests the Arctic Ocean would find a similar fate.

So then what should be done? Is it fair to simply allow history to repeat itself in the Arctic Ocean? Well, no, it is not. Is it fair to say that regardless of the circumstances, absolutely no fishing should ever take place in the high seas of the Arctic Ocean? No, again.

The solution lies in gathering the required information to determine if and under what circumstances a fishery is possible. It requires the establishment, should it be determined that a fishery can take place, of an appropriate fisheries management regime. And it requires the complete engagement of the Inuit, the people who from time immemorial have relied on the bounty of the Arctic Ocean to sustain them and their culture. If we are truly interested in sustainable development in the Arctic these three basic principles must be our guides.

The Arctic Ocean ecosystem and the Inuit who depend on it are undergoing tremendous change as a result of global warming. While this causes tremendous uncertainty about the future, there is one certainty: unregulated, high seas, industrial fisheries lead to stock depletion, confrontation, adverse impacts for the adjacent coastal peoples, and almost always a formal management agreement after the damage is done. In the Arctic Ocean, let us identify the rules before their absence once again becomes the problem.

Comments on Chapter 4: Chinese perspective

Zhou YingQi

Global climate change may increase the primary productivity of living resources in the Arctic marine area as those resources become more abundant due to sea water the temperatures rising and more direct sunlight because of melting ice cover. These changes might also have effects on the migration routes and distribution of the Arctic fish stocks in space and time, which might provide certain possibilities for commercial fishing in the future, but up to now the most of these opportunities are uncertain.

Because of cold weather and harsh environmental conditions, the Arctic, compared to other oceans, has experienced less human activity and influence during the past hundred years. However, the Arctic and Antarctic influence the Earth, as a home to all of us, and feedback on current activities in these regions should also not be ignored. Atmospheric circulation and climate change, as well as storage and regulation of water resources all are important to human society and its development and as such these issues have an important and meaningful significance in many areas of scientific research.

Despite the harsh Arctic environment, the ice melts and new technologies developed may gradually increase the possibilities to access the area of the Arctic and the living and non-living resources found there. We should realized that the Arctic remains one of the most pristine areas on the planet and the combined effects of climate change and human activities will increase the risks living resources might encounter. We must remain very cautious about development and utilization of resources in the Arctic.

It is well known that the ecosystem in the Arctic has never been disturbed before by human activities and it should be mentioned that the ecosystem, despite the harshness of its temperatures and other conditions, is a biologically very vulnerable system. In order to be attentive to these vulnerabilities, any activities in the area should only be conducted for scientific purposes. If there is to be fishing in the Arctic, it should be managed through an international organization under agreement or convention, which should be open to the states interested. Eliminating illegal, unreported, and unregulated fishing is a continual challenge around the world and should not be allowed to happen in the Arctic area.

A conference or forum could be established as a platform for exchanging views about the Arctic and discussing issues amongst interested participants.

FISHERIES RESOURCES AND VULNERABLE ECOSYSTEM IN THE ARCTIC WATERS

The availability of some species of fish in the waters of the Arctic Ocean and adjacent seas have led to the development of a world-class commercial fishing industry. Commercial fish stocks in the Arctic waters are mainly Arctic trout, Arctic cuttle fish, butterfly fish, and capelin, among others. The Barents Sea, Norway Sea, and Greenland Sea are the most famous fishing grounds in the world, with catches approximately 8 to 10% of the total world catch. In the Bering Strait Alaska pollack has been the largest single species fishery in the world.

Scientists in China are very concerned about the biological resources in Arctic waters and have conducted scientific research programs related to the Arctic area. For example, in July 2010, the Chinese scientific research vessel Xue Long (meaning “Snow Dragon”), carried out her fourth Arctic survey and expedition, depicted in the photographs of Figure 4.10. The main target of this voyage was the investigation of the effects of rapid change in the Arctic, as well as ecological, environmental and climate research. Forty-seven stations were covered during the survey on the slope of Bering Sea, including projects with physics, chemistry, biology, geology, optics, the atmosphere and more. Some findings from the voyage are interesting. For instance, in the area of N60.55, W177.38 degrees in the continental slope of Bering Sea, within half an hour of underlying biological trawling collected nearly one ton of benthic organisms, through which sampling and investigations showed to represent quite abundant benthic biomass. During the eighty-two days-long voyage more than 800 samples were collected, including around 100 benthic species from 24 stations in three months. These species included crabs, starfish, sea urchins and similar organisms, mainly from the Bering Sea, the Chukchi Sea and Canada basin, collected from sampling depths of 20 or 30 meters to 1,500 meters. In addition, more than 100 bottles of plankton samples have been collected.

One of targets of the survey was to collect data for understanding the Arctic food web. The project was called "The Relationship Between the Structure of the Arctic Marine Food Chain and Sea Ice Changes," and aimed at the relationship between the plankton and the species on the top of food chain and the nutrition structure in the ecological system. Researchers explored the factors influence the food chain directly and considered those with the geographic data from acquisition stations, looking for certain indications of the distribution patterns and mechanisms of the Arctic biology.

Figure 4.10. R/V Xue Long in the Arctic region

Arctic ecosystems are tough but also vulnerable. In the Arctic Ocean region, summer is short, with a long and cold dark winter. As a result, marine animals have been very tenacious in order to survive and adapt to harsh natural conditions through years of evolution. Because of the relatively simple food chain, if any of these organisms are destroyed it will be enough to cause the collapse of the entire ecosystem. Under such extremely harsh environmental conditions as found in the Arctic, the original ecosystem structure and function is extremely difficult to recover. Degraded ecosystems not only lead in turn to the deterioration of the environment, but will result in the extinction of species and the reduction of biodiversity.

However, even as the animals have adapted to natural conditions in recent years, a rapidly changing environment poses a new challenge to polar organisms and animals including fishes. It is hard to predict whether organisms can ultimately survive, therefore, ecosystems in the Arctic should be considered extremely vulnerable. This extreme vulnerability should be noticed as the first priority when conducting any human activities in the Arctic in order to guarantee the practices of sustainable development and utilization. The ecosystem approach and management which has been proposed by the FAO should be a key guideline.

As the Arctic sea ice continues to shrink, and the time length of ice melting becomes longer, freshwater increasingly enters the system causing changes in Arctic Ocean currents, circulation, structure, and distribution, having serious consequences for living marine resources. Rapid melting of sea ice has caused ice algae, a major source of food for many fish and plankton in Arctic, to decline drastically. The results are that some populations of Arctic cod began to shrink, having a strong influence on the Arctic coast fishery economy.

Arctic microbes such as bacteria and fungi and microfauna (flagellates such as nematodes) are already struggling to survive, without much of an ability to reproduce. Since the Arctic ecosystem itself is fragile and vulnerable, so are microorganisms's ability for self-modification or self-recovering.

CONSERVATION, PROTECTION OF MARINE LIVING RESOURCES IN ARCTIC WATERS

Ocean science is an "observation science" in that the observation is still a major activity for marine science. As such, observations are currently the major activities of marine science and studies on the polar marine ecosystem. Because polar ecosystems, biological life history and ability to adapt to the environment, as well as the population and distribution of marine living resources are poorly understood, we must take care while undertaking any actions in the area. Currently, the Arctic waters do not provide favorable conditions for any commercial fishing activities. This is not the case because there are not fishing technologies and capacities, but rather because our understanding of polar marine living resources is too limited. At this point, only scientific studies and surveys should be considered in our action plan, ultimately strengthening scientific study as means for cooperation for interested parties.

In current research on the Arctic, many fundamental scientific questions persist which have not been answered clearly yet, such as those on the interference between the Arctic sea surface, icebergs, and the atmosphere, and how each plays a role in the global climate system. There are still many questions about the history of the Arctic ecological system and the impact human activities have on the system, as well as how flora and fauna in the Arctic react to climate changes and so on.

A range of factors and issues might affect the polar ecological system. Primary among these issues is pollution, including noise pollution, chemical pollution, and their impacts on migratory routes. Besides fishing operations, we are more concerned with varied human activities, in particular shipping which damages polar marine biological resources. For instance, two of the world's richest fisheries in the Bering and Barents Seas are located in Arctic areas but involve extensive shipping. Therefore, necessary institutions and mechanisms must be established for the strengthened supervision and management of monitoring chemicals discarded in the Arctic, to increase efforts to reduce persistent organic pollutants, heavy metals and other contaminants (including land pollution sources), to support removal of harmful chemicals accumulated in the Arctic, and reduce the risk of release of radioactive substances.

According to the results of current research, noise produced by ships and engineering construction already created certain degree of harm to the marine animals and aquatic organisms, including fishes, whales, and marine mammals. The noise might drive or frighten fish schools away from their favorable migration routes or habitats and might introduce other risks. Increasing ship traffic has the potential to increase pollution and the risk of oil or waste water spills, as well. There is a need for effective international regulatory arrangements to enhance marine safety and protect the environment. It is suggested that there be an allocation of professional experts or observers on board for monitoring and preventing pollution from ships engaged in shipping in Arctic waters. Therefore, regulations in the Arctic region must be established related to the assessment of human activities, the impacts of noise on marine mammals, and established rules and standards for protection based on scientific research. So more surveys and investigation are required in the future plan.

With the growth of potential mineral resources, energy, and biological resources in the Arctic, the contradictions between countries and peoples of the surrounding areas are growing at the same time. Moreover, in conflicts between modern industrial economic development and environmental protection in the Arctic, the contradictions between modern civilization and the ancient culture of the local population is increasingly obvious. Scientific activity in the Arctic is closely linked to economic, military, political interests, but also to natural sciences and social sciences. These are mutually related and cannot be discussed separately.

REGULATION AND MANAGEMENT ON FISHERIES

Until now there has been no comprehensive regional fishery convention and coordinating management organization in the Arctic region, and, in light of requirements of the UN Convention on the Law of the Sea (UNCLOS) and United Nations Fish Stocks Agreement, the Arctic states and Non-Arctic states with interests in Arctic fishery resources are liable and to take responsibility to cooperate in order to conserve and manage these Arctic fisheries resources properly.

Recent changes in the attitude of the Arctic Council and divergences from mandates of several regional fishery management organizations make the prospect of Arctic fisheries complicated. The north Pacific portion of the Arctic marine areas has been deemed a potential alternative for fishing industries because of regional fishery management practices in the north Atlantic Ocean and the capability of fishing fleets.

It is suggested that the survey and biological investigation and research on Arctic marine resources by international cooperation should be a high priority. An Arctic conference could be established as a platform for exchanging views and discussing the issues participants are interested in. Some sub-groups could be set up to focus on particular problems. Such scientific inputs in Arctic fisheries will pave a way for future commercial fishing in the Arctic and might offer another new fishing ground. Marine biological scientists, whether they come from the Arctic states or non-Arctic states, should have a voice and influence in Arctic marine resources conservation and management and governance.

There are two main types of fishing in the region: an artisanal or subsistence fishery and commercial fishery. The artisanal fishery can be licensed and protected under certain regulations, but the commercial fishery should be strictly limited. The fishing activities should be within the framework set by the international fisheries management organizations under its mandate. For example, the International Whaling Commission (IWC) ensures effective protection in the Arctic region and any activities related to whaling in the Arctic region should be decided by IWC. At the same time, there should be considerations to support proposals on the management of whaling in subsistence fisheries for local aboriginal people, even if whale protection negotiations did not fully agree. Whaling should remain subject to appropriate control, catches need to be recorded and controlled within the scope of accreditation needs and continued dialogue is needed with local traditional seal hunting communities. Guided by the FAO's approach to subsistence fisheries policies, there shouls be consideration and support for a reasonable catch certificate system for seal products[1] on the market, including any import, transit, and export. However, this should not affect the economic and social interests of local communities which historically engaged in traditional hunting of seals as one of their fundamental living resources. These determinations should be made through dialogue with aboriginal groups living in the area to achieve consensus.

Fisheries management in the Arctic should be under international agreement involving states that have real interest in the area. The waters of the Bering Sea and the North Atlantic Ocean are already covered by international regional fisheries management organizations. Besides the exclusive economic zones under the national jurisdiction of coastal states, the remaining waters in the Arctic are considered the high seas, an "Arctic hole" which needs to be managed so that developing a conservation treaty for living marine resources to implement the United Nations Fish Stocks Agreement is at higher priority.

Arctic waters are a broad, complex set of marine jurisdictions and any delineation of their boundaries needs to take into account a variety of factors, particular the impacts of human activities on living resources. The Arctic Ocean is an ocean, not a sea, and certainly not a gulf. It cannot be treated as if it were an enclosed or semi-enclosed sea. Arctic affairs should be open to interested parties from non-Arctic States. Due to climate change and warming effects, there could be a tremendous impact on the living marine resources in the Arctic including the Bering Sea, North Pacific, and North Atlantic. If a fish population and their food organisms relocate or their geographical distributions obviously change, moving towards northern waters for instance, this is an issue that obviously concerns not only the coastal states, but also the interests of non-Arctic States. It is recommended that Arctic fisheries and related ecosystems develop approaches to conservation and management, and should establish a regional fisheries management organization before the start of commercial fishery.

Most fish migrate from one place to another depending on the weather, environment, and their habitat range. In doing so, some of them will cross the borders of exclusive economic zones and high seas. The Arctic states should implement the international obligations of the 1995 United Nations Fish Stocks Agreement, Item 5, Article 8, and actively promote and implement management guided by the concept of ecosystems approach, rather than the traditional sector or industry management.

The Antarctic Treaty is an example. Under the Antarctic Treaty system, the environmental protection and conservation of living marine resources are two separate treaties. Although the Arctic marine environment protection treaty already exists, a fisheries management treaty is needed. If one international organization were empowered to manage the two issues the fisheries management could be merged into considerations for the marine environment. Otherwise fisheries conservation and management requirements may not be compatible.

Due to the special geographical situation of the Arctic, the Arctic should not be managed by the Arctic states only. Of course, the eight states have a vital interest in the Arctic, however, participation should be open to non-Arctic states which have vital interests there, too. Actions taken should actively support the United Nations Law of the Sea. Further development of cooperation in the Arctic management system, should ensure (a) safety and stabilization, (b) strict environmental management, including principles of prevention, such as precluding and precaution points, (c) sustainable utilization of living marine resources, as well as open and equitable access to resources, and (d) promote broad dialogue and negotiation, support non-arctic states participating in negotiations. Instead of proposing new laws, it is suggested that there be full implementation of existing obligations. However, this should not preclude the further development of the existing legal framework to enable it to adapt to the new conditions or Arctic specificities.

One lesson that should be learned regards areas commonly known as high seas in the north Pacific nicknamed “donut holes” and “peanuts holes” because they are surrounded by exclusive economic zones. They were rich in pollock during the 1980s and declined during the 1990s. Afterward, a moratorium was placed on commercial fishing with factory trawler fleets for decades under the Convention of Conservation and Management for Pollock Resources in Central of the Bering Sea due to the collapse of pollock stocks. Those fisheries will not be re-opened until conditions are better. Monitoring systems, fisheries management, and the necessary sustainable security measures should be taken, such as setting precaution points, and eliminating illegal, unreported, unregulated fishing.

PROPOSAL FOR ACTION PLAN

A multi-sector framework for integrated ecosystem management on marine living resources could include the establishment of a set of marine protected areas, navigational specification rules, and a plan for ensuring the sustainable development of mineral resources. At the international level, there is a need to further explore all the possibilities for the protection of marine biological diversity beyond areas of national jurisdictions, including tracking the implementation of UNCLOS agreements.

To promote the International negotiations on high-latitude marine protected areas

- Arctic affairs should be arranged on high-level dialogue of Ocean Affairs,
- the possibility of establishing an Arctic information center should be explored, and
- education networks related Arctic affairs should be established.

Waters systems and environments of the Arctic will be influenced by adjacent areas and the atmosphere. The Arctic is a fragile ecological system, and humans need to be particularly careful and strictly manage their activities there. If fish are affected by environmental pollution and noise impacts, they could change their migration routes and habitats which might affect their breeding and survival.

Arctic fisheries are divided into two types: indigenous subsistence, which would be licensed and protected, and commercial fisheries. A strict management system which combats illegal fishing must be established on the basis of scientific investigations and sufficient proper management.

Scientific cooperation committees and working groups must be established, providing scientific guidance and recommendations, providing preparation and the foundation for establishing a fisheries management organization, the coordination of scientific investigation, information exchange, and cooperative activities. Additionally, organizing regular conferences or meetings of parties interested in Arctic issues to exchange information will strengthen international cooperation.

Notes

1. Some species of seals are not in the list of CITES.

Comments on Chapter 4: Korean Perspective

Jong Deog Kim

Professor Fluharty's chapter has presented a very comprehensive analysis of current issues on Arctic living marine resources including fisheries and ecosystem management. His presentation also covers some practical counter measures not only for the Arctic coastal states but non-Arctic states such as China, Japan and Korea. I believe his chapter presents a logical need for international cooperation to manage integrated and sustainable living resources in the Arctic and its adjacent sea areas.

According to the chapter, the interest of North Pacific Rim states in Arctic fisheries seems reasonable in relation to the Bering Sea. As we are well aware, China, Japan, and Korea are major global fisheries producers and consumers. Therefore, opening of the Arctic is an issue of major interest to them because it highly affects the fisheries industry and seafood supply. The three nations have good capacities in scientific surveying and monitoring on marine resources management as well. For instance, they have experience conducting scientific research on pollack in the Bering Sea Donut Hole and have their own facilities, such as icebreakers. Based on international discussion on Arctic fisheries, Korea is very willing to participate in Arctic resource surveys with its experience in the Antarctic Ocean.

Regarding the concept of "Arctic Ocean fisheries," I think there is still some confusion on the notion because of the migratory features of living resources and ecosystems in the region. A clear definition of the physical scope is important to establish new agreements on Arctic fisheries and resource management, regional fisheries agreements and other necessary governance. Given migratory fisheries resources, I think we can refer to the Antarctic Convergence in the Convention for the Conservation of Antarctic Marine Living Resources of 1980.

Generally, when we consider fisheries resources management, it is quite appropriate to conceptualize in terms of fisheries consumption and supply. I think analysis on the global supply and demand of Arctic fishes based on scientific understanding will be useful for future development. The catch of major Arctic fishes, such as halibut, cod, and other white fish has slowed down, compared to rising demand. It is highly likely that the Arctic Ocean will emerge as the major fishing ground.

As with other countries in the East Asian region, our domestic fisheries production hardly kept up with rising fisheries consumption. Accordingly, fisheries importation continued to increase, which called for development of new fishing grounds. In particular, production of pollack, halibut, and cod, the cold current species enjoyed by the Korean people, has seriously decreased. Unfortunately, major production areas for such species are the Arctic Ocean and its adjacent sea. Therefore, Arctic fisheries are more than somewhat crucial for stable seafood supply and domestic price management.

Beginning in 2013, we will seek more concrete cooperation measures with the Arctic states, including fisheries forum with industry, government, academia, NGOs, and local people for finding a more reasonable approach. I think our existing bilateral or multilateral cooperative relations with NAFO, Russia, Norway and the US, will be the foundation for this cooperation. Of course, we do not need to say that this interest should be under the international rules and coastal states' authority in the fisheries resources management. When such strategies are drawn up, applicable resource conservation measures should be considered and active consultation should follow with regional fisheries organizations and the nations who have jurisdiction over the EEZ of the Arctic.

PART IV

Potential Arctic Oil and Gas Development

5. Potential Arctic Oil and Gas Development: What are Realistic Expectations?[1]

Arild Moe

INTRODUCTION

The Arctic has increasingly come into focus over the last decade. With energy one of the major issues, the Arctic has been presented as a new Middle East and there has been talk of "a race for resources" and potential for conflict because of imminent and massive petroleum activities in the Arctic Ocean. There is widespread concern that increased petroleum exploration and production could have grave environmental consequences.

The purpose of this chapter is to clarify the potential and the challenges of involvement in the Arctic by reviewing resource estimates and discussing the governance of Arctic offshore energy resources. Very often Arctic development is considered primarily in view of the needs of energy consuming countries outside the region. In this chapter, I argue that more attention must be given to the strategies and interests of the owners of the resources who can determine the speed of development. Here special attention is given to Russia and Norway. The chapter is, however, meant to contribute to a discussion of the role Arctic hydrocarbon resources may have for North Pacific countries.

DRIVERS

The attention to the Arctic as an energy province has been spurred by several simultaneous, but unrelated developments. Political uncertainty in the Middle East, the world's dominant oil supply region, has helped direct the focus toward regions regarded as more peaceful and stable. The Arctic, which never has seen armed warfare on a large scale,[2] had during the Cold War been an important deployment area for strategic submarines, and was perceived as heavily militarized. Much of the military infrastructure remains in the region, but, with the Cold war gone, the military interest in the Arctic waned. It is, however, not only the perceived tranquility that has made the Arctic look attractive to the international oil industry. Acreage available for development by international oil companies (IOCs) has shrunk considerably over the last few decades.

In a growing number of oil producing countries, state oil companies are given a dominant or preferential role. Foreign companies must increasingly accept a secondary role, or they are not allowed in at all. Still, the IOCs possess unique experience and technology required in complicated fields or harsh environments. The Arctic is a region where development presumably will require such assets.

These drivers have been augmented by changes in the natural environment. Over some years now the world has witnessed rapid climate change in the Arctic. Events are catching up with model simulations of the ice situation. While this development is indicative of the critical global challenges ahead, it is also offering new opportunities. A smaller ice sheet and less or no summer ice will make larger areas in the Arctic more accessible for exploration. However, due to large annual and seasonal variations, the oil industry will have to be prepared to meet ice limitations similar to today's, for many years. Also, climate change means more extreme weather, complicating operation of equipment, and melting permafrost, making infrastructure development in the coastal zone more difficult.

THE RESOURCE POTENTIAL

The description of the Arctic as peaceful and accessible would have no relevance for the oil industry if there was no expectation of finding resources. The changing perceptions of the resource base in the Arctic are therefore a key element in assessing the situation and outlook.

Even, as argued above, there are new drivers for oil industry engagement in the Arctic, the interest has been there for several decades. Offshore petroleum production in Arctic waters was regarded as a natural development for the oil industry already in the 1970s. By that time exploration as well as production was underway several places in the Arctic onshore, and it was assumed that discovered petroleum accumulations would extend into the adjacent offshore areas. In an overview published by the Central Intelligence Agency in 1978, the Beaufort Sea continental shelf outside Alaska and Canada (where first exploration drilling took place in 1976), offshore areas around the Canadian Arctic islands, Greenland's west coast, the continental shelf northwest of the Norwegian mainland and the areas east of the Svalbard archipelago, Russian Barents and Kara Seas were considered the most promising.[3]

Resource estimates were published on some occasions, and geologists expressed great optimism,[4] but the estimates were very rough and, besides, large parts of the Arctic were considered inaccessible, for technological, climatic and political reasons. It was only after the end of the Cold War that the general image of the Arctic started to change. In

2000 the United States Geological Survey (USGS) released its World Petroleum Assessment. The purpose of the exercise was to “rigorously document the geologic foundation for estimating undiscovered petroleum resources for the world”.[5] “Undiscovered resources” are understood as resources which are located in the ground by a certain probability. Geological probabilities are estimated for geological provinces and exploration must be carried out to actually identify accumulations (structures and fields). In the USGS survey the petroleum basins of the world were grouped into eight regions. The Arctic was not defined as one region in the study since the focus of the report was not the Arctic, and it was only somewhat later that analysts started adding data on the various Arctic provinces that had been assessed and termed as Arctic in the report. The estimates from these provinces added up to 25% of the world’s undiscovered resources. But much of this referred to onshore areas usually not defined as Arctic, notably the East Siberian basin, representing 11% of the 25%. On the other hand, large parts of the Arctic offshore had not been assessed at all, thus there was also the possibility that undiscovered resources were larger.[6] Anyway, the 25% figure was easy to remember and caught the attention of analysts and policymakers who did not care to acquaint themselves with the geographical delimitation and certainly not with the definition of undiscovered resources. Thus soon many newspaper readers were under the impression that 25% of the world’s oil was located in the Arctic offshore. There is no doubt that the report and accompanying misunderstandings served to direct the attention of policymakers and the public towards opportunities in the north. But it also influenced the oil industry, which was able to read the USGS numbers more correctly.[7]

The new USGS report “Circum-Arctic Resource Appraisal” (CARA) from 2008 had an explicit Arctic focus and sought to rectify the omissions and confusion of the World Petroleum Assessment. CARA only included the area north of the Arctic Circle and more sub-regions within the Arctic were more closely assessed. The results were summed up thus: “…about 30% of the world’s undiscovered gas and 13% of the world’s undiscovered oil may be found there…”[8] Some observers were quick to point out that the estimates had been reduced, compared to the World Petroleum Assessment. But in reality, estimates of undiscovered resources in the “real” Arctic had been increased, taking into account the different geographical scope of CARA. Whereas the estimates are based on the assumption that resources can be extracted with existing technologies, the USGS pointed out the uncertainties in the assessment and its limitations: “…these estimates do not include technological or economic risks, so a substantial fraction of the estimated undiscovered resources might never be produced.” Also the accuracy of the probabilistic methodology applied can be questioned. The resource estimates published are averages from a quite wide range of probabilities. Nevertheless, the publication of percentages and also volume assessments for individual basins gave once more the impression of a huge and fairly certain petroleum potential in the Arctic.

The relative importance of Arctic resources

But how big are these figures, really? They certainly make up significant shares of the world's undiscovered resources (see Tables 5.1 and 5.2),

But in discussion of the Arctic's share of the undiscovered resources it is often overlooked that there are enormous amounts of discovered oil as well as gas resources in the world that for various reasons have not been developed.

Table 5.1. The Arctic's share of global oil resources

OIL	Arctic	World	Arctic share in %
Undiscovered	90	732	12.3 %
Discovered	60	1579	3.8 %
Total	150	2311	6.5 %

Compiled by D.H. Claes, University of Oslo, based on "World Petroleum Assessment", USGS Fact Sheet FS-062-03, "Circum-Arctic Resource Appraisal: Estimates of Undiscovered Oil and Gas North of Arctic Circle", USGS Fact Sheet 2008-3049:; A.M. Spencer et al. (eds): Arctic Petroleum Geology. Geological Society, London, Memoirs, Vol. 35, 2011.[9]

Table 5.2. The Arctic's share of global natural gas resources

	Arctic	World	Arctic share in %
Undiscovered	1669	5196	32.1 %
Discovered	1615	8453	19.1 %
Total	3284	13649	24.1 %

Compiled by D.H. Claes, University of Oslo, based on "World Petroleum Assessment", USGS Fact Sheet FS-062-03, "Circum-Arctic Resource Appraisal: Estimates of Undiscovered Oil and Gas North of Arctic Circle", USGS Fact Sheet 2008-3049:; A.M. Spencer et al. (eds): Arctic Petroleum Geology. Geological Society, London, Memoirs, Vol. 35, 2011.

In its latest edition, the Statistical Review of World Energy reports that the reserve to production rate for oil is 54.2 years and 63.6 for natural gas.[10] A large share of those reserves are located in the Middle

East in countries with already high production. These countries do not need to increase their output significantly and the discovered but undeveloped resources there must be seen as a long term economic reserve. They also form a crucial part of the world's energy resource base for the longer term and inform assessments of future availability and price of hydrocarbons even if in the short and medium term these resources are not available for the international oil industry. The industry goes where it can make a profit. That brings us back to the Arctic as a prospective petroleum region.

COSTS AND PRICE

Even if resource estimates are big, "undiscovered" does not mean "recoverable." First, the resources must actually be found, after a costly and often lengthy exploration period. Recovery then depends not only on technological solutions but also on the costs versus price: Does it make economic sense to develop Arctic resources? It is understandable that Arctic production must be considerably more expensive than onshore in the Middle East. Nevertheless, there will always be reasons to develop more expensive alternatives, as long as the market price justifies the costs.

The oil price has shown volatility over several years, but the price has been high enough to justify costly Arctic development. Developments in the gas market have been more dramatic. The rapidly increasing estimates of recoverable unconventional gas, particularly shale gas, have introduced a whole new segment of supplies. The volumes becoming available in an increasingly globalized gas market has a dampening effect on prices. Unconventional gas is not necessarily cheap gas and it does not need to signify the end of all Arctic offshore gas projects, but the expectation of growing prices is gone and the need to find cost-effective technical solutions for Arctic projects is more pressing than ever.

There are still many uncertainties about the potential and costs of unconventional gas over the longer term. Also the prospect of exploiting unconventional gas in a variety of countries, including China, will have implications for the attractiveness of Arctic gas resources.

JURISDICTIONAL CONFLICTS?

Seen from afar, the Arctic Ocean may look like a vast no-man's area. But in reality the continental shelf is controlled by the coastal states. Article 76 of the UN Convention on the Law of the Sea (UNCLOS) grants all coastal states a continental shelf of 200 nautical miles if it does not meet another state's shelf. The continental shelf may also extend further out, to a maximum of 350 nm from baselines, if there is a natural prolongation of the land territory.

Unlike territorial waters the exclusive economic zone and the continental shelf is not sovereign territory. Other states enjoy full rights to shipping activities and shall also as a rule be granted permission for scientific activity. But the coastal state enjoys sovereign (exclusive) rights to the exploitation of resources.

The delimitation of continental shelves and EEZs to bordering shelves and zones, as well as the outer delimitation of continental shelves where it extends beyond 200 nm is a complicated issue. But the number of border disputes in the Arctic is very small, contrary to popular perception. Outstanding bilateral disputes include:

- Maritime boundary between Russia and the United States in the Bering Sea.
- Beaufort Sea between Canada and the United States.
- Lincoln Sea between Canada and Denmark (Greenland).
- Hans Island between Canada and Denmark (Greenland).

In all these disputed seabed-areas potential hydrocarbon resources are involved. The largest—and most complicated dispute—is between the US and Russia. The agreement reached in 1990 has, however, been respected by both sides even if it has not been ratified by Russia.

Perhaps the most prominent bilateral jurisdictional dispute in the Arctic was the area of overlapping claims between Norway and Russia in the Barents Sea. It emerged when developments in the law of the sea granted coastal states continental shelves of minimum 200 nautical miles from shore, without ascribing how delimitation of neighboring shelves should be carried out. The two sides adhered to different principles for delimitation and the resulting disputed area in the Barents Sea and the Polar Ocean amounted to 175,000 square kilometers. Negotiations started formally in 1974. Some seismic surveys were carried out until the mid 1980s. After that both states practiced a moratorium on exploration to avoid activities in contested waters. The limited seismic surveying carried out provided data that were re-analyzed several times, leading to very optimistic statements from the Russian side regarding the resource base. An agreement on delimitation was announced in principle in April 2010. The area was divided fifty/fifty and the agreement prescribed that fields crossing the boundary will have to be developed in cooperation. The agreement entered into force in July 2011.

Both Norwegian and Russian leaders have emphasized that resolving the delimitation of the continental shelf is the culmination of a long, gradual process and that the line now drawn is based on international law. The legal development and the dynamics of the negotiations are important to understand how the line was drawn, but a willingness to find a political compromise must be added as an explanation as to why a solution was arrived at.[11] I believe that both states see the agreement as a contribution to stability in the Arctic and as a way of proving that the existing international framework with UNCLOS as the major building block is capable of solving disputes peacefully. Thus they signal that attempts to revise this framework are unnecessary.

OUTER DELIMITATION

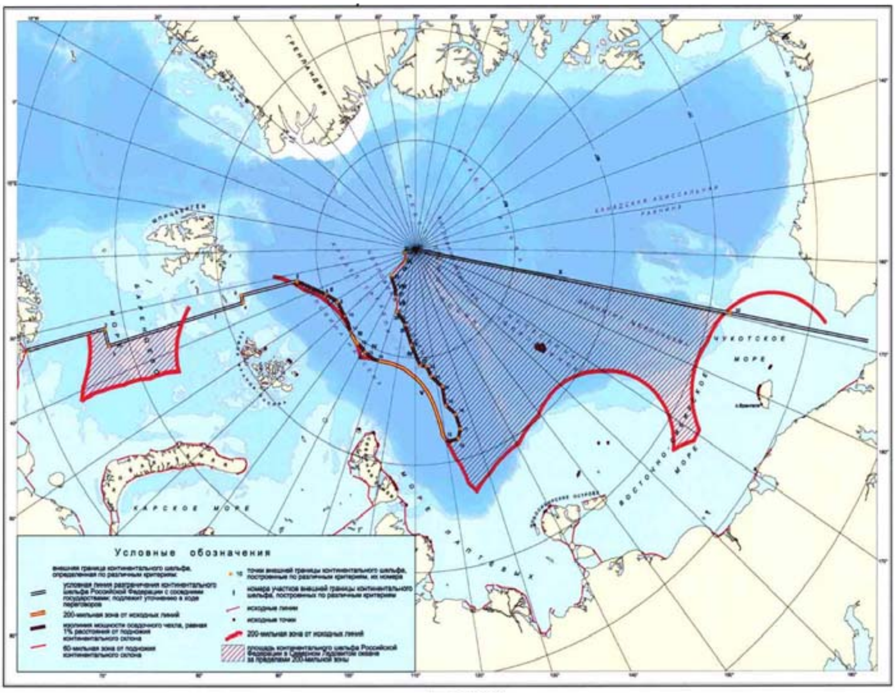
UNCLOS describes in some detail geological requirements for including a seabed area in the "extended" continental shelf, beyond 200 nm. A special commission (The Commission on the Limits of the Continental Shelf) composed of technical specialists has been set up by the UN to review submissions of such documentation. If the commission finds the documentation sufficient, it gives its endorsement, which means international recognition of the outer limit.

Norway submitted its documentation in 2006 and the commission delivered its final recommendation on the Norwegian submission in March 2009. This was the first submission to be finally processed and meant that Norway now had an internationally recognized delimitation of its extended continental shelf. Only one other state has so far submitted documentation of an extended continental shelf in the Arctic, namely Russia, in 2001. In effect, Russia claimed sovereign rights over resources on the seabed area of some 1.2 million km^2 outside the 200-nautical mile line (see Figure 5.1).

Russia's geological argument was based on the linkage between the claimed areas' ridges on the seabed and the Russian mainland. All the four of the other Arctic coastal states as well as Japan questioned elements in the Russian submission.[12] The commission found the substantiation of the Arctic claim insufficient and asked for more information.[13] Since then a revised submission has been under preparation, reportedly to be finalized by 2014.[14]

The risk that the Russian claim will overlap with claims of Denmark and Canada or that Russia will not respect another negative conclusion from the Commission have led some observers to regard the outer delimitation of continental shelves in the Arctic as an explosive issue. I will argue though that even if a dispute is highly possible, it does not necessarily mean open conflict. First we may see postponement. There is the possibility of several rounds with the commission. That could take decades. However, even if, at the end of the day, it is clear that claims in the Arctic cannot be reconciled or substantiated, all the Arctic states may see it in their interest to leave it like that, i.e., agree on disagreements and go on with their business. They all have a very strong interest in preserving peace and stability. Open conflict between Arctic states would undermine UNCLOS as the legal basis in the region. And, with extensive resource right granted by this convention, protecting its application in the region is in the strongest interest of all the Arctic coastal states. Furthermore, a realistic assessment of economic interests should also imply that a conflict over outer delimitation of continental shelves is not worthwhile. The seabed areas, which may be contested, are very deep down. It seems unlikely that industrial activity there can become profitable in the foreseeable future, requiring, perhaps, many decades for that outcome. The US Geological Survey maintains that most Arctic offshore resources are likely to be found in relatively shallow waters, within the 200-mile limit. Most of these uncontroversial continental shelves are virtually unexplored. That should logically happen first.

In conclusion, I see little risk of jurisdictional disputes between Arctic states becoming serious inter-state conflicts.



Source: Russia's submission from 2001. Shaded areas are outside 200 nm miles from baselines.

Figure 5.1. Russia's Arctic continental shelf claim

GOVERNANCE

Whereas the coastal state has exclusive rights to the exploitation of minerals in the seabed and can regulate activities there, environmental risks extend beyond areas of national jurisdiction and imply a need for international agreements or at least norms. Oil and gas activities pose direct and immediate threats to biodiversity not only as a result of accidents, but also as a result of regular activities. They include impacts of infrastructure development, the introduction of alien species and pathogens, for example in ships' ballast water, and eutrophication and acidification of Arctic ecosystems as a result of discharges of pollutants from the industry.

Several international conventions are addressing safety of maritime petroleum operations and environmental standards, most of them not-binding. But an important process—development of a "Polar Code" is underway under the auspices of the International Maritime Organisation, (see VanderZwaag's chapter) and more recently the Arctic Council (c.f. Oran Young's chapter) has become involved as a framework for drafting a binding oil spill agreement. The point in this connection is that we are likely to see the emergence of some form of 'international regime' that puts limitations on petroleum activities in the Arctic. This includes concern for the 'climate footprint' of all kinds of energy projects. Major petroleum companies will need a 'license to operate' emanating not only from a formal concession from the resource owner, but also from a broader international understanding that operations are safe and justifiable in environmental terms.[15] Also some voices within the big oil companies call for extreme caution in Arctic operations.[16]

THE SIGNIFICANCE OF NATIONAL POLICIES

Even if resources are economically recoverable and there should be no risk for conflict between states over resources, it is a relevant question when and how much of the resource potential the resource owners, i.e. the coastal states, want to make available for the industry.

The implication of this question is that an evaluation of national strategies, priorities and needs must be added if we want to say something about the opportunities in the Arctic. USGS only singled out the geologically most promising areas for oil and gas discoveries. For oil the Alaskan platform stands out, but sizeable resources are also expected north of Canada, northern part of Russian Barents Sea, north of East Siberia, Greenland offshore. Gas resources are expected to be more concentrated: the Kara Sea and Russian Barents Sea, as well as the Alaskan platform. Altogether the preeminent potential of the Russian continental shelf is clear.

RUSSIA–THE KEY ACTOR

All the Arctic coastal states have potential for petroleum production on their Arctic continental shelves. And indeed three of them (Norway, Canada and the U.S.) have already started production. But it is Russia that has the largest Arctic continental shelf and where the largest concentrations of hydrocarbons are expected. Understanding Russia's petroleum policy and interests is therefore key to our overall picture of future developments in the Arctic.[17]

Over the last ten years the prominence of offshore development has increased considerably in policy documents and speeches made by Russian top officials. According to Russian estimates, initial hydrocarbon resources on the Russian continental shelf amount to some 70 billion tons oil equivalents of hydrocarbons.[18] And the country's main offshore resources are located in the Arctic, 70% in the Barents and Kara Seas alone. However, only ten per cent are proven resources.[19] According to Gazprom, some 80% of the initial resources are expected to be gas.[20]

In the latest edition of the Russian government's Energy Strategy, the Arctic offshore area is assigned an important role.[21] The increased priority given to offshore areas led to some improvements in the legal framework,[22] but these developments were overshadowed by legislation limiting foreign investment in strategic sectors that was adopted in April 2008. All the resources on the Russian continental shelf were declared to be of 'strategic significance', excluding licenses to foreign companies. Moreover, the continental shelf was reserved for state companies, which, in practice, are only two: Rosneft and Gazprom. This did not preclude joint projects with foreign companies, as long as the license remained with the Russian party. But through this legislation the authorities ceded the initiative to the two companies. An assessment of the outlook for petroleum development in the Russian Arctic offshore must therefore take into consideration the strategies and interests of Gazprom and Rosneft.

Arctic offshore natural gas

Gazprom, which totally dominates Russian gas production and controls the lion's share of Russian gas reserves prepared in 2003 a 'Concept for development of hydrocarbon resources on Russia's continental shelf until 2030'[23] and two years later a more detailed program that sets out an order for development of the various offshore regions. The main driver for development of Arctic offshore gas was LNG production which could be sold in markets beyond the reach of Russian piped gas, particularly the United States. The first gas project in this program was Shtokman. This gas and condensate field, located 650 km north-east of Murmansk city and 540 km from shore is one of the largest offshore gas fields in the world, with reserves of 3,800 billion cubic meters (bcm). Various options for development were discussed over the years, but only with the establishment in early 2008 of Shtokman Development AG (SDAG) with Gazprom (51%), Total (25%) and Statoil (24%) as partners did a concrete plan materialize. Whereas the full development of Shtokman is envisaged in three stages, each producing up to 23.7 bcm (corresponding to 15 mt of LNG) per year, SDAG would only be responsible for the first one. Different schemes have been considered: an exclusive LNG (liquefied natural gas) development, or dividing the output 50/50 between LNG and gas transported by pipeline to the Baltic Sea and further via the NordStream pipeline to Germany. Final investment decision for the project was postponed several times and uncertainties increased due to changes in the gas market.

By 2012 it was evident that Shtokman would be too expensive with existing and expected market conditions and that the project would have to be seriously revised, possibly with new partners, to become viable. Thus the project has not been officially abandoned, but it may take many years before a new and viable development scheme can be implemented. It also seems likely that the organizational and contractual set up will be affected by changes in the market situation. Shtokman AG was established in 2007-2008 when the gas market looked very different, with concerns over a looming supply constraint. The two foreign companies were ready to enter a structure where they did not have ownership in the license and would not sell the gas. That would be left to Gazprom. But they would together finance, develop and operate the field for 25 years. Thus the role of the foreign companies was akin to that of 'technical assistant'—a role usually seen as unattractive by oil majors. The "Shtokman model" was then heralded as the preferred or only model for foreign companies wanting to be involved in large scale energy projects in Russia. The question now is, however, whether this model which so clearly reflects the strength of the resource owner is sustainable in today's market situation.

In parallel with Shtokman a new Russian LNG project emerged, somewhat surprisingly. The Yamal LNG project is based on gas from the South Tambey field on the eastern side of the Yamal peninsula and is led by the independent Russian gas company Novatek. Since 2010 Total is a major participant. The Russian government has promised to assist with developing crucial port infrastructure amounting to some $30 billion USD, something which has drawn criticism for being a subsidy.[24] Production is envisaged to start in 2016 and increase to 16 million tons per year. Final investment decision is expected by the end of 2013. Part of the business plan for Yamal LNG is to ship gas both westwards and eastwards by way of the Northern Sea Route, seeking the market with most favourable conditions. But the economics of transportation on the Northern Sea Route to the Pacific remains uncertain.

Also Gazprom has contemplated LNG from the gas rich Yamal peninsula, but plans are very preliminary. Meanwhile Gazprom, after a controversial process, had become majority owner of the Sakhalin 2 project in the Far East. The project which was developed by Shell and two Japanese companies is now giving Gazprom direct experience in the LNG market.[25]

Offshore oil–Rosneft

Rosneft, which is 75% owned by the state, for long did not have a public Arctic strategy, but due to the privileged position it earned as a state dominated company it was granted a series of promising offshore licenses, with which it initially did very little. A Heads of Agreement with ExxonMobil in 2011 on exploration and possible development of a large area in the northern part of the Kara Sea represented a significant change in this respect. A final agreement was reached in April 2012.

After the delimitation agreement with Norway in the Barents Sea went into force, Rosneft was granted exploration and development licenses for most of the Russian part of the previously disputed area. In April 2012 the company signed an agreement with the Italian company ENI to explore and subsequently develop resources in the southern part of the area, and a few weeks later a similar agreement was made with Norway's Statoil for the northern part, as well as three blocks in the Okhotsk Sea.

According to Rosneft the Arctic areas to be jointly explored with the foreign companies contain vast resources:[26]

- With ExxonMobil : 6.268 billion tons (46 billion barrels) of oil and 14.58 trillion cubic meters "estimated recoverable resources";[27]
- With Eni: 3.5 billion tons (25.7 billion barrels) "recoverable resources";
- With Statoil : 2 billion tons (17.7 billion barrels) of oil 1.8 trillion cubic meters of gas "prognosticated resources".[28]

Such numbers must, however, be treated with great caution. There has not been any drilling in these areas and assessments are based on fairly superficial geological information. It will take time before the resource picture becomes more certain. More specifically the agreement with ExxonMobil stipulates seismic surveys in the period 2012 to 2016 and drilling of the first exploration well in 2014 or 2015. The agreement with ENI stipulates first exploration drilling before 2020,[29] the same with the deal with Statoil.[30]

Rosneft's deals with the three foreign companies involve the same scheme. Joint ventures for exploration of and eventual production from the assigned blocks will be established. The foreign companies will hold a third of the shares in each JV and Rosneft two thirds. The foreign companies will cover all the costs in the geological prospecting phase (seismics) and a certain number of exploration wells and also compensate Rosneft for 'historical costs'—initial prospecting—and a third of the price for acquiring the licenses. At present it seems improbable that the JVs will be allowed to take over the licenses. They will remain with Rosneft. Thus there are some similarities with the Shtokman model. However, the joint ventures will probably, if exploration is successful, not only develop the fields, but also sell the oil, since oil exports unlike gas exports are not monopolized. This is a crucial incentive to foreign investors.

Evidently, the foreign companies take all the risk in the initial exploration phase at the same time as they are minority partners in the JVs. But reportedly important decisions in the JVs will have to be made unanimously. Nevertheless, the foreign partners demonstrate considerable faith in their Russian partner as well as in the framework conditions. These conditions, especially tax rules, have been a matter of concern for foreign companies—and also the Russian companies—interested in Arctic ventures. And the signing of contracts in April 2012 was clearly released by the declaration of a new taxation policy. New offshore projects would be exempted from the export tax (which was USD 460 per ton as of April 2012), and the minerals extraction tax—NDPI—can be lowered to 5% for the most complicated projects. Property tax and value added tax on imported equipment that Russia does not produce would be lifted. It was promised that the tax conditions will not change for a period of 15 years after start-up of production.[31]

Russian policy outlook

The deals concluded by Rosneft over less than one year marks a significant shift in Russia's Arctic offshore policy, and help realign realities with the ambitious rhetoric which has been heard over the last ten years. Russian authorities acknowledge that Russian companies are not in the position financially and especially technologically to play a dominant role in such development and that partnerships with international companies are required. Moreover, they understand that terms must be adjusted if the foreign companies shall commit large funds for investment. But Russia is not ceding control over developments on its continental shelf.

Despite the major breakthroughs in 2012, it is too early to tell whether Arctic offshore resources will emerge as a major factor in Russia's energy production as early as expected by some and it is still unjustified to say without reservation that the Russian Arctic continental shelf will become a major arena for the international oil industry in the next ten years. According to Rosneft's president Igor Sechin production from the blocks developed with ExxonMobil may start in 2020 if all goes well.[32] This sounds very optimistic. In addition to the geological uncertainty, the speed of development in other complicated offshore projects internationally suggests a later start-up. Questions must also be raised regarding Rosneft's capacity to handle all the projects it now will be involved in, if it is going to sit in the driver's seat, as presupposed in Russian policy.

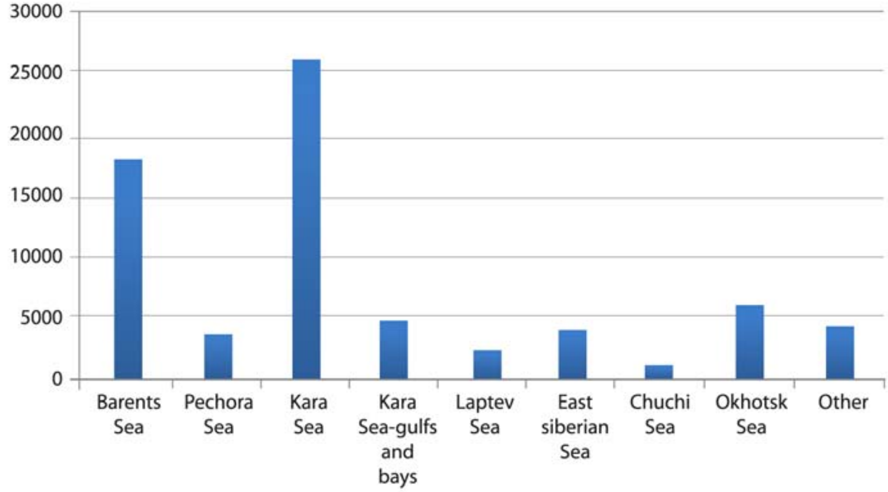
Rosneft, as well as Gazprom, has earlier been heavily criticized by the Ministry of Natural Resources for passivity offshore. That is obviously changing. But the ministry still harbours ideas of opening up the continental shelf for other Russian companies—especially Lukoil—who could then also form alliances with foreign companies. This line of policy has support from other liberals in the government and seems to be in conflict the priorities of President Putin.[33]

As noted above, the general expectation is that the highest concentrations of hydrocarbons will be found in the Barents and Kara Seas, but there are expectations of deposits further east, both in the Laptev Sea and the East Siberian Sea (see Figure 5.2). In these areas, which are even more remote from infrastructure, the geological mapping has been very limited though.

It is repeatedly stressed that the Arctic offshore resources are the country's strategic reserve for the twenty-first century. This is used as an argument to go offshore, but the implication of this realisation could also be the opposite. Is it really rational to spend this reserve now, if there are other options? A major driver for Arctic expansion has been problems in the development of Russian onshore resources. Russia possesses vast onshore oil and gas resources. But exploration has been insufficient over many years, which means that resources have not been developed to a stage where they can be put into production.

There is also no doubt that future onshore production will have to come from smaller, more complicated fields in more remote areas.[34] An important argument for the Arctic offshore is not only the expected volume of resources there, but also that those concentrations are expected to be high, that is, that the fields will be big. The present Russian industry structure with emphasis on very big companies has a much better fit with large fields than with small, heterogeneous deposits.

But if a more diversified oil industry was allowed to develop, the potential of the diverse onshore resource base could be tapped more effectively. Likewise, serious economic reforms would make it possible to tap into the vast energy efficiency potential, particularly in the consumption of natural gas. There is also a policy line strongly arguing for the need to reduce the country's dependence on the hydrocarbon sector, as expressed by former president Medvedev. Such developments in the Russian economy could hold back the need for rapid Arctic offshore development. The government must also consider how big a share of the resource rent it keeps if it is necessary to offer wide-ranging tax concessions to open offshore areas. Both the gas and the oil industry are increasingly calling for tax concessions in "complicated regions," including the continental shelf. In addition, there are serious concerns about the environmental risks associated with Arctic offshore operations. A major accident could delay development and help bring other alternatives higher on the agenda.



Source: Calculated on the basis of distribution of resources reported by Vladimir Pavlenko. 2012 "Call of the Arctic", Oil of Russia, 3, 2011, p. 46, and total continental shelf resources 70 bill. toe (100 bill tons standard fuel equivalents) reported by e.g. Deputy Natural Resources Minister D. Khramov in interview with "Golos Rossii", 26 March 2012. http://www.mnr.gov.ru/press-service/publications/detail.php?ID=128451&sphrase_id=128623

Figure 5.2. Initial hydrocarbon resources on the Russian continental shelf

Despite the reservations presented above, it seems clear that the Russian government policy is to expand Arctic offshore activities rapidly. The recent concessions given to new offshore projects show this. It should also be stressed that the petroleum companies Rosneft and Gazprom are supporting this policy as long as they continue to enjoy monopoly privileges. There is very little likelihood that the offshore offensive will be called off, but the speed of development in coming years may be affected by changes in overall economic policy.

Oil from the Russian Arctic will presumably be sold freely on the international market. If transportation of oil from the Kara Sea along the Northern Sea Route makes sense it is likely to emerge as a new supply corridor to the North Pacific, already in the last few years several voyages with tankers carrying condensate have gone through the NSR from ports in the west. But, as indicated above, sizable offshore oil production is still probably more than ten years off. Russian Arctic onshore production is another matter. Some 12-15 million tons are annually shipped westwards from the terminal near Varandey in the north-eastern part of European Russia. These volumes can go eastwards if that is more profitable. Output from the huge Vankor field in the far north of East Siberia was originally intended for shipment by sea, but was connected to the trunk pipeline system instead. This field is the primary source of Russian oil exports to China and will contribute to filling up the Eastern Siberia-Pacific Oil Pipeline (ESPO). The pipeline is in itself a reflection of the growing importance of production in East Siberia and a determination to reach Asian markets. Development of the resource base takes longer than first anticipated however.

The foreign policy component is stronger for gas than for oil. The need for diversification of gas exports has been noted on several occasions and has become more important as the traditional market in Europe is stagnating. Export diversification has both commercial and political components. Schemes that can bring Russian gas to new customers are clearly welcomed by the Russian government. The question is how important the Arctic is for Russia in this regard. Projects in Eastern Russia also have this potential. Already in 2007 the Russian government launched a program for an integrated gas production, transportation and supply system in Eastern Siberia and the Far East, with a view to potential gas exports to North Pacific markets. The major resource base in the Far East is onshore. According to Gazprom, initial gas resources in Eastern Siberia and Russia's Far East are some 52.4 trillion cubic meters (tcm) onshore and 14.9 tcm offshore (Sakhalin and the Okhotsk Sea).[35] The importance attributed to development of Russia's Far East was underscored by the establishment in 2012 of a special federal government ministry to coordinate government programs there.[36]

Also, projects in the Russian Arctic enjoy political support for similar reasons. Sustaining and developing the Northern Sea Route has high priority. Hydrocarbon projects that can provide traffic and help finance infrastructure are important in this regard. One might expect goodwill and perhaps preferential treatment in policy processes. This is one interpretation of the seemingly very positive treatment of the plans for the Yamal LNG project which aims at using the Northern Sea Route both westwards and eastwards. And as noted above, the Russian government seems intent to undertake substantial infrastructure investment which will help the economics of the project. Nevertheless, the authorities can only help a project become profitable if it is marginally unprofitable. Subsidization is unlikely beyond the infrastructure construction mentioned. Commercial terms remain decisive. This has been witnessed in the negotiations with China where Russia has not wanted to sign an export agreement at the price proposed by the Chinese side (and which is considerably lower than the price paid in Europe) despite the fact that the gas in question has no alternative takers. The fate of the Shtokman project suggests that LNG projects in the Russian Arctic at present are very uncertain.

It is evident that Asia-Pacific is becoming more and more important in Russia's energy strategy, both to diversify exports, but also to support domestic regional development. Major development projects in the Russian Far East are underway and will help meet both goals. The additional value for Russia of exports from the Arctic in terms of diversification will be marginal, since Arctic energy will serve the same Asian-Pacific markets as the Far East can do. The goal of maintaining and developing the Northern Sea Route remains, however, an argument in favor of Arctic projects.

NORWAY

Activities are also picking up in the Norwegian High North. Norway started exploration in the southwestern part of the Barents Sea in 1980. Over the next thirty years several minor discoveries were made, and three substantial—the gas field Snøhvit ('Snow White'), discovered by Statoil in 1984, the Goliat oil field, discovered in 2000 by Agip and a third major oil discovery, Skrugard, was made by Statoil in 2011. The last few years have seen new optimism about the resource potential in the region (see Figure 5.3). By 2011 remaining reserves in discovered fields amounted to 193 mill tons oil equivalent (mtoe).[37] 70% of this was natural gas. Exploration activity in the Norwegian Barents Sea has not been very intensive, however, with only some 75 exploration wells drilled as of 2011, and there are expectations of sizable new discoveries.

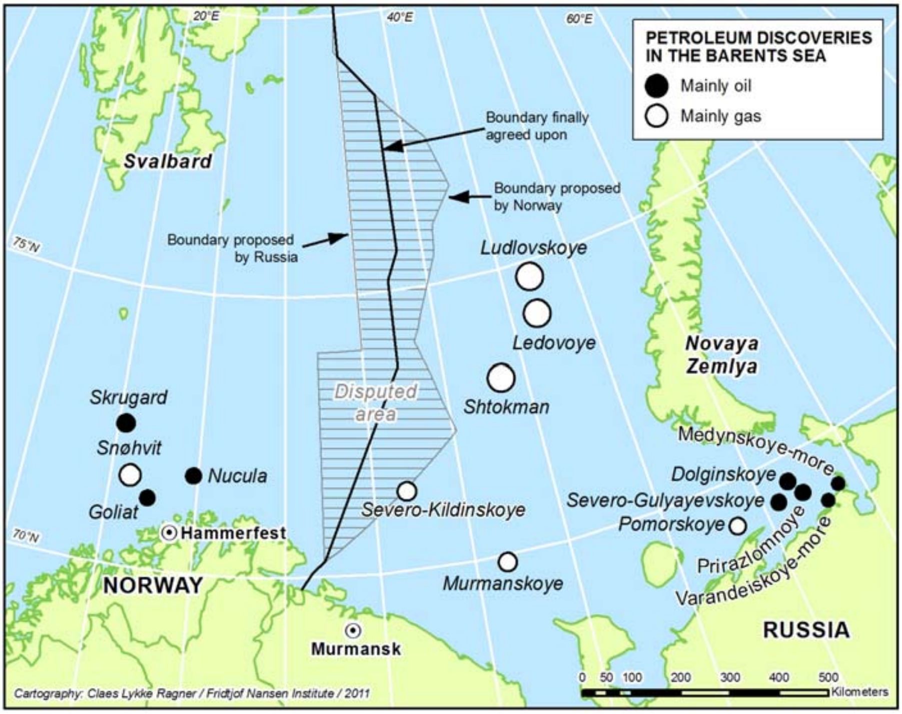


Figure 5.3. Petroleum discoveries and delimitation line in the Barents Sea

Official estimates put undiscovered resources at 735 mtoe.[38]

Production is only taking place at the Snøhvit field, starting in 2007. This is the first large liquefied natural gas (LNG) project in Europe. The field is located 140 km from shore north-west of Hammerfest. The development of the project was stopped several times as the market outlook was not deemed promising. Only after 2000, with positive expectations in the US market, and only after tax concessions did it go ahead. It was still a difficult birth involving commercial uncertainty and cost overruns. After its start it experienced serious technical problems. The field, with recoverable reserves of 173 billion standard cubic meters (scm) natural gas and 22 million scm condensate, has been developed with sub-sea installations at water depths of about 300 m. The gas is piped to shore, where a liquefaction plant has been built at Melkøya. From there the gas is shipped as LNG in special carriers to market. The field is slated to produce approximately 6 bn scm annually. Of this, 2.6 billion scm has been contracted by Statoil for the US market and 1.6 for Spain, whereas 1.7 billion scm is sold by the other main partners, Total and GDF Suez. Plans call for doubling the production capacity, but it has not been decided whether the new volumes should be liquefied or brought to the European market by way of a new pipeline which would have to be built along the Norwegian coast.

Asia-Pacific has also been seen as a possible market for Snøhvit gas and there have been plans for an experimental voyage with an LNG tanker taking gas to the Pacific via the Northern Sea Route.[39] If the transportation solution is deemed satisfactory this could become an option. Unlike the Russian projects which are starting from scratch in an unfavourable market situation, the bulk of investments at Snøhvit have already been made and extensions involve relative low unit costs. Thus, the commercial calculations can be different.

The next field to come on stream in the Norwegian Barents Sea will be the oil field Goliat, with production start in late 2013, operated by ENI. The field is estimated to contain 23.2 million tons of recoverable oil. After the delimitation agreement with Russia was reached a large acreage that had been closed for exploration became available. Norway immediately started 2D seismic surveys which were completed in 2012. Licensing rounds can be expected in a few years. But also in the "old" part of the Norwegian Barents Sea there is increased optimism following the recent discoveries. In June 2012 a licensing round including 76 blocks in the Barents Sea was announced by the Norwegian Ministry of Petroleum and Energy.

All in all developments on the Norwegian continental shelf indicate that Norwegian oil and gas can become relevant for Asian importing countries, and projects are more mature than on the Russian side. However, as with Russian hydrocarbons, a key uncertainty is transportation and the development of stable and safe conditions for shipping along the Northern Sea Route.

ARCTIC ENERGY AND NORTH PACIFIC MARKETS

Japan and Korea are the world's two largest importers of liquefied natural gas. Japan's imports are expected to be around 85-90 million tons annually in the coming years (depending on how much nuclear capacity is re-started)[40] whereas Korea takes about 35 million tons. China has recently also become a significant importer, but unlike Korea and Japan it has pipeline supplies as an option.[41] Understandably, Asian importers would like to have a diversified supply base for such an essential commodity. Large volumes have come from outside the region, like Qatar, presently the biggest LNG producer in the world. However, in the North Pacific there is a perceived need to diversify not only sources of supply, but also supply routes—the channel problem. Shipments from the Middle East have to pass through relatively narrow straits that could become choke points in a tense international situation. In this context the emergence of Australia as a major LNG exporter has been a relief. A multitude of projects have been developed there and a series of new projects have been presented in recent years. In fact, Australia has been set to overtake Qatar's leading role. A production volume of 100 million tons by 2020 has until recently been seen as realistic.[42]

Australia's aspirations have become more uncertain as the economics of several of the new developments projects are questioned. The reason is high construction and labor costs combined with lower price expectations. The latter is caused by the emergence of new LNG projects in several countries, leading to an expected "glut" of LNG. This may in turn be seen as positive from the point of view of importers, but the market is volatile, with many uncertainties surrounding the various new LNG sources. At the moment, the outlook is such that investors are reluctant to start the proposed new projects in Australia, but there is a chance that supplies from other sources at the end of the day will not be as cheap as expected.

New supply sources include Alaska's North Slope, East Africa and the Caribbean, especially as the Panama Canal is being widened. As of now, the price of LNG in the North Pacific is higher than in the US, partly because the pricing formulas are different. In the Pacific, as well as Europe, the gas price is pegged to oil, whereas in the US the price is set separately from oil. Due to fierce competition and oversupply in the US the price there is significantly lower than in the Pacific. Suppliers traditionally serving the Atlantic markets (and Europe is saturated) may find it more lucrative to ship their gas to the Pacific, when that is physically possible.

LNG from Russia will also play a very important role in import policies of North Pacific countries. But clearly expansion of capacity in the Russian Far East is first in line. At present, it is about 10 million tons per year. Increase will depend on new liquefaction capacities as well as field development. But as noted above this has high priority in the Russian government.

The biggest and most unexpected change from a few years back is the changing role of the United States market. From being a significant importer of LNG the shale gas revolution has turned the US into a potentially significant exporter. Estimates vary, and there are many uncertainties surrounding the establishment of export infrastructure. But the more optimistic market actors maintain that the US could boost an export potential up to around 100 million tons by 2020, making the US the world's biggest exporter![43] Most of this would be sold in the Asian markets.

Many of the new supply options not only increase diversification, they also reduce the channel problem since they involve supplies shipped across open seas. So where do these developments leave Arctic LNG? First, it seems safe to say that the supply outlook, even if bright today, is volatile. All the new supply options require specific and thorough scrutiny. But the Arctic now looks more like one of several options and not one major option. However, in addition to the diversification and channel issue, the Arctic could possibly also offer another advantage: large volumes and long term commitments. Importers could in principle be willing to pay a premium for long term safe supplies. Such willingness is, however, unlikely to be expressed in a higher price per unit of energy from a given source. It is more likely that it will take the form of preferential (subsidized) credits, tax concessions or other state support in connection with development of new supplies. This brings us back to the production outlook and the conditions for developing Arctic resources, especially in Russia. As argued above, Russian authorities seem to be increasingly willing to show flexibility with regard to taxation to get projects underway. But as it looks now Arctic offshore gas still has a cost problem. Whether importers' interest is high enough to bridge the gap between price and costs remains to be seen. For energy planners the very long lead times is a complicating factor. To explore and then develop new fields and build infrastructure may take decades. There may be a need to develop new technologies. In the meantime the market may have undergone drastic changes. The fate of the Yamal LNG project will probably have much influence on commercial actors' willingness to participate in long term exploration and development program, but even if that project is aborted, governments may find it in their interest to support such activities. But for it to actually happen their priorities must be realigned with the resource owners' interests, i.e. in particular Russia's.

There are some similarities in the supply situation for oil to China, Japan, Korea. Diversification and the desire to avoid the straits point to Arctic oil as an interesting option. But unlike gas, the general expectation is that oil projects will be commercially viable. Only in some years will it become clearer what the volume potential is, however. At that stage oil from the Barents and Kara Seas may become an option for buyers in the North Pacific. But reliable and safe transportation along the Northern Sea Route will—as for LNG—be a decisive factor for this trade to develop into a significant supply source.

SUMMING UP

There is little disagreement that the Arctic contains very large hydrocarbon resources, but sometimes the impression of the region's potential role in world energy supplies is exaggerated. Most of the resources are undiscovered. Extensive exploration is needed before major production can get underway. Thus, timing is essential to keep in mind when supply possibilities are discussed. The resources are located on the continental shelves of the Arctic coastal states and are firmly under national jurisdiction. There is little risk for inter-state conflict among Arctic states over resource rights. More international attention to how resources are developed should be expected though.

Whereas just a few years ago major Arctic offshore gas projects were seen as a natural next step for the international petroleum industry, the global gas supply and accompanying price expectations have changed the outlook dramatically. There are now serious concerns over the profitability of such project and tax concessions from resource owners are necessary, but perhaps still not sufficient to get them underway. The other side of this coin is that gas importers are getting more supply options elsewhere.

Production from oil fields already licensed or expected to be licensed in Russia as well as Norway will probably increase significantly from the mid-2020s. Projects will be export oriented and volumes will be available to buyers willing to pay the price. In the case of gas, prices in e.g. the North Pacific may hold back demand from Arctic sources, unless specific incentives are offered by the producers. In the case of oil the price is determined in the world market.

Both for oil and gas a crucial issue is transportation. For Arctic energy to be a viable option of significance for the North Pacific a stable framework for shipping and investments in infrastructure as well as ships is required.

Notes

1. Research for this article has been financed by the Geopolitics in the High North project supported by the Research Council of Norway.
2. Admittedly, there were serious battles during World War Two in the Barents Sea.
3. Polar Regions Atlas, Central Intelligence Agency, May 1978, pp. 24-25.
4. See e.g. Arctic Energy Resources, Amsterdam: Elsevier, 1983.
5. USGS Fact Sheet FS-062-03, June 2003.
6. "USGS: 25% Arctic oil, gas estimate a reporter's mistake", Petroleum News, Vol.12, No.42, October 21, 2007.
7. But also in company presentations important qualifications can be omitted. Thus on a Shell web-site it was stated that "An estimated

25 per cent of the world's remaining oil and gas lies under the Arctic". http://www.shell.com/home/content/innovation/meeting_demand/finding_new/frontiers/arctic/arctic.html. The site is no longer accessible.

8. Gautier, Donald et al. (2009) Assessment of Undiscovered Oil and Gas in the Arctic, Science, (324) May 2009.
9. Percentages vary slightly from USGS numbers quoted in the text, since more updated assessments of world resource have been used in the table.
10. Statistical Review of World Energy 2012, http://www.bp.com
11. For an analysis of factors explaining the agreement see Arild Moe, Daniel Fjærtoft and Indra Øverland: 'Space and Timing: 'Why was the Barents Sea Delimitation Dispute Resolved in 2010?', Polar Geography, No 3, Vol 34, 2011, pp. 145-162
12. Statement by the Chairman of the Commission on the Limits of the Continental Shelf on the progress of work in the Commission, Commission on the Limits of the Continental Shelf, Tenth session, New York, 25 March-12 April 2002, CLCS/32, http://daccess-dds-ny.un.org/doc/UNDOC/GEN/N02/327/68/PDF/N0232768.pdf?Open Element.
13. United Nations General Assembly, Fifty-seventh session, Agenda item 25 (a) Oceans and the law of the sea-Report of the Secretary-General. Addendum A/57/57/Add.1 8 October 2002. http://daccess-dds-ny.un.org/doc/UNDOC/GEN/N02/629/28/PDF/N0262928.pdf?Open Element.
14. Deputy Natural Resources Minister D. Khramov in interview with "Golos Rossii", 26 March 2012. http://www.mnr.gov.ru/press-service/publications/detail. php?ID=128451&sphrase_id=128623
15. "Arctic Resource Development: Risks and Responsible Management" Report prepared for ONS SUMMIT 2012—The Geopolitics of Energy by the Fridtjof Nansen Institute and Det Norske Veritas. http://www.fni.no/doc&pdf/ONS-Arctic.pdf
16. See e.g. "Total warns rivals that risks of oil drilling in the Arctic are too high", Financial Times, 26 September 2012.
17. Canadian and Alaskan resources will be analysed in an upcoming North Pacific Arctic Conference.
18. This is a widely reported figure, see e.g. "Russian continental shelf", Gazprom web-site http://www.gazprom.com/about/production/projects/deposits/shelf/. Russian reserves and resources are reported in standard fuel equivalents (coal equivalents). 1 ton standard fuel = 0.7 ton oil equivalent.
19. Deputy Natural Resources Minister D. Khramov in interview with "Golos Rossii", 26 March 2012. http://www.mnr.gov.ru/press-service/publications/detail. php?ID=128451&sphrase_id=128623
20. "Russian continental shelf", op.cit.

21. Energeticheskaya strategiya Rossii na period do 2030 goda, Order of the Government of the Russian Federation, No 1715-r, 13 November 2009.
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27. When BP entered into a deal with Rosneft over the same blocks in early 2011 it was announced that they were estimated to contain 5 billion. tons of oil and 10 TCM of natural gas. http://www.zerich.ru/news/prime-tass/fr/99126/
28. Includes north Barents Sea and Okhotsk Sea blocks.
29. http://www.rosneft.ru
30. http://www.statoil.com/no/NewsAndMedia/News/2012/Pages/StatoilRosneftMay2012.aspx
31. 12 April 2012. 'Prime Minister Vladimir Putin holds a meeting on promoting the development of the continental shelf'. http://www.premier.gov.ru/events/news/18680/print/
32. http://www.oilcapital.ru/company/154574.html
33. "Shelf razbirayut na chastnoe".(The shelf is dismantled), Kommersant, 3 august 2012.
34. V. Kryukov and A. Moe: 'Oil Exploration in Russia: Prospects for Reforming a Crucial Sector'. Eurasian Geography and Economics, Vol. 51, No 3, 2010, pp. 312-329.
35. Eastern Gas Program. http://www.gazprom.com/about/production/projects/east-program/
36. Resolution of the government of the Russian Federation 30 June 2012 No. 664. On the discussion of various schemes to promote development in Eastern Siberia and the Far East, see Simoniya's commentary to the present chapter.
37. Facts – the Norwegian Petroleum Sector 2011, Ministry of Petroleum and Energy and Norwegian Petroleum Directorate, 2012. Converted from mill. tons standard cubic meters oil equivalents.
38. Ibid.
39. http://www.lngworldnews.com/knutsen-gets-approval-to-ship-norwegian-lng-via-northern-sea-route/

40. For a discussion of Japan's options, see Takagi's commentary to the present chapter.
41. For a presentation of demand outlook in China, see Kang Wu's commentary to the present chapter.
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Comments on Chapter 5: Scientific perspective

Nodari A. Simoniya

The potential role of Arctic hydrocarbons in provision of Northeast Asia with energy resources is very great. Since the first oil shock that followed the well-known historic events of 1973, northeast Asian countries have been trying to solve the problem of hydrocarbon dependence on the Middle East. The problem is still unsettled satisfactorily, while the Middle East has hardly become a more stable region. Moreover, old intraregional contradictions there have been aggravated, while intervention in recent years of outside forces under the motto of "Democratization of the Middle East" quite increased the instability level to an unprecedented height (in Iraq, Libya, Yemen, Syria, Bahrain, etc.). Under these circumstances, some energy resource-consuming countries are trying to resolve the energy security problem at the expense of development of African resources. However, this activity in the upstream sphere in certain African states led to reanimation of many primordial (tribal, religious, ethnical) conflicts (in Nigeria, Sudan, etc.). Against this background, the increasing interest in the Arctic potential in Northeast Asia is no wonder. How do matters stand with use of this potential in five Arctic countries?

Table 5.3 demonstrates that the US is the world's largest oil consumer and imported 577.1 million tons in 2010. Moreover, they absorb practically the whole oil export of another Arctic neighbor-country—Canada (consuming 125 out of 128.2 million tons the same year), and also around 37 million tons of export oil of one more Arctic state—Russia. Additionally, in 2010 the US received a bit less oil—34 million tons—from Europe, mainly from Norway. The US, in their turn, export almost exclusively oil products (101.7 million tons) and those go mainly to their

Table 5.3. Proven Reserves, Production, Consumption of oil in Five Arctic States, 2010.

	Proved reserves (thousand million tons)	Production (million tons)	Consumption (million tons)
US	3.7	339.1	850.0
Canada	5.0	162.8	102.3
Norway	0.8	98.6	10.7
Denmark	0.1	12.2	8.7
Russia	10.6	505.1	147.6

Source: BP Statistical Review of World Energy, June 2011.

neighbors—Mexico and Canada, and also to the countries of South and Central America. All the Asia-Pacific countries get only 14.8 million tons out of the total volume of these oil products. Europe (primarily such Arctic states as Norway and Denmark) delivers even less oil to Asia-Pacific - only 12.6 million tons. Hence, in the nearest future northeast Asian countries should not particularly rely on western Arctic states. So, only Russia remains an option for procuring oil resources.

Traditionally, Russian oil export balance was in favor of the West. It was the same with other former Soviet republics (like Kazakhstan and Azerbaijan). So, already in 2010 out of the total oil export from former Soviet republics amounting to 421 million tons, Europe and North America received on the whole 333.7 million tons, while Asia-Pacific countries got 73.6 million tons. It is important, however, to point out that in recent years a new tendency has begun to accumulate strength. In 2005 Asia-Pacific countries received only 25.4 million tons from former USSR republics. Today, however, a new part of the Eastern Siberia-Pacific Ocean (ESPO) main pipeline has begun to function with an offset to China, and, according to the agreement on 25 billion dollar credit among China, Rosneft, and Transneft, 15 million tons of oil are annually delivered along this pipeline to China. The second part of ESPO will be completed by the end of 2012. Then the pipe's capacity will already amount to 80 million tons. By the way, after transfer by the railway oil from Skovorodino is already delivered to the terminal in Kozmino Bay, which has already had a considerable impact on oil import in Japan. In 2006, when Japan began purchasing oil from Sakhalin, the share of these shipments in its oil imports was just 0.7%. One year later it increased five-fold, reaching 3.5%. In 2010, with the start of ESPO shipments from Kozmino, Japanese imports of oil from Russia amounted to 14.5 million tons, or 6.4 per cent of its total oil imports. Simultaneously, for the first time ever the Middle Eastern share went down below 80%.

Statistics related to dynamics of foreign sales of liquefied natural gas (LNG, in bcm per year) produced by Sakhalin Energy, the operator of Sakhalin-2 project, are telling a similar story (see Table 5.4).

Table 5.4. LNG export from Russia

Exported to	2009	2010	2011
Japan	3.69	8.23	9.8
China	0.25	0.51	0.3
South Korea	1.35	3.90	3.9
Taiwan	0.24	0.67	0.3
India	0.67	–	–
Thailand	–	–	0.2
Kuwait	0.41	0.09	–
Total	6.61	13.40	14.5

Compiled on the basis of: BP Statistical Review…, June 2010, June 2011 and June 2012.

In the very near future, when a number of new LNG lines start to operate in the Russian Far East, it is fair to expect still bigger volumes of LNG supplies for the Asia-Pacific region. At any rate, this is what Putin visualized when he ordered a quick construction of Sakhalin-1-Khabarovsk-Vladivostok gas pipeline and then insisted that the works on Kirin block of Sakhalin-3 project start ahead of the schedule.

In discussing Russia's efforts to redirect some of its energy exports to the East, it is impossible not to mention the Trans-Korean gas pipeline, 1,100 kilometers long and planned as an extension of the Sakhalin 1-Khabarovsk-Vladivostok pipeline. This project is usually discussed in a package with Trans-Korean Railroad (planned as an extension of the Trans-Siberian). Since both the pipeline and the railroad are supposed to go from Russia to South Korea through the North Korean territory, the importance of these schemes cannot be measured just by stable supplies of gas or more dynamic transits of goods. Implementation of the Trans-Korean projects might contribute to a new atmosphere of cooperation on the peninsula and may eventually help to do away with a major geopolitical impediment to economic integration in East Asia.

Both projects had been offered more than once to both the North and the South Korea, and more than once both the North and the South expressed their approval. South Korea demonstrated its no-nonsense attitude towards this offer by building its own section of the railroad which now ends near the border with the North and last October Russian Railroads ran a trial train along the upgraded trans-border route between Russia's Khasan and North Korean Rajin.

Until recently, America's negative attitude would not permit the Trans-Korean projects to go beyond the stage of talks. Every time there were signs that the North and the South were coming to terms, the US would invariably do something to provoke a break in their contacts. All this created a pessimistic aura around the projects and a widespread perception that they were doomed.

In a parallel development, since July 2011 Pyongyang and Washington began to talk to each other in earnest. For a while it looked like Secretary of State Hillary Clinton was determined to correct the mistake of her spouse, former-US President Bill Clinton who once postponed an already prepared trip to North Korea hoping to get there later but never making it. But then the death of Kim Jong-Il and the proudly announced but unlucky launch of a North Korean space satellite resulted in new uncertainties about the fate of Trans-Korean projects. Who knows what may happen next, but Russia's stake in both these projects is too high to give up, especially now, when not just top officials but Russian business and academics are focused on Asia as never before.

In connection with the terrible tragedy on Fukusima-1 and the stoppage of all the remaining nuclear power reactors for safety checks in Russia and Japan, there has been a kind of revival of discussion on a forgotten old proposal of building a sea gas pipeline to Hokkaido. In early May 2012 vice president of Gazprom, Alexander Medvedev and the Democratic Party of Japan policy chief Seiji Maehara agreed in Tokyo to study the possibility of laying a gas pipeline linking Hokkaido and the Sakhalin Islands.[1]

Let us now turn attention to LNG deliveries from other Arctic countries to Asia-Pacific. We will begin with a discussion of the general situation with natural gas in these states (see Table 5.5).

Thus, in spite of the "shale gas revolution" and a considerable increase in natural gas production, which allowed the country to become the leader in gas extraction, , the United States had to import gas from Canada in 2010. Having outpaced Russia, the whole of US gains amounted to 92 bcm, exporting only 20.91 bcm to this country. Naturally, in the given situation, American gas export to Northeast Asian countries could be only symbolic: 0.85 bcm to Japan (from its first terminal on Alaska) and to South Korea (for the very first time)—0.35 bcm. Due to a decreased demand on Canadian gas in the US Japan, wasting no time, made a decision regarding the planned regasification terminal at Kitimmat, intending to turn it into an export terminal and to deliver LNG to Asia. In the meantime, in the US under conditions

Table 5.5. Proven reserves, Production, Consumption in five Arctic countries, 2010

	Proved reserves (trillion cubic meters)	Production (bcm)	Consumption (bcm)	Deficit/Profit (bcm)
USA	7.7	611.0	683.4	− 72.4
Canada	1.7	159.8	93.8	+ 66.0
Norway	2.0	95.7	3.7	+ 92.0
Denmark	0.1	8.2	4.9	+ 3.3
Russia	44.8	588.9	414.1	+ 174.8

Source: BP Statistical Review, June 2011.

of a liberal economic model and tumultuous commotion around shale gas, gas prices began to fall sharply. At the end of January 2012 the price of futures with delivery in February fell down at NYMEX to $2.4 for 1 million BTU, the lowest level since the beginning of 2001. At that time market participants began to talk about a possibility of a further fall to $1 for 1 million BTU. According to the Wall Street Journal, leading energy concerns in the US decreased the volumes of gas well drillings in the first quarter of 2012. ExxonMobil Corporation and ConocoPhillips already declared further decrease of extraction.[2]

Some companies backed by the authorities of the American states involved in gas and oil extraction intend to begin gas export from the US to Asia. Alaska's three producers have formally agreed to study the prospect of exporting LNG from the North Slope to Asian markets. After months of talks, ExxonMobil, ConocoPhillips and the UK's British Petroleum announced on March 29, 2012 that they had reached an agreement to develop natural gas in the North Slope, as well as work with Canadian pipeline operator, TransCanada, in support of the Alaska Pipeline Project from Prudhoe Bay to Valdez, Alaska, for LNG exports to Asia.[3] In another US state of Louisiana, where there happened to be some surplus of shale gas, independent corporation Cheniere Energy has received the final major US government approval that it needed to begin construction of the first facility to export US-sourced shale gas as LNG. At the same time, Cheniere announced that it has signed up a consortium of eight banks (The Bank of Tokyo-Mitsubishi UFJ and seven American and European banks) to help arrange as much as $4 billion in financing for its proposed four-train 18 million tonnes per annum liquefaction facility near Sabine Pass. Another corporation, Sempra Energy, has signed a pair of deals with Japanese liquefied natural gas players firming up its plan to built liquefaction facility at the Cameron LNG import facility in Hackberry.[4] Going through similar problems connected with low gas prices, Canadian business also started cooperation with Asian companies. So, the largest Canadian gas producer, Encana, in February 2012 signed a C$ 2.9 billion ($2.9 billion USD) JV with Mitsubishi to develop its Cutback Ridge assets in British Colombia's Horn River basin. More recently, it closed a deal with Toyota Tsusho to sell one-third of its coal bed methane production from the Horseshoe Canyon fairway in Southern Alberta, and promised to pursue more joint ventures.[5]

It is very important to remember that the US model is in practice not so liberal after all, and the administration always kept a keen focus on oil and gas prices. Recently, the US energy department has signaled that it will not allow LNG exports to Asia to appreciably increase internal gas prices.[6]

Irrespective of what was said above, I want to make one short remark here. In Professor Moe's chapter there is a statement I find a bit too optimistic: "From being a significant importer of LNG the shale gas revolution has turned the US into a potentially significant exporter." I would rather not be so sure about that. Remember that in 2003 expert Daniel Yergin made a prognosis that just in a few years the US will be the biggest LNG market, and that was followed by a real boom in construction of LNG import terminals. Now, Yergin is proud that his CERA invented a new term "Shale gale." Today there is less talk about shale gas and more about shale oil.

As for Norway, in 2010 it exported all in all 100.59 bcm with 95.88 of them—through the pipe to Europe. Out of 4.17 bcm LNG export, only 0.23 bcm were delivered to South Korea (0.16 bcm) and to Taiwan (0.07 bcm), the rest went to North America and a number of European countries. However, in 2011 new oil and gas deposits were discovered in Norway, and for the first time since 1997 the volume of additional reserves exceeded the volume of extraction. The giant North Sea Johan Severdrup field, the world's biggest offshore oil discovery last year, and the Skrugard and Havis fields in the Barents sea have added between 2 billion and 4 billion barrels of oil equivalent to Norway's resources, depending on appraisal results.[7] Bearing in mind the fact that the lion's share in the overall Norwegian energy consumption balance (41.8 million tons in oil equivalent in 2010) is provided by hydro energy (26.7 million tons/oil equivalent), and the fact that natural gas has quite a humble part in this balance (only 3.5 million tons), and finally taking into consideration the small population of the country, we can suppose with confidence that quite soon Norway will be able to considerably increase its oil and gas export chances, including export to AP. It will be also furthered by the outlined stirring up of Norwegian-Russian cooperation within the Arctic shelf framework.

I would like to say a few words about a paragraph of Arild Moe's circumstantial report dealing with the issue of an "Outlook for reform/modernization of the Russian economy". Naturally, I cannot speak about all the economic aspects in a brief comment, though Vladimir Putin on the second day after his election signed eleven decrees regarding first steps aimed at improvement of the business climate in the country, including reorganization in the sphere of customs, construction, and support of export. For that reason, I shall dwell here on two key moments that without any exaggeration might influence the whole Russian energy sector, and, accordingly, the country's economy and cooperation with the rest of the world, especially with Asia-Pacific countries.

Firstly, this moment describes the beginning of the process of realizing state-private partnerships within the framework of the enormous region of East Siberia and the Far East, covering about 60% of Russian territory and embracing sixteen subjects of the Russian Federation. In 2010 Putin, at that time still Prime Minister of Russia, initiated the formation of an entity called the Far East and Baikal Region Development Fund, with the investment capacity of 70 billion rubles in the period up to 2015 coming from the state. Implementation of this project, officially based on the PPP principle, was entrusted to Vladimir Dmitriev, Chairman of the Board of state-owned Vnesheconombank (VEB). After a year or so, nothing much came out of it—primarily because the private sector did not like the idea of investing its money under bureaucratic guidance. Past experience had shown that in the framework of such "joint-ventures" the representatives of ministries and state-owned banks had been only too willing to "dissolve" the money from private sources in all sorts of blurred "territorial development" schemes instead of pointedly investing them in particular projects. This kind of practice was widely seen as wasteful and abusive. When First Deputy Prime Minister Igor Shuvalov called potential private investors to discuss the situation in the government headquarters, all of them openly refused to contribute to the Fund. At the same time they expressed their readiness to interact with the state as equal partners in projects that would represent mutual interest.

Reacting to this turn of events in November 2011, Putin instructed then Minister for Emergency Situations (and now Moscow Region Governor) Sergey Shoigu to prepare a blueprint for an "Autonomous State Corporation" to develop Eastern Siberia and the Far East. With the geographic area of responsibility spanning from the Western border of Krasnoyarsk Province to the Pacific coast, this Corporation was to function under the aegis of a supervisory board nominated by the Russian President and personally chaired by him. In January 2012, Shoigu submitted his draft to Putin. After the document was generally approved by the government, it was up to the Ministry of Economic Development to polish it. They had done it in about two months.

But, even before that job was completed, some of the spokesmen of the Russian "liberal elite" began to express their disagreement—if not irritation—with Putin's plans. By this time he was not just the Prime Minister, but the President-elect as well. At the forefront of this campaign was ex-Finance Minister Alexey Kudrin. His invectives against Putin's new project were widely spread by Vedomosti—the Russian language daily jointly published in Moscow by the Wall Street Journal and Financial Times, strictly following their party line. Kudrin insisted, for instance, that the proposed corporation could only inhibit the development of the region because other players willing to work there would face an unbeatable competitor.

The real information bomb exploded on April 28, 2012. On that day Finmarket news agency reported that the blueprint for the new corporation literally "outraged" some high-ranking officials who did not bother to hide their feelings, even though they were fully aware of the project's origins. According to the report, the Minister of Finance Anton Siluanov was as rigidly opposed to Putin's initiative as his predecessor Kudrin, and had expressed his views in a special letter, addressed to First Vice-Premier Shuvalov. The Minister's argumentation was based on the claim that the proposed corporation with its "vague objectives and functions" would usurp the prerogatives of federal ministries, resist financial control and severely disrupt the established process of governance.

So what is going on? Why do these people act and speak as they do?

First, the funds of which the future Corporation is supposed to be in charge are really quite substantial. Initially, these may amount to 1.3 trillion rubles, primarily intended for infrastructure projects. That amount is not all, since project financing will be coming as well from private sources, both domestic and foreign. Behind the bureaucracy's opposition to the creation of the Corporation are palpable fears that it will have no real access to these financial flows and therefore no chance for self-enrichment.

Second, the proverbial "interministerial coordination" is now a major stumbling block on the road to Russia's modernization. The suffocating effect of this procedure, cultivated through the years by the "liberals" of Kudrin's school, should be known to Putin all too well. What else if not this inner knowledge is prompting him to assure that his Eastern Corporation will not be subject to formalistic control and will not be crushed by it, unlike some other potentially useful initiatives? If due to Putin's determination the Corporation will start to function as planned, the consequences of its activity—such as accelerated transformation of

Russia's Asian territories and the system of its external partnerships — might someday make the system of bureaucratic capitalism inherited from Yeltsin unsustainable. Are the proponents of the status quo capable of looking that far? Maybe not, but their self-preserving instincts are certainly sharp enough to tell them that the system is challenged and they cannot help but react.

How far are Putin's opponents prepared to go in their resistance to his plan? How tolerant or how firm he will be in this situation? So far, these are open-ended questions. However, judging by what we already know of Putin—and noting how the theme of Siberia and the Far East as development priorities perennially reappears in his post-election statements—one may hope that he will act as befits a real leader who faces a moment of truth.

The second moment lies in determined and radical change of Vladimir Putin's views on the role of foreign corporations in Russian shelf development. Putin's initial illusions about the abilities of Gazprom and Rosneft to resolve this problem alone have completely blown over (and not in the last place it was promoted by Gazprom's impotence to deal with the task of putting Shtokman deposit into operation, which I already dwelt upon in my report a year ago*). He obviously decided to change the main leader (Gazprom) for a new one, more active and resolute (Rosneft), and to create a large holding on the basis of the latter. On May 6, 2011 he appointed Igor Sechin—former chief curator of Russian fuel and energy complex and main initiator of struggle with corruption in energy sphere—as the head of Rosneft. In the course of 2011, Sechin energetically curated adjustment of Rosneft's partnership with foreign business for the development of Arctic deposits on a mutually beneficial basis. They even concluded a framework agreement with British Petroleum, but this corporation's partners in TNK-BP, who had become notorious in the past for their ingenious speculative operations, frustrated that important deal. Sechin, however, instantly agreed with a more reliable partner—ExxonMobil, and in August 2011 signed a framework agreement, which was realized and finally executed by May 2012. Many serious Russian and foreign experts assess it as an epoch-making event. To back this up, on 16 April President-elect Vladimir Putin signed a financial agreement that will eliminate export duties and lower mineral taxes for a minimum of fifteen years after commercial production from the venture is achieved. Both companies pointed to the partnership as the model for its new co-operation agreement.[8] Naturally, other corporations followed suite. Similar agreements were concluded in May 2012 with ENI and Statoil. Putin and Sechin made it clear that on similar terms Rosneft may also conclude agreements with Russian private companies that are ready to share risks connected with works on the Arctic shelf. At the same time Putin notified those who love to speculate, to obtain assets and then to sell them profitably, without making any contribution into realization of the project. The first company to respond to this proposal was the largest private Russian oil company Lukoil.

Lastly, I believe that Sechin's real authority within the framework of the Russian fuel and energy complex will be much wider and more considerable than those of the official (but unprofessional in the energy sphere) Vice Premier Arkadii Dvorkovich. It is not by chance that Vladimir Putin included Sechin into Board of Directors of Rosneftegaz holding 100% shares of which belong to the state. A full 75.6% of Rosneft shares as well as 10.74% of Gazprom's shares and 7% of Caspian pipeline consortium are on the balance of this holding just as about eighty gas distribution enterprises all around Russia.[9] Besides, in the second half of last year Sechin prepared an important ally for himself in Rosneftegaz leadership: according to his personal recommendation, Igor Makarov, head of independent gas company Itera, was nominated to the board of directors of this holding. Following in February of 2012 Rosneft and Itera concluded an agreement on cooperation and creation of JV, where 51% of shares belonged to Rosneft.[10] Then, Gazprom (as independent Novatek permanently annoys him with its successes) obtained another powerful rival, which will undoubtedly support the campaign started by Leonid Mikhelson (Novatek's head) for the abolition of Gazprom's monopoly on the export of Russian gas.[11]

So, the process of offensive, real competition on Russian home energy markets is obvious.

Notes

1. Daily Yomiuri Online, May 5, 2012.
2. Vedomosti, January 20 and May 4, 2012.
3. Upstream, April 6, 2012.
4. Upstream, April 20, 2012.
5. Upstream, 4 May 2012.
6. Upstream, 10 August 2012.
7. Upstream, 27 April 2012.
8. Petroleum Economist, May 2012, p. 30.
9. Izvestia, May 23, 2012; MK (Moskovsky Komsomolets), May 25, 2012.
10. Neft i Kapital, No.4, April 2012, pp. 14-15.
11. Kommersant, May 10, 2012.

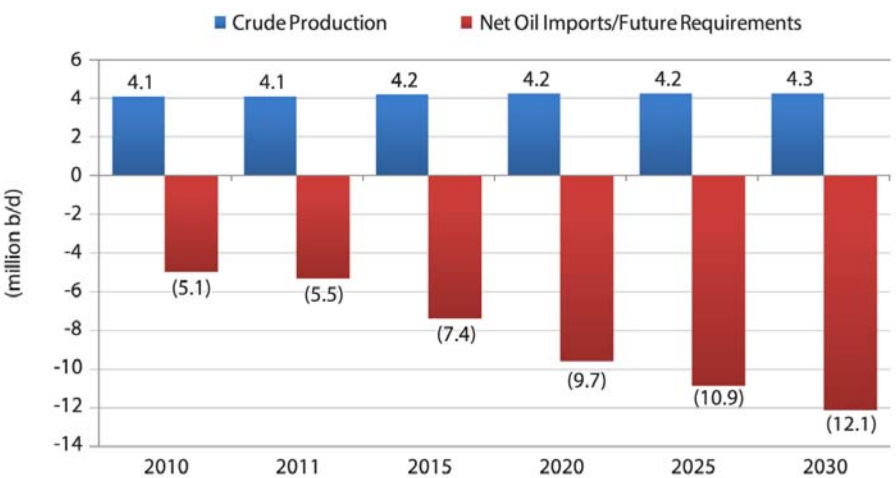
Comments on Chapter 5: Chinese perspective

Kang Wu

OUTLOOK FOR OIL AND GAS DEMAND AND SUPPLY IN CHINA

China is currently the largest energy consuming country in the world. China became a net oil importer in 1993, a net natural gas importer in 2007, and finally a net coal importer in 2009. In other words, China is currently a net importer of all three types of fossil energy. As the second largest oil consuming country and second largest oil importer in the world, China's need for imported oil has been growing very fast since 1993. In 2011, China had a net oil (crude oil and refined products combined) imports of 5.5 million barrels per day (b/d), up from 205 thousand b/d in 1993, 1.5 million b/d in 2000, and 2.9 million b/d in 2005. In the meantime, domestic oil production has stagnated (Figure 5.4). China imports oil from all over the world where major suppliers are from the Middle East, Africa, Russia and Central Asia, and Latin America (Figure 5.5).

In 2011, net oil imports of China accounted for 53% of country's total oil consumption (up from 45% in 2008), as compared to 58% for



Note: 2012~2030 data are projections.

Figure 5.4. China's Crude Oil Production and Overall Oil (Crude and Products) Imports, 2010-2030

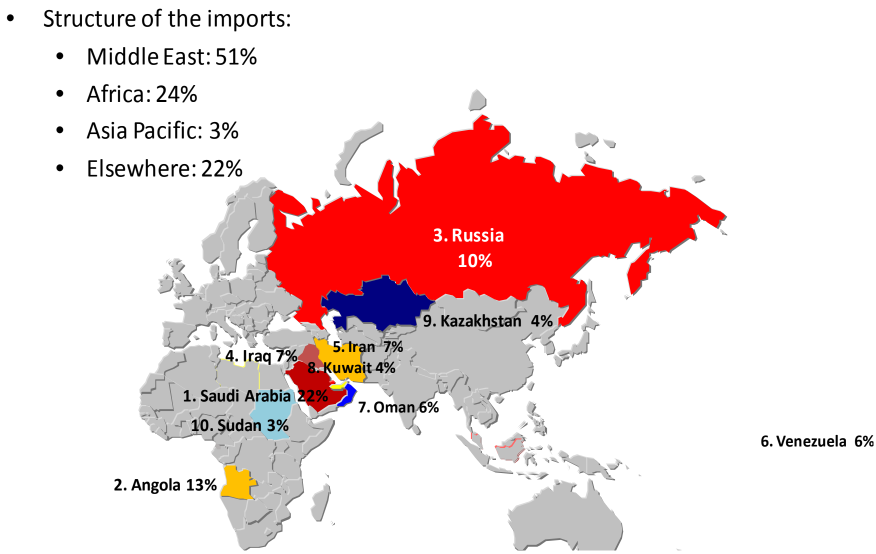


Figure 5.5. China's Crude Oil Imports by Source, 2011

the US (down from 65% in 2008)—the world's largest oil consuming country (FGE 2012 and BP 2012). The difference between China and the US is that US demand went down during the past five years and will be flat or will decline over the coming decades while the Chinese demand increased rapidly since the middle of last decade and will continue to grow. We expect that the share of net oil imports in China's total oil consumption will go up to 68% in 2020 and 70% in 2030 (Figure 5.4), thanks to rising demand and flat domestic oil production.

When it comes to natural gas, the size of the market for demand and supply is much smaller. However, China has recently surpassed Japan to become the largest natural gas consuming country in Asia. China started importing liquefied natural gas (LNG) in 2006. By 2007, the volume of imports exceeded that of exports to Hong Kong. China also started importing natural gas by pipeline from Turkmenistan via Kazakhstan at the end of 2009. In 2011, China's net imports of natural gas (LNG and pipeline gas combined) accounted for 21% of China's total natural gas use. This share is expected to go up to nearly 40% by 2020.

Under these circumstances, securing future oil and gas supply to meet China's growing demand has become vital for the country. Since the beginning of the millennium, the Chinese have increasingly given energy security a high priority in its five-year program and long-term energy planning. Among many measures taken and planned by the Chinese government, diversification of energy supply sources (particularly oil and gas) and increasing overseas energy (again with focus on oil and gas) investments are two of the key strategies. Both of them point to the Arctic as one of the new frontiers for China to ensure its energy security through trade and investment.

CHINA'S POLICIES TOWARD AND INTEREST IN THE ARCTIC

China neither owns Arctic coasts nor has sovereign claims over the region, with no claims to either continental shelves or the natural resources that lie beneath them. However, China intends to expand its role as a global power and shows increasing interest in the Arctic. In general, China wishes to be involved in its management by obtaining a permanent observer status in the Arctic Council if the terms are right. The Council is comprised of Canada, Finland, Iceland, Norway, Russia, Sweden, the US, and Denmark and is an intergovernmental forum promoting cooperation among eight states bordering the region. For the Arctic's energy and natural resources, China seeks to participate in the exploration, development, and eventually production as a major investor. In addition, China is a potential market for any oil and gas from the Arctic.

China has acquired its ice breaking capability but currently has only one ship, named *Xue Long* ("Snow Dragon"), in operation (Campbell 2012). Still, *Xue Long* is the world's largest conventional ship equipped with ice breaking capability with a displacement capacity of 21,000 metric tons (tonnes). The ship was purchased from Ukraine in 1993 and upgraded as scientific research vessel, and is capable of breaking ice to the depth of 1.2 meters. This icebreaker scientific research vessel *Xue Long* operates mainly in Antarctic waters but has been to the Arctic five times as well in 1999, 2003, 2008, 2010, and 2012. The latest mission of *Xue Long* to the Artic started in July and ended in late September 2012, where the ice breaker ship sailed on the Northeast Route and entered the Arctic Ocean from the Pacific Ocean for the first time (XinhuaNet 2012). China's own ice breaker ship with a displacement capacity of 8 thousand tonnes with a cruise speed of 15 knots and ice-breaking depth of 1.5 meters is under construction and will be put to use in 2014.

China has had a presence in the Arctic since 2004 when it established a research station-Huang He Zhan-in Svalbard, Norway, which is well inside the Arctic Ocean in the Barents Sea. Also, China already has the largest foreign embassy in Reykjavik, Iceland in expectation of Iceland becoming a major shipping hub (Makki 2012). Although China claims no Arctic territories, it has an appetite for its natural resources. More importantly, China is interested in utilizing shortened routes through the Northern Sea Route as Arctic ice melts (Hong 2012), although actual distances depend on the originations and destinations of different journeys. Overall, China has not come up with a clear policy toward the Arctic. However, public statements from various ministries of the Chinese government suggest that China is becoming increasingly active in the Arctic affairs.

OVERSEAS INVESTMENTS OF CHINESE NOCS CONCERNING THE ARCTIC

As mentioned earlier, overseas energy (oil and gas in particular) investments are one of the leading strategies for China to address the issue of energy security. The effort has been led by several Chinese national oil companies (NOCs): CNPC/PetroChina, Sinopec, CNOOC, and Sinochem, as well as other Chinese companies, sovereign wealth funds, and financial institutions. Since the late 1990s, the cumulative actual and intended investments by Chinese NOCs and other players have exceeded $100 billion USD, with the largest one being CNOOC's proposed $15.1 billion USD takeover of the independent Canadian oil and gas producer Nexen at present (Reuters 2012). In 2011, China's equity oil production from overseas operations reached an all-time high of 1.5 million b/d. That amount was more than one-third of China's domestic oil production. As Chinese companies continue to expand their overseas investments, they turn to areas such as shale gas, deep-water drilling, Canadian oil sands, and now perhaps oil and gas potential in the Arctic. In the areas of energy trade and investments, China has developed relationships with all Arctic Council member nations to various degrees. These relationships will help China gain footage in the Arctic business.

For the Arctic in particular, Russia's Rosneft has been working with various Chinese NOCs. The Russian company has reached agreements with a number of foreign companies, including all three Chinese NOCs (CNPC/PetroChina, CNOOC, and Sinopec) to begin exploration in the Arctic area. In late 2010, CNPC signed a long-term cooperation agreement with Russia's state-owned tanker shipping company Sovcomflot (SCF) on shipping oil and gas through the Arctic.

Chinese President Hu Jintao paid a state visit to Demark in June 2012. Among many bilateral issues discussed, Sino-Demark cooperation in new energy and gaining Denmark's support for China's application to gain the permanent observer status in the Arctic Council were also on the agenda. China struck an Arctic oil agreement with Iceland on the oil-rich Arctic region after Chinese Premier Wen Jiabao flew to Reykjavik in April 2012 on the first stage of a four-nation European tour.

Separately, Iceland's Orka Energy signed a deal with China Petrochemical Corporation of the Sinopec Group on using geothermal energy in China for heating homes and generating electricity. Although China's relationship with Norway has been strained due the award of the Nobel Peace Prize to the Chinese dissident Liu Xiaobo, energy cooperation between CNOOC and Statoil and the two countries continues. China will need Norway's support for getting involved in Arctic business ventures.

IMPLICATIONS OF THE ARCTIC OIL AND GAS DEVELOPMENTS ON CHINA

The Moe chapter (see Moe 2012) indicates that oil and gas resource potential is huge in the Arctic. For proven reserves, the Arctic accounts for 4% of the world's total for oil and 19% for gas. If the unproven, estimated portion is added to these calculations, the share of the Arctic is 7% for oil and 24% for gas. The implications of this are huge for China for both trade and investments.

As far as trade is concerned, China's oil import requirements are forecast to go up from 5.5 million b/d in 2011 to 9.7 million b/d in 2020 and 12.1 million b/d in 2030. China is likely to overtake the US to be the largest oil importer between 2015 and 2020. For natural gas, China's import requirements–a combination of LNG and pipeline gas–are forecast to increase from 3.0 billion standard cubic feet per day (bscf/d)—equivalent to 23 million tonnes (mmt) of LNG–in 2011 to 11.9 bscf/d (equivalent to 93 mmt of LNG) in 2020 and 18.0 bscf/d (equivalent to 138 mmt of LNG) in 2030. Obviously, this is not only a huge, but also a fast growing market for oil and gas from the Arctic.

On the investment front, the Chinese NOCs and other players are still at the forefront in investing everywhere in the world aggressively. As mentioned earlier, these Chinese have recently moved to more difficult and challenging projects and areas, including potentially the Arctic. As exploration, development, and production of Arctic oil and gas resources are expensive, the Chinese investments may be appreciated and needed to get the work off the ground. Once again, China has no territorial claims over the Arctic Ocean and shores, which may eventually give them an advantage as a third-party investor in the region as long as the sovereign nations craft regulations governing foreign investments carefully. As such, after some initial resistance and particularly if China can overcome the geopolitical and diplomatic changes with certain Arctic Council member nations, China will eventually become a permanent observer of the Council and their investments will be welcomed in the region in the long run.

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Comments on Chapter 5: Japanese perspective

Yuji Takagi

JAPAN'S INNOVATION CHALLENGE AFTER MARCH 11, 2011

After the disaster of March 11, 2011 Japan's energy challenge is continuing to attract the greatest national concern. The Great East Japan Earthquake and tsunami and the resulting Fukushima Nuclear Power Plant accident have had unprecedented impacts and Japan is now facing the serious problem of power shortages. In order to overcome these shortages, the challenges are focused on increasing power supply capacity, enhancing energy savings, and securing fuel procurement. Long-term energy policy and strategy are now occupying a central space on the agendas of government, industry and local communities.

As for long-term energy implications, the biggest national concern is the probable scenario of a "sharp decrease in nuclear production" for this year and beyond. Out of a total of 54 nuclear power reactors that existed prior to March 11, 2011 all were shut down for two months beginning in early May 2012, while only two reactors at one plant resumed operations in July of 2012 in order to overcome the summer peak demand. Under such circumstances, the government's "Basic Energy Plan" will inevitably be revised. The revision shall include such factors as the future of nuclear energy, the further promotion of renewable energy, enhancement of energy efficiency, and the re-establishment of a best energy-mix and strategy to address the balance of energy security and climate change.

Japan's numerical energy targets, as guidelines for a long-term approach toward 2030, were centered on five points. First, energy efficiency was to improve 30% in terms of GDP intensity; second, oil dependency was to decrease to lower than 40%; third, oil dependency in the transportation sector was to decrease about 80%; fourth, nuclear energy was to maintain a 30-40% share or more in the electricity generation mix; finally, overseas resource development was to increase 40%. However, the entire design of this long-term energy policy is now under drastic review, in order to properly incorporate the effects of the Fukushima nuclear power plant accident. In particular, now under study is the possibility of limiting dependence on nuclear power generation to between 0% and 25% of total generation, while it had occupied roughly 30% before the Fukushima accident.

JAPAN'S FUTURE HOPES FOR MARINE RESOURCES

In Japan, a new hope for future potential energy resources has arisen, in that large reserves of methane hydrates under the deep sea off Japan's coast of Tokai-Kumano. These reserves are estimated to contain the equivalent of 100 years of domestic gas consumption, and their target commercial production is projected for 2018.

Especially after March 11, 2011 driving forces in Japan for the development of new energy resources to replace nuclear energy have geared up dramatically, both in the government and the private sector, as well as many research institutions and universities. This development scenario includes not only methane hydrates, but also research and development into innovative power generation utilizing marine resources, including sea waves, sea tides, ocean currents, and osmotic pressure. This is Japan's special approach both as a "Big Ocean State," possessing the sixth largest ocean surface area in the world, and also as a technology oriented country.

Japan suffers from an enormous handicap of scarce natural resources, represented by the fact that Japan's energy self-sufficiency rate is only 4%, the lowest among the major industrialized countries. This handicap in fact led to Japan's achieving its reputation the best energy efficiency in the world. Although Japan ranks as the fifth largest energy consumer, the third largest oil consumer, the third largest oil importer, and the largest LNG importer in the world, its energy intensity is by far the smallest among top energy consuming countries.

HIGH DEPENDENCE ON MIDDLE EAST OIL AND GAS

The Persian Gulf countries (the Gulf) of the Middle East are especially crucial for Japan's energy security because nearly 90% of its crude oil supply is imported from the Gulf. The import ratio from the Gulf compared to the entire world was 87% in 2011, and has been at almost the same level for the last 15 years. Therefore, strengthening the relationship with the Gulf is of utmost importance and an urgent issue for Japan's sustainable oil and gas procurements, considering that Japan's government policy on nuclear energy will certainly be revised because of the events of March 11, 2011.

That earthquake and the recent yen exchange rate appreciation against the major currencies have had a large impact on the economy, leading to Japan's recording a trade deficit in 2011 for the first time since 1980, as Japan imported a historically record high quantity of LNG, mostly from the Gulf, to make up for the reduction in nuclear energy. In this way, the Gulf is a critically important trade counterpart for Japan for energy security, and therefore Japan has been contributing in the Gulf as an industrial goods exporter and also is engaged in direct investment, mainly for Gulf infrastructure projects.

RESOURCE DIVERSIFICATION AND COMPETITION AMONG NEW RESOURCES

However, at the same time, Japan must diversify its energy import sources. In fact, Australia and Sakhalin in Russia have been added as stable supply sources. How and whether Arctic oil and gas will become one of the import resources for the Japanese market in the future is totally a matter of competition among newly developed resources by origin and by resource type, as well as by speed of their development. The allure of the Arctic is strong at a time when Asian powers are eager to diversify their energy resources and enhance supply security. Chinese, Korean and Japanese involvement in the Arctic would add a new dimension to the region's geopolitical and sovereignty debates.

The best energy mix for Japan in terms of power generation as an ideal case toward 2030 is, in my personal opinion, a good balance combining all possibilities without excluding any: oil and coal together could be reduced to 10%, LNG increased up to 35%, nuclear energy cut in half to 15% (from 30% before the Fukushima accident), renewable energy ramped up to 30%, with the remaining 10% accounted for through new approaches such as "wise-saving" or a new lifestyle achieved through a new national campaign utilizing IT technology in the fields of smart city, smart grid, and smart life.

Arctic oil and gas for the Japanese market will be subject to competition from many other resource candidates, such as U.S.-origin shale gas LNG or East Siberia-origin LNG or newly developed Australia, African, and Asia-Pacific LNG in the future, as well as renewable energy or unconventional resources or ocean-origin power. All these energy resources might well take significant time to become commercially available. From a commercial and geopolitical viewpoint, Arctic oil and gas has plenty of hurdles to overcome in order to compete with all these other new candidate sources, from a long-term viewpoint. Still, the key to these competitions shall always lie in the realm of innovative technology: how technology has been developed and utilized in a commercially feasible way is at the heart of what the history of energy has been teaching us for decades.

Comments on Chapter 5: Korean perspective

Yoon Hyung Kim

Most of Korea's energy supply and demand is dependent on hydrocarbons such as coal, oil, and gas. To improve the energy use structure, the Korean government embarked on an ambitious nuclear and renewable energy source development. However, according to the Korea Energy Economics Institute, the share of renewable energy sources are projected to be no more than 20% of the total energy supply/demand in 2035. This implies that the era of hydrocarbon as a dominant energy source will continue for the time being. Accordingly, the procurement strategy of oil and gas resources is an urgent national task for Korea. As of 2011, Korea is the sixth largest oil importer in the world and the nineth largest oil consumer. Worse yet, more than 86% of oil imports are sourced exclusively from the Middle East. To secure the needed oil and gas resources and to overcome the uncertainty regarding the future energy supply and to diversify the supply base for oil and gas, Korea regards the Arctic oil and gas as mid-term strategic resources and plans to expand its participation in the Arctic oil and gas development projects.

Korea has a huge deficit in gas and is the world's second largest importer of liquefied natural gas (LNG). Net imports have reached unprecedented levels. Korea's LNG imports are around 35 million tons annually. On the other hand, the world gas market has changed within the last four years because of the shale gas revolution and this has tended to devalue the prospect for Arctic gas supplies. The Arctic may become a source of natural gas for consumers in Asia. One project on the Yamal Peninsula already includes shipment eastward as part of its business plan. China, Japan, and Korea are all potential consumers of Arctic hydrocarbons. What is important in this connection, however, is not only the size of resource base but also market accessibility and the attractiveness of alternative sources. The prospects for shipping oil and LNG through the Northern Sea Route will be an important consideration. The shale gas revolution is another important factor affecting the economic attractiveness of Arctic hydrocarbons. The US shale gas revolution has been transforming the world and the Korean energy outlook. The life of hydrocarbon will be extended. The global security of energy supplies will be improved. The shale gas revolution makes nuclear and renewable electricity uncompetitive. A technological breakthrough, the combined-cycle gas turbine, replaces coal with gas in power generation, thereby cutting greenhouse-gas emissions.

The Korean government perceives that sequencing of the development and production of unconventional gas is as follows: shale gas first, followed by coal-bed gas, tight gas and Arctic gas. The Korea Gas Corporation (Kogas), the world's largest corporate buyer of LNG, has procured a long-term LNG supply of 3.5 MTPA starting from 2017 by signing a twenty-year LNG Sale and Purchase Agreement with Cheniere Energy on January 30, 2012. On December 17, 2010, Kogas signed the heads of agreement with Santos Australia for the purchase of 3.5 MTPA of coal-seam gas LNG for a period of 20 years from 2015.

The Arctic gas now looks more like one of several options and not one major option. However, in addition to the diversification issue, the Arctic could possibly also offer another advantage: large volumes and long term commitments. Furthermore, in considering that a take-or-pay supply contract for the LNG business is over twenty years, the Arctic gas will become one of the most important strategic resource base for Korea. President Lee Myung-bak and Russian President Dmitry Medvedev agreed to work closely together to push a pipeline project to send Russian gas to South Korea via North Korea in November 2011. Subsequently, a tentative agreement reached between Kogas and Russia's Gazprom called for starting the construction of a pipeline through North Korea in 2013 in order to begin pipelined natural gas (PNG) supplies of 7.5 MTPA to South Korea in 2017. According to the recent South Korean government source, talks have dragged on because North Korea is demanding a transit fee that is two to three times higher than international rates.

Other technological advances might reduce the cost to produce Arctic gas. Korea has been actively involved in the Arctic for this reason. The Korea Polar Research Institute (KOPRI) opened the DASAN station in Ny-Ålesund in 2002. Research activities have been increasing since, focusing mainly on environmental research, glacial and periglacial geomorphology, hydrology, and atmospheric chemistry. Starting with the DASAN science station, Korea obtained the ad hoc observer status in the Arctic Council in 2008 and constructed Korea's first icebreaker Araon in 2009. While Korea has embarked on the Arctic development activity, it has not yet shown any concrete Arctic development activities. Korea's first icebreaker explored Canada's Arctic Ocean to check the sea-floor for gas hydrate reserve in May 2012. For the first time, the Korean government included polar resource development in the nation's fourth oversea resource development basic plan in December 2010. In February 2011, Kogas acquired a 20% stake in the Canadian Umiak gas reserve owned by Calgary-based MGM Energy. This investment by Kogas is significant as it is the first resource development in the North Pole by a Korean firm, which will establish a bridgehead to enter a promising frontier.

PART V

Informal Arctic Governance Mechanisms

6. Listening to the voices of Non-Arctic Ocean governance[1]

Oran R. Young[2]

SORTING OUT THE ROLE OF NON-ARCTIC STATES IN ARCTIC OCEAN GOVERNANCE PRESENTS A PUZZLE

An increasingly important puzzle confronting those concerned with Arctic Ocean governance centers on the search for an effective means to pay attention to the legitimate concerns of non-Arctic states, without interfering with or disrupting the work of existing cooperative arrangements like the Arctic Council. The problem here is easy to identify but difficult to solve. The Arctic states—acting either as members of the Arctic Council or as members of the group of five Arctic coastal states—wish to maintain a position of preeminence when it comes to dealing with matters of Arctic Ocean governance. Major non-Arctic states (e.g. Brazil, China, India, Japan, Korea, and several European states) and intergovernmental bodies (e.g. the European Union), on the other hand, have growing interests in the Arctic Ocean relating to activities like commercial shipping, oil and gas development, industrial fishing, ship-based tourism, and environmental protection and feel that they have a legitimate claim to be consulted when it comes to addressing matters relating to the governance of such activities. The trick is to find a way forward that satisfies the essential concerns of both groups. The impacts of the transformative changes now occurring in the Arctic lend an air of urgency to this issue. The Arctic is already experiencing the effects of climate change on a large scale; increasing accessibility is almost certain to lead to growth in economic activities in the region in the coming years. It will not do simply to adopt a watching brief regarding this matter on the assumption that we can come to terms with the substance of the problem at some future time when the way forward seems clearer.

This chapter addresses this puzzle, explaining why some apparent solutions will not work and suggesting alternative procedures for solving the puzzle. The first section provides a brief account of what may be described as the new Arctic policy agenda; it underlines the policy implications of the transformative changes now occurring in the circumpolar Arctic. The next section describes the stance of the Arctic states regarding Arctic Ocean governance and argues that this stance does not constitute a solution to the puzzle under consideration here. The following section then considers several suggestions for solving the puzzle that seem superficially appealing but that will not work in practice. This clears the ground for an analysis in the penultimate section of alternative ways forward that hold more promise. Two distinct but not mutually exclusive strategies emerge from this analysis. One centers on roles that issue-specific international forums (e.g. the International Maritime Organization, the International Arctic Science Committee) can play in addressing specific matters relating to Arctic Ocean governance; the other emphasizes the value of informal mechanisms that can provide a means for effective communication without running into the political difficulties that impede efforts to devise more formal solutions. The concluding section proposes a practical way forward that all parties concerned may want to pursue in the near future.

A NEW ARCTIC POLICY AGENDA IS EMERGING

Policy agendas in all settings are both crowded and fluid. Numerous actors engage in strategic efforts to advance their own interests by influencing the ways in which major issues are framed for consideration in policy forums and by seeking to push the issues that matter most to them to the top of the agenda. Policy agendas are therefore moving targets; it is important to be alert to shifting priorities at all times. Still, it is possible to discern broad patterns of change and major points of inflection in the contents of policy agendas in most settings.

From the 1950s into the 1980s, the core issues of the cold war dominated the Arctic agenda (Osherenko and Young 1989). Starting with the decision in 1954 to proceed with the construction of the Distant Early Warning Line (DEW Line) across the North American Arctic, the region was divided into two armed camps, with the Soviet Union occupying nearly half the region on one side and the remaining Arctic coastal states (Canada, Denmark, Norway, and the United States) allied with each other as NATO members on the other side.[3] Classical security issues occupied the center stage in Arctic politics. The region was heavily militarized. The Arctic Basin served as a prominent theater of operations for nuclear-powered submarines and manned bombers equipped with cruise missiles. Arctic territories offered prime locations for the deployment of increasingly sophisticated early-warning systems.

The collapse of the Soviet Union led to a sharp reorientation of the Arctic agenda, giving rise to a variety of initiatives aimed at fostering regional cooperation among the eight Arctic states (the five Nordic states plus Canada, Russia, and the United States). Often traced to President Gorbachev's "Arctic zone of peace" speech in October 1987 (Gorbachev 1987), this new era led in short order to the creation of the

International Arctic Science Committee (1990), the launching of the Arctic Environmental Protection Strategy (1991), and the establishment of the Arctic Council (1996). Sub-regional and sub-national initiatives in such forms as the Barents Euro-Arctic Region (1993) and the Northern Forum (1991/1993) reinforced this sense of the Arctic as a more-or-less self-contained region with a distinctive policy agenda of its own. The result was a conscious effort to focus on matters of environmental protection, the health and welfare of the region's permanent residents, and, increasingly, the broader concerns of sustainable development, with a clear preference for avoiding issues relating to military security and the deployment of armed forces.[4]

The center of gravity of the Arctic policy agenda has shifted again in the wake of the dramatic recession of sea ice in the Arctic Basin in 2007 and the resultant rise in expectations—warranted or unwarranted—regarding the accessibility of globally significant shipping routes and valuable natural resources in the region (Anderson 2009, Howard 2009, Sale and Potapov 2010, Young 2011, Astill 2012, Young 2012).[5] Once again, the Arctic has become an area of interest to various outside actors. But this time the driving forces involve economic/commercial considerations rather than the imperatives of national security. Four propositions capture the essential features of the new Arctic policy agenda.

The Arctic has become a focus of global attention

The recession of sea ice in the Arctic Basin has fueled worldwide interest in the opening of commercial shipping lanes in the Arctic and in the exploitation of offshore deposits of oil and gas that are becoming increasingly accessible. Enhanced prospects for ship-based tourism and industrial fishing have come into focus as well. There can be no certainty about future developments in this realm. There are many hurdles to be overcome before commercial shipping on a scale that is significant in global terms becomes a reality (AMSA 2009, Fairhall 2010, Brigham 2011). Recoverable reserves of oil and gas in the Arctic may prove disappointing.[6] In any case, Arctic oil and gas will always be expensive to produce and deliver to markets, a fact that makes their attractiveness highly sensitive to world market prices.[7] Nonetheless, there is intense interest in many quarters in the prospects for commercial shipping and resource development in the Arctic. From the point of view of Arctic politics, two features of this trend stand out. The drivers of this development are global economic forces; the security issues of the cold war era are, for the most part, a thing of the past. But, second, this development has brought the Arctic to the attention of major powers around the world, including China, India, and the European Union, which are interested in the region's natural resources, and Korea, Japan, and Singapore, which are interested in the prospects for commercial shipping in the region. The Arctic policy agenda for the foreseeable future will be populated with global concerns over and above the more limited regional concerns that have headed the Arctic policy agenda during the period since the collapse of the Soviet Union.

Marine issues have taken center stage

A look at the issues now rising to the top of the Arctic policy agenda makes it clear that we are witnessing a reorientation away from terrestrial issues and toward marine issues. The recent explosion of interest in the Arctic is linked to the prospects for developing commercial shipping and exploiting large offshore reserves of oil and gas in the region, with activities involving fishing and ship-based tourism rounding out the new Arctic agenda. It is not surprising, under the circumstances, that policymakers have devoted increasing attention to matters like the preparation of the Arctic Council's Arctic Marine Shipping Assessment (AMSA 2009), the negotiation of the new Arctic search and rescue agreement (Arctic Council 2011), the effort to reach agreement on the terms of a legally-binding Polar Code covering the design, construction, and operation of ships operating in Arctic waters, and the preparation of the Arctic Ocean Review. There is nothing inherently wrong with this reorientation of the Arctic policy agenda. But the rise of these marine issues does tend to deflect attention previously devoted to matters like securing the health and well-being of the Arctic's permanent residents, dealing with the impacts of environmental contaminants (e.g. persistent organic pollutants, discarded nuclear reactors), and finding ways to enhance the sustainability of the small and often isolated communities of the circumpolar Arctic. It also has the effect of shifting the center of gravity in Arctic policymaking toward the five Arctic coastal states (the A5) in contrast to the full membership of the Arctic Council (the A8). Among other things, this is a development that could dilute the influenceof indigenous peoples' organizations that have acquired considerable influence in their roles as Permanent Participants in the Arctic Council.

Managed development is overshadowing sustainable development

Those who are concerned with activities like offshore oil and gas development under Arctic conditions and the future of commercial shipping in the region are not insensitive to matters of environmental protection. They know that the Arctic is an environmentally sensitive region and that extra care is needed to avoid environmental disasters under the harsh conditions characteristic of the region. But there is no escaping the fact that the rising pressure to develop the Arctic's resources is driven by global economic imperatives in contrast to the quest for sustainable development within the Arctic itself. The corporations drilling for oil in the Chukchi and Beaufort Seas and in the coastal waters around Greenland are prepared to accept relatively strict regulations. Much the same is true of German, Japanese, Korean, and Norwegian shipping companies desiring to inaugurate regular commercial operations using the Northern Sea Route. But it is apparent that what is at stake here is a form of managed development of a sort driven by the needs of advanced industrial societies and newly industrializing societies located to the south rather than an effort to reorient human/environment relations in a manner that is sensitive to the idea of the triple bottom line associated with the concept of sustainable development or the emerging concept of planetary stewardship. What is more, policymakers and corporate decisionmakers dealing with offshore oil and gas development and commercial shipping are, for the most part, located far outside the Arctic; they lack both deep knowledge of the conditions prevailing in the Arctic and a strong attachment to the goal of achieving sustainable development in the region. In terms of policy, this means that we are witnessing a shift from a focus on Arctic-specific issues to an emphasis on issues of interest to global players (e.g. shippers, energy companies) that happen to involve the Arctic. The current buzz regarding the Arctic could evaporate quickly if there is a shift in the locus of attention of energy companies or new shipping routes open up in other areas that seem more attractive than the Arctic routes in purely financial terms.[8]

Arctic policy is becoming a matter of high politics

Hard-nosed observers claim that we are witnessing a remilitarization of the Arctic and that "armed clashes" may occur in the region sooner rather than later (Borgerson 2008, Huebert et al. 2012). Both the logic of this argument and the evidence supporting it, however, are flimsy (Wezeman 2012). While proposals to turn the Arctic into a nuclear-weapons-free zone are not likely to gain traction during the foreseeable future, there is no reason to expect that matters relating to the remilitarization of the region will rise to the top of the Arctic agenda anytime soon. In fact, most observers have commented on the relative lack of serious conflicts in the region. Nonetheless, the integration of the Arctic into the global economy as a resource frontier and a locus for commercial shipping has brought the region to the attention of the world's great powers. China has demonstrated a clear desire to acquire a voice in Arctic affairs (Jakobson 2010, Yang 2012). The European

Union has taken steps to devise its own Arctic policy (Airoldi 2009, European Commission 2012). Other major players, including not only Japan and Korea but also Brazil and India, have begun to follow Arctic affairs with interest. What this means is that the Arctic is now being drawn into the global system of high politics. Arctic issues (e.g. the exploitation of oil and gas deposits in the region's offshore areas) will be influenced by both the economics and the politics of global energy markets. Great power rivalries, often driven by matters that have little or nothing to do with the Arctic, will manifest themselves in efforts to address Arctic issues, including the delimitation of the boundaries of coastal state jurisdiction over the seabed beyond the boundaries of exclusive economic zones and the development of the provisions of the proposed Polar Code designed to regulate Arctic shipping. None of this precludes the maintenance and even the enhancement of cooperative arrangements in the Arctic. But it does mean that the fate of such arrangements will often be affected by political dynamics that have little to do with the Arctic as such.

The developments outlined in the previous paragraphs will not drive issues like the health and well-being of the Arctic's permanent residents and the sustainability of the mixed economies of widely-dispersed Arctic communities off the region's policy agenda. Policy agendas can and often do encompass a wide range of discrete issues at the same time. But these developments are reordering the Arctic agenda and bringing new players into the game (Berkman and Young 2009, Berkman and Vylegzhanin 20132). A cursory examination of the explosion of newspaper articles and the flood of popular books dealing with the Arctic is sufficient to make this clear.[9] Such publications focus almost inevitably on topics like the race to exploit the Arctic's natural resources, real or imagined jurisdictional conflicts among the Arctic states, and the prospects that the resultant competition could trigger armed clashes in the region. Whether or not the analyses these sources advance are well-founded is somewhat beside the point. The fact is that they reflect a marked shift in perceptions on a global scale regarding the content of the Arctic policy agenda in the wake of the dramatic recession of sea ice in the Arctic Basin in recent years.

THE STANCE OF THE ARCTIC STATES IS NOT TENABLE

The Arctic states and especially the A5 (Canada, Denmark/Greenland, Norway, Russia, and the United States) have taken vigorous steps to assert their control over all matters of governance relating to the Arctic Ocean and its marginal seas. The strategy they have adopted, articulated with particular clarity in the language of the May 2008 Ilulissat Declaration, amounts to arguing simultaneously that others should acknowledge their preeminence with regard to Arctic Ocean governance and that they—the A5—can be trusted to handle this assignment in a manner that proves beneficial to the Arctic Ocean itself as well as to all those interested in the use of its resources (Ilulissat Declaration 2008). Noting the transformative changes now affecting the Arctic Ocean, the A5 assert that "[b]y virtue of their sovereignty, sovereign rights and jurisdiction in large areas of the Arctic Ocean the five coastal states are in a unique position to address [the] possibilities and challenges" likely to arise in the foreseeable future. They note that the law of the sea provides a legal framework for dealing with emerging issues pertaining to the Arctic Ocean and state that they "… remain committed to this legal framework and to the orderly settlement of any possible overlapping claims." The conclusion to be drawn from these observations, they assert, is that there "… is no need to develop a new comprehensive international legal regime to govern the Arctic Ocean." The A5 "… will keep abreast of the developments in the Arctic Ocean and continue to implement appropriate measures." The clear implication is that others should acknowledge the dominance of the A5 in this realm and defer to their stewardship with regard to Arctic Ocean governance.

It will come as no surprise that the other members of the Arctic Council (Finland, Iceland, and Sweden), not to mention the Permanent Participants, found this initiative unacceptable. Although these states and indigenous peoples' organizations regard the council as the principal forum for addressing matters of Arctic policy, the A5 did not invite them to participate in the May 2008 Ilulissat meeting; they did not even consult them about the issues at stake or the language to be included in the Ilulissat Declaration. Not only did this leave these actors in the lurch regarding some of the most important issues arising in the Arctic today; it raised understandable concerns about the future role of the Arctic Council. The result was a period of inner turmoil in relations among the Arctic states and uncertainty regarding the implications of this development for the future of international cooperation in the Arctic. But what threatened to become a serious rift among the members of the A8 has now been resolved in favor of a reaffirmation of the primacy of the Arctic Council as the principal vehicle for addressing matters of common concern in the Arctic, including issues of Arctic Ocean governance (Pedersen 2012). Under the terms of the Nuuk Declaration, adopted at the council's ministerial meeting in May 2011, the eight Arctic states affirm the primacy of the council in dealing with Arctic affairs, agree on a number of measures to strengthen the council, and call on non-Arctic states "to accept and support the objectives of the Arctic Council" and "recognize that an extensive legal framework applies to the Arctic Ocean including, notably, the Law of the Sea." In effect, what had been the stance of the A5 regarding relations with non-Arctic states has reemerged as the stance of the A8 in a move to draw a clear line between the Arctic states and the non-Arctic states in addressing issues on the Arctic policy agenda.

Understandably, the major non-Arctic states are not comfortable with this stance. They believe with some justification that they have both legitimate interests in the Arctic and certain rights stemming not only from historic involvement in the Arctic but also from economic, legal, and scientific considerations that are hard to ignore. Even more important is the fact that there is little prospect that the A8 can address current issues of governance relating to the Arctic Ocean (e.g. the development and implementation of a regime regulating commercial shipping) effectively without active participation on the part of key non-Arctic states. Why is this the case? The answer involves matters of rights, responsibilities, and resources together with some broader considerations relating to the place of the Arctic in international society.

Non-Arctic states have acknowledged rights and interests in the Arctic

Regardless of the ultimate resolution of claims regarding the delimitation of coastal state jurisdiction over the seabed beyond the outer boundaries of their Exclusive Economic Zones in the Arctic, non-Arctic states will have rights to a variety of uses of the Arctic Ocean (e.g. rights to navigation, high seas fishing, laying submarine cables, overflight) under the provisions of the law of the sea (as codified in the 1982 UN Convention on the Law of the Sea), which all parties acknowledge as the constitutive foundation for Arctic Ocean governance. Under the circumstances, key non-Arctic states must play an active role in formalizing issue-specific regimes dealing with a variety of Arctic matters, such as the mandatory Polar Code for Arctic shipping now being developed under the auspices of the International Maritime Organization (IMO). Major non-Arctic states, including Brazil and India as well as China, Japan, Korea, and some of the European states are also in possession of resources and technological capabilities that Arctic states need or want in efforts to develop commercial shipping in the Arctic and to extract recoverable reserves of oil and gas located in Arctic waters. This is especially true in the case of Russia, which controls the Northern Sea Route, is expected to control the lion's share of recoverable reserves of natural gas located in Arctic waters, and is already entering into agreements with multinational corporations and one or another of the non-Arctic states regarding such matters. A number of non-Arctic states are in possession of scientific capabilities that will be important to providing the knowledge needed to make informed decisions about Arctic Ocean issues. The Europeans have an impressive track record regarding Arctic research; the Chinese have established a research station at Ny Ålesund on Svalbard and will soon have a capacity to conduct seaborne research from icebreakers in polar waters that is second only to the capacity of Russia.[10]

Non-Arctic states also have Arctic responsibilities.

The transformative changes now occurring in the Arctic are tightening the links between this region and the Earth System in both biophysical and socioeconomic terms (Arctic Governance Project 2010). The forces of change affecting the Arctic (e.g. climate change, globalization) are driven increasingly by the actions of non-Arctic states. China alone accounts for about 23% of global greenhouse gas emissions and has become the global leader with regard to international trade. Almost 60% of the black carbon or soot and a large fraction of certain persistent organic pollutants that make their way to the Arctic are thought to originate in countries that are members of the European Union (Cavalieri et al. 2010). Similar observations are in order regarding the economic links between Arctic communities and the global system. The revenues available to Arctic states, counties, oblasts, and territories are heavily dependent on income derived from the extraction of natural resources (e.g. minerals, hydrocarbons) destined for world markets. Employment opportunities in many Arctic communities are closely tied to the activities of multinational corporations. The decisions of outsiders (e.g. the European Union's ban on the importation of seal products) can have devastating impacts on small Arctic communities. It follows that non-Arctic states not only have legitimate interests in Arctic affairs; they also have responsibilities regarding matters of environmental protection and sustainable development in the Arctic.

Geopolitical shifts are hard to ignore

More broadly, shifts that are geopolitical (or geoeconomic) in nature are making it harder and harder to ignore the concerns of non-Arctic states. This is obviously the case with regard to China. But rising powers like Brazil and India are not far behind in these terms.[11] This does not mean, as some commentators have suggested, that we are witnessing the beginning of a new cold war in the Arctic or that the region will become a scene of armed clashes in the foreseeable future. The forces at work in the Arctic center more on global economic developments and exercises in the use of soft power that go with these developments (Nye 2011). Nevertheless, there is no avoiding the fact that the tightening of the links between the Arctic and the global system increases the sensitivity of the region to macro-scale shifts in the economic and political dynamics of the Earth System. Without going into detail on a case-by-case basis, it is apparent at this stage that the idea of separating the Arctic from the rest of the Earth System and endeavoring to establish an Arctic Ocean governance system that excludes participation on the part of key non-Arctic states will not work.

No one denies that the A8, and especially the five coastal states, occupy a special position regarding Arctic Ocean governance due to their status as Arctic states. They are entitled to exercise authority over activities taking place in their Exclusive Economic Zones and on the prolongation of the seabed extending beyond the outer limits of their Exclusive Economic Zones;[12] they have obligations to protect the rights of the Arctic's indigenous peoples relating to the use of marine resources (e.g. marine mammals); they are especially vulnerable to the possible effects of oil spills or extreme natural events occurring in the Arctic; they will be called upon to take the lead when it comes to matters of safety at sea or search and research in the Arctic. These considerations are sufficient to justify claims on the part of the Arctic states to a special status with regard to Arctic Ocean governance. But they are not sufficient to support claims on the part of these states to be allowed to call all the shots when it comes to matters of governance relating to the Arctic Ocean.[13]

SOME SUPERFICIALLY ATTRACTIVE SOLUTIONS ARE NON-STARTERS

What can be done to solve this puzzle in such a way that all legitimate stakeholders—the A5, the other Arctic states, key non-Arctic states, indigenous peoples' organizations—are satisfied with the resultant governance system for Arctic Ocean issues? Some of the most common ideas arising in discussions of this matter are non-starters. This is particularly true of proposals aimed at adjusting the character of the Arctic Council and especially those that would require changes in the terms of the 1996 Ottawa Declaration on the Establishment of the Arctic Council (Ottawa Declaration 1996).

Arctic Council membership is not negotiable

One possibility would be to alter the terms of Paragraph 2 of the

Ottawa Declaration, which deals with membership and the status of the Permanent Participants. This paragraph in its present form simply lists the A8—the A5 plus Finland, Iceland, and Sweden—as the members of the Arctic Council and creates the status of Permanent Participants for indigenous peoples' organizations. There is no provision for reevaluating or adjusting the membership of the council, and it is worth noting that the provision regarding membership represents the resolution of a somewhat contentious debate going back to the 1980s and the negotiations that led to the adoption of the 1989 Rovaniemi Declaration and the creation of the Arctic Environmental Protection Strategy (Rovaniemi Declaration 1989; Young 1998). The recent tension between the A5 and the A8 and its resolution with a clear reaffirmation of the primacy of the Arctic Council has had the effect of entrenching the membership provisions of Paragraph 2 further. The main innovation of the Ottawa Declaration is the creation of the status of Permanent Participants, a status that is highly valued by the indigenous peoples of the Arctic and that is widely viewed among students of international law and politics as the most innovative feature of the Arctic Council. Any adjustments that would have the effect of diluting the role of the Permanent Participants would be resisted vigorously by all the indigenous peoples' organizations; the A8 would support them regarding this issue.[14]

A common suggestion worth considering in this context is that the Arctic Council could follow the lead of the 1959 Antarctic Treaty, which draws a distinction between Consultative Parties and Non-consultative Parties. Any country can accede to this treaty but only those able to pass a specific test can become Consultative Parties. As set forth in Article IX(2) of the treaty, signatories are eligible for Antarctic Treaty Consultative Party (ATCP) status during such time as they "demonstrate [an] interest in Antarctica by conducting substantial scientific research activity there, such as the establishment of a scientific station or the dispatch of a scientific expedition" (Antarctic Treaty 1959). All signatories can attend Antarctic Treaty Consultative Meetings, but only ATCPs have the right to vote on measures considered at the meetings. Today, 50 states are parties to the Antarctic Treaty; 28 of these are ATCPs. Applying this distinction to the Arctic would lead to a situation in which the Arctic Council would have full members and associate members as well as Permanent Participants.

Appealing as this two-tiered system is in some respects, it will not work for the Arctic. What criterion could be developed to separate full members and associate members? Clearly, the criterion used in the Antarctic Treaty would not work; it is far from clear whether there is any alternative that would make sense under the conditions prevailing in the Arctic. In any case, the criterion articulated in Article IX(2) has been watered down over time, allowing a number of countries to become ATCPs, even though their claims to fulfillment of the stated condition are tenuous at best. Combining this observation with the fact that the Arctic Council does not make use of voting in arriving at decisions, it seems clear that the two-tiered system would be likely to have the de facto effect of enlarging the membership of the council over time. Both the A8 and the Permanent Participants would be sensitive to this concern; there is virtually no chance that they would be willing to embrace some version of the Antarctic Treaty's distinction between Consultative and Non-consultative Parties during the foreseeable future.

The bottom line is clear. The provisions of Paragraph 2 of the Ottawa Declaration are untouchable in political terms. Having recently dealt with the tension between the A5 and the A8, the members of the council have no interest in entering into a debate now about who should be accepted as members of the Arctic Council. The Permanent Participants would regard any expansion of the council's membership, including the introduction of a two-tiered system, as a development that would have the effect of diluting their role. Any move to revisit the terms of Paragraph 2 of the Ottawa Declaration will not gain traction at this stage. Such an initiative might well engender controversy that would be counterproductive.

Permanent observership is not the solution

The situation with regard to Paragraph 3 of the Ottawa Declaration, which deals with observer status in the Arctic Council, is somewhat different but ultimately no more conducive to solving the puzzle under consideration here. Why is this the case? The Arctic Council, by action of the biennial ministerial meeting authorized in Paragraph 3, can accord the status of permanent observer to non-Arctic states, intergovernmental organizations, and nongovernmental organizations. Currently, six European states (France, Germany, the Netherlands, Poland, Spain, and the UK) are recognized as permanent observers; intergovernmental organizations that are observers include the Nordic Council of Ministers, UNDP, and UNEP. Among the non-governmental observers are the International Arctic Science Committee, the International Union for Circumpolar Health, the University of the Arctic, and the Worldwide Fund for Nature.

The problem with this idea for solving the puzzle under consideration here is twofold. To begin with, observer status under the best of circumstances is unsatisfactory from the point of view of non-Arctic states as a means of getting their concerns taken seriously in discussions of Arctic policy issues. All six states that are currently permanent observers have found this status unsatisfactory and generally frustrating in terms of providing opportunities for substantive engagement regarding issues now emerging on the Arctic policy agenda. Representatives of the observer states are seldom allowed to speak in meetings of the Arctic Council managed by the chair of the Senior Arctic Officials, much less in the biennial ministerial meetings of the council. Nor do they have access to discussions among the Senior Arctic Officials themselves or in meetings of the deputy ministers, a recent innovation in the practice of the council. Observers can interact with representatives of member state delegations on an informal basis. But there is no established practice that provides opportunities for meaningful engagement regarding matters of politics and policy, and the environment of council meetings is not conducive to real dialogue. To the extent that the recent shift in the Arctic Council from an emphasis on policy shaping to an interest in policy making continues, the force of this reasoning will become even stronger (Kankaanpää and Young 2012).

The permanent observers are often allowed or even encouraged to contribute to the efforts of the Arctic Council's working groups, especially if they are sufficiently interested to consider providing material support for specific projects. This is an important opportunity, especially since the reports of the working groups are among the council's most influential products. Useful as they are, however, the working groups do not provide an effective venue for policy dialogues regarding a range of politically sensitive issues now arising on the Arctic agenda. Representatives of all the non-Arctic state observers regard this situation as highly unsatisfactory. If anything, attendance at Arctic Council meetings serves to remind those representing observer states of the lack of efficacy of this status.

Over the last several years, moreover, the status of permanent observer has become even less satisfactory from the point of view of the non-Arctic states. In essence, the issue of permanent observer status has become a political football, handled badly by all parties concerned and resulting in a morass that is not conducive to solving the puzzle under consideration in this chapter. For reasons having to do with factors such as understandable dismay over the European Union's ban on the importation of seal products and China's treatment of human rights activists, the last two ministerial meetings of the Arctic Council (in Tromsø in 2009 and in Nuuk in 2011) have set aside applications for permanent observer status on the part of non-Arctic states and intergovernmental organizations, including China, Japan, Korea and the European Commission applying on behalf of the European Union, without action. The result has been to politicize the issue of observer status in the council. The 2011 ministerial meeting not only failed to approve pending applications for permanent observer status; it also adopted a new set of criteria and rules of procedure applicable to all permanent observers and including such provisions as a requirement that permanent observers "··· recognize Arctic States' sovereignty, sovereign rights and jurisdiction in the Arctic" and demonstrate "··· a political willingness as well as financial ability to contribute to the work of the Permanent Participants and other Arctic indigenous peoples."[15] In addition, the new rules provide for a review of "permanent" observer status every four years. Taken seriously, the effect of these new rules is to tighten the grip of the Arctic states over interactions taking place under the auspices of the council and to further restrict the opportunity for representatives of non-Arctic state observers to engage in serious dialogue regarding matters of policy with representatives of the A8.

Understandably, those non-Arctic states that are already permanent observers, like France, Germany, and the UK, have found these changes offensive. They certainly do not bode well for the use of permanent observer status as a mechanism for communicating the concerns of non-Arctic states like China, Japan, and Korea with regard to policy issues being handled through the Arctic Council. Ironically, the net effect of these developments has been to translate the somewhat exclusionary tone of the Ilulissat Declaration from a contentious pronouncement on the part of the A5 to a settled practice of the A8. Although it is pointless to assign blame for the muddle regarding the role of permanent observers, the overall conclusion seems clear.

Nothing in this analysis is intended to suggest that non-Arctic states should refrain from applying for permanent observership in the council. There are benefits to be gained from the status of permanent observer that are unrelated to the puzzle under consideration in this chapter. But the mechanism of permanent observership does not provide a solution to the puzzle. Given Canada's role in these developments, there is little reason to expect this conclusion to change once Canada assumes the chairmanship of the council following the next ministerial meeting in May 2013.

BUT THERE ARE OTHER WAYS FORWARD

If adjusting the terms of the Ottawa Declaration does not offer a way forward in efforts to solve the puzzle, what is the alternative? In responding to this question, it is important to be clear on the nature of the issue at stake. For the Arctic states, the major concerns are acknowledgement of their primacy in dealing with Arctic affairs and maintenance of the effectiveness of the Arctic Council as the principal mechanism for addressing Arctic issues that have trans-boundary or international implications. From the perspective of the non-Arctic states, the essential need is to have their voices heard at the policy level when it comes to addressing matters of Arctic Ocean governance. This is not a matter that requires obtaining formal membership, much less voting rights, in a body like the Arctic Council. But it is more than a matter of being allowed to participate in various projects undertaken by the council's working groups (e.g. the 2004 Arctic Climate Impact Assessment, the 2009 Arctic Marine Shipping Assessment, the ongoing Arctic Ocean Review), useful as some of these projects undoubtedly are. What is critical for the non-Arctic states is to obtain an acknowledged voice at the policy level in addressing matters of Arctic Ocean governance.

Two ways forward seem worthy of serious consideration in efforts to solve this puzzle. One strategy involves focusing on the development of a regime complex as a means of addressing a variety of specific issues relating to Arctic Ocean governance. The other strategy features the development of an informal consultative mechanism that allows for non-Arctic voices to be heard without undermining or detracting from the work of the Arctic Council. These strategies are distinct but by no means mutually exclusive. The best recipe for making progress in Arctic Ocean governance is likely to be to pursue the two strategies together.

An Arctic Ocean regime complex is emerging

One promising approach is to boost the development of what is known as a regime complex for the Arctic Ocean in which a number of issues are addressed through differentiable yet related governance arrangements. Regime complexes are collections of non-hierarchically related governance arrangements (often called elements or elemental regimes) that deal with various aspects of a recognized issue domain or a spatially-defined area, such as plant genetic resources, climate change, or Antarctica (Raustiala and Victor 2004, Keohane and Victor 2011, Orsini, Moran, and Young forthcoming). In the case of Antarctica, for instance, the arrangements governing the conservation of seals and the management of commercial fishing are handled under the provisions of conventions (the Convention on the Conservation of Antarctic Seals and the Convention on the Conservation of Antarctic Marine Living Resources) that are not subordinate to the 1959 Antarctic Treaty, although they obviously deal with matters of Antarctic governance broadly defined. The management of ship-based tourism in Antarctic waters is handled through the efforts of the International Association of Antarctic Tour Operators (IAATO), a non-governmental organization that has succeeded in establishing and implementing well-defined regulations covering the activities of owners and operators of ships carrying tourists in Antarctic waters. Other elements of the Antarctic regime complex deal with functional concerns that are not limited to Antarctica (e.g. the International Convention on the Regulation of Whaling, the Agreement of the Conservation of Albatrosses and Petrels) or that are global in scope (e.g. the Montreal Protocol on Substances the Deplete the Ozone Layer). Taken together, this collection of elements constitutes what can be characterized appropriately as an Antarctic regime complex.

Regime complexes vary along an integration-fragmentation spectrum in which one extreme features sets of elements that are so interconnected that they merge into a single governance system, while the other extreme involves collections of elements whose connections are tenuous at best. Location on this spectrum is a variable in the sense that regime complexes may become increasingly integrated over time or lapse into collections of arrangements whose linkages become weaker and weaker. To take the example of the regime complex for Antarctica again, integration has increased over time, especially in the aftermath of the negotiation and entry into force of the 1991 Environmental Protocol to the Antarctic Treaty. Yet this example also makes it clear that there is no basis for complacency regarding the integration of regime complexes. A number of issues now confronting the Antarctic regime complex, ranging from rising interest in bioprospecting to the impacts of climate change, will present significant challenges to those responsible for managing the complex.

What are the prospects for the development of a regime complex for Arctic Ocean governance in the coming years? Is progressive development in the sense of movement toward the integration end of the integration-fragmentation spectrum a realistic goal for this complex?

How might this development address the puzzle of listening to the voices of non-Arctic states in Arctic affairs? All parties concerned agree that the law of the sea as articulated in the 1982 UN Convention on the Law of the Sea (UNCLOS) provides the constitutive foundation for an Arctic Ocean regime complex (United Nations 1983). Like all constitutive arrangements, UNCLOS features general principles and procedures; it does not offer specific prescriptions for Arctic Ocean governance (with the limited exception of Article 234 on ice-covered waters). So, for example, Article 76 establishes a generic procedure for addressing the delimitation of jurisdictional boundaries on the seabed beyond the outer boundaries of the Exclusive Economic Zone. Currently, the Arctic coastal states are making use of this procedure as a key element in their effort to sort out issues relating to the delimitation of jurisdiction over the seabed in the Arctic Ocean. There are reasons for optimism regarding the success of these efforts, though it is important to bear in mind both that Article 76 has nothing to say about the specifics of the Arctic case and that the findings of the Commission on the Limits of the Continental Shelf are recommendatory in nature.

A number of issue-specific regimes have developed over time to address functional and spatially defined issues of Arctic Ocean governance (Young and Osherenko 1993). The oldest is the management system for the Svalbard Archipelago established in the 1920 Treaty of Spitsbergen and featuring an arrangement under which the parties recognize Norwegian sovereignty over the archipelago in return for a Norwegian pledge to demilitarize the islands and to allow all parties equal access to the natural resources of the archipelago.[16] Other relevant arrangements include the agreement among the Arctic coastal states regarding the conservation of polar bears, the Canada/US bilateral agreement relating to the management of the Porcupine caribou herd, the North Atlantic Marine Mammals Commission, and a variety of bilateral and multilateral agreements dealing with migratory birds that spend part of each year in the Arctic. Although each of these arrangements is self-contained, they are beginning to take on the character of elements of a larger regime complex for the Arctic Ocean.

Additional elements of this regime complex have emerged more recently or are currently under construction (Young 2012a). The International Arctic Science Committee, established in 1990, has grown into a body that has 21 members (the A8 plus 13 other countries) and provides leadership in identifying research priorities and coordinating the efforts of scientists located in many countries. The International Maritime Organization (IMO) adopted a set of Guidelines for Ships Operating in Arctic Ice-covered Waters in 2002 (revised in 2009). These guidelines are recommendatory, and the IMO is currently at work on the development of a Polar Code that will include mandatory regulations dealing with the design, construction, and operation of commercial ships in the polar regions. Negotiating the terms of such a code is not easy, but there are reasons for optimism regarding the completion and adoption of the Polar Code within the next 2-4 years. A non-governmental body known as the Association of Arctic Expedition Cruise Operators (AECO) has emerged in recent years. Because the activities of AECO focus on areas close to Norway and the Svalbard Archipelago, interest is growing in expanding this arrangement into something more like the International Association of Antarctic Tour Operators (IAATO). In 2011, the Arctic States adopted an Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic. Although the parties to this agreement are the A8, the terms of the arrangement accord with the provisions of the 1979 International Convention on Maritime Search and Rescue and the 1944 Convention on International

Civil Aviation. More broadly, a number of global arrangements, including the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer, the 1992 UN Framework Convention on Climate Change, and the 2001 Stockholm Convention on Persistent Organic Pollutants, are relevant to the Arctic and form elements in the Arctic Ocean regime complex.

The Arctic Ocean regime complex encompasses a mix of elements featuring regulation through the efforts of the Arctic states themselves and elements in which non-Arctic states are major players along with the Arctic states. The members of the 1973 agreement dealing with the conservation of polar bears are the A5, a configuration that makes sense given that they are the range states. The development of the Arctic search and rescue arrangement as an agreement among the A8 also seems appropriate in light of the fact that the Arctic states will be called upon to supply the lion's share of the capabilities required to carry out search and rescue missions in Arctic waters.

The Agreement on Cooperation in Aeronautical and Maritime Search and Rescue in the Arctic was signed at the Arctic Council ministerial meeting in May 2011. In formal terms, however, the council did not adopt this agreement (Arctic Council 2011).[17] On the other hand, it makes sense to negotiate the Polar Code under the auspices of the IMO in which all those states with an interest in Arctic shipping are members, and there is a credible rationale for the development of an Arctic tour operators association as a nongovernmental body including ship owners/operators located in non-Arctic states. Mixed arrangements make sense in other cases. The Arctic Council's new initiative aimed at the development of guidelines covering Arctic marine oil pollution prevention, preparedness and response seems appropriate, given that oil spills in Arctic waters during the foreseeable future are almost certain to take place within the Exclusive Economic Zones of the Arctic coastal states. But it also makes sense to link this arrangement to the IMO's conventions on oil pollution prevention, preparedness and response and on prevention of pollution from ships, since energy production is a global concern in which all states have a clear interest.[18] Overall, the hallmark of the emerging Arctic Ocean regime complex is the development and implementation of a collection of distinct but related governance arrangements that allows for differentiation regarding a variety of matters, including provisions for listening to the voices of the non-Arctic states.

A critical element in this complex is the Arctic Council itself. What the council does best is to identify emerging issues, frame them in ways that are conducive to consideration in policy forums, and take steps to highlight their importance to various constituencies (Kankaanpää and Young 2012). Sometimes the emphasis is on Arctic-specific issues, like the need to enhance capacities to deal with emergencies in the Arctic (e.g. ship groundings, oil spills). In other cases, the Arctic Council has been able to play a role in moving issues upward on global agendas, as in the cases of persistent organic pollutants leading to the 2001 Stockholm Convention and short-term climate pollutants now emerging as a priority concern in connection with efforts to address the problem of climate change. What is particularly important in the context of this discussion, however, is the emerging role of the council as an integrative force in the development of the Arctic Ocean regime complex. Making use of concepts like ecosystem-based management and tools like coastal and marine spatial planning, the Arctic Council is particularly well-placed to address the need to connect the individual elements of this regime complex in such a way as to avoid conflicts, promote synergy, and identify gaps in the complex that deserve attention going forward. It would be a mistake to exaggerate the capacity of the council to play this role. The council lacks the authority to make formal decisions, and its access to material resources remains limited. Nonetheless, it is clear that interest in this role for the council is rising. The engagement of the council in the development of the search and rescue agreement signed at the ministerial meeting in May 2011 is a case in point; there is a rising interest in the future role of the council as a mechanism for moving the Arctic Ocean regime complex along the integration-fragmentation spectrum in other areas as well.[19]

An informal consultative mechanism could make a constructive contribution

Moving toward the creation of a regime complex for the Arctic Ocean is a step in the right direction. Yet by itself this strategy will not solve the puzzle under consideration in this chapter. What is needed, in addition, is an informal mechanism that will not seem threatening to the members of the A8 but that will seem appealing to key non-Arctic states as a means of gaining a serious hearing for their views about matters of Arctic Ocean governance that go beyond piecemeal concerns suitable for treatment in conjunction with the individual elements of a regime complex. No existing model provides a simple blueprint for such a mechanism. But there is a good deal of experience with matters of this sort that can offer guidance to those concerned with solving the puzzle of listening to the voices of non-Arctic states in Arctic Ocean governance. Pertinent examples include: (i) a working group along the lines of the Working Group on Arctic International Relations, (ii) a committee like the Standing Committee of Parliamentarians of the Arctic Region, (iii) the Commission on Security and Cooperation in

Europe, (iv) the North Sea Conferences operating within the ambit of the OSPAR Convention, (v) the World Economic Forum and the World Social Forum, and (vi) an Arctic caucus or a North Pacific Arctic caucus operating within a broader forum.

The Working Group on Arctic International Relations (WGAIR) arose in 1987 as an informal means to facilitate communication among members of the policy and academic communities of the eight Arctic states (Young 1996). Its principal goal was to allow for an ongoing exchange of views across the barrier created by the division of the Arctic between the (then) Soviet Union on one side and the United States and its Arctic NATO allies on the other. Although it is difficult to establish causal connections, the WGAIR played an acknowledged role in establishing and promoting the spirit of cooperation that fueled the creation of the International Arctic Science Committee (IASC) in 1990, the Arctic Environmental Protection Strategy (AEPS) in 1991, and eventually the Arctic Council itself in 1996. For its part, the Standing Committee of Parliamentarians of the Arctic Region (SCPAR) is an informal association of members of the legislative bodies of the A8. It has no official status and no authority to make formal decisions regarding matters of Arctic policy. Nevertheless, the SCPAR organizes periodic conferences on Arctic themes and has played a constructive role in identifying emerging issues and exploring innovative approaches to these issues in a manner that is free of the restraints imposed on the Arctic Council by virtue of the fact that it is a more formal body whose principal participants are government officials.

The Commission on Security and Cooperation in Europe (CSCE) came into existence in 1973 during the midst of the cold war as a mechanism for developing confidence-building measures to alleviate East-West tensions regarding matters of security in Europe. Over time, it became a forum for airing issues relating to human rights and played a role in the transformations occurring inthe former Soviet Union and Eastern Europe during the 1980s. With the passage of time the CSCE morphed into a more formal intergovernmental body now known as the Organization for Security and Cooperation in Europe. In its initial incarnation, however, the CSCE exemplified the sort of informal mechanism under discussion here.

The World Economic Forum and the World Social Forum provide mechanisms of another type for informal consultation on matters of current interest at the international level. Neither forum has any official status. Both forums operate by organizing annual high-level but informal gatherings of members of the business community and economic policymakers in the case of the World Economic Forum and members of civil society and social policymakers in the case of the World Social Forum.

Neither forum seeks to arrive at any specific conclusions, much less to make any formal decisions. Both present opportunities for lively discussions regarding innovative ideas in an informal environment and for off-the-record meetings among key players concerned with current issues of common concern.

The North Sea Conferences illustrate another type of informal consultation (Skjaerseth 2000). These conferences came about as a device for allowing a subgroup of states concerned with North Sea issues to engage in a dialogue within the framework of the 1992 Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR) without including representatives of all the members of the convention. Held at the ministerial level and occurring at approximately three-year intervals, the conferences have developed a reputation as a place where informal but politically significant commitments are made. An interesting feature of this case in the context of this discussion of Arctic Ocean governance is that the North Sea Conferences provide a mechanism for limiting participation to a subgroup of essential actors as a means of avoiding complications arising from the inclusion of all the members of OSPAR. What is needed in the case of Arctic Ocean governance, by contrast, is a mechanism for listening to the voices of actors that are not formal members of a grouping such as the Arctic 8.

Finally, there are opportunities for organizing informal caucuses or affinity groups that address matters of ongoing concern and that meet on the marginsof broader gatherings that take place on a regular basis. In the case of the Arctic, an option worthy of consideration would be to nest an Arctic caucus intoa larger, recurrent gathering like the G8, the G20, or the Asia-Pacific Economic Cooperation (APEC) forum. It would be relatively easy to operate an Arctic caucus on the margins of one or another of these meetings without generating a lot of publicity, creating unrealistic expectations on the part of interest groups concerned with one or another Arctic issue, or undermining the role of the Arctic Council as the principal forum for addressing matters of international cooperation in the Arctic.

None of these examples provides a pre-packaged solution to the puzzle of how to listen to the voices of non-Arctic states in Arctic Ocean governance, without distorting or disrupting existing arrangements like the Arctic Council. Any informal consultative mechanism created to address this puzzle will have to be crafted to meet the circumstances of the case at hand. But what these examples do make clear is that informal consultative mechanisms are not only politically feasible in a variety of settings but also capable of playing a constructive role in addressing important issues that are hard to deal with in more formal settings. Though such mechanisms lack the authority to make formal decisions, they can and do offer ways forward in facilitating cooperation where the more formal arrangements are ineffective.

A concrete initiative would be timely

What is the next step in dealing with the puzzle under consideration here? Though there is no simple much less correct answer to this question, there is a good case for responding to the question now with a concrete initiative. While explicit forecasts are impossible, it seems clear that Arctic Ocean development, including commercial shipping as well as the extraction of oil and gas, will move forward in the coming years. The involvement of non-Arctic states and multinational corporations in this process is unavoidable. What is needed is a mechanism to maximize the benefits of this development in a manner that is sensitive to the triple bottom line of sustainable development. One constructive step would be to establish an informal Arctic Ocean Forum (AOF), designed to serve as avenue in which representatives of non-Arctic states could set forth their views and in which dialogue among representatives of Arctic and non-Arctic states could occur without interfering in any way with the more formal operations of the Arctic Council. Just as the Northern Forum provides a mechanism for articulating the concerns of subnational units of government (e.g. states, counties, territories, oblasts) and for allowing representatives of these units to interact both with one another and with representatives of national governments, the Arctic Ocean Forum could become an informal meeting ground for the discussion of Arctic developments that have trans-boundary or international implications along with broader international developments that have Arctic implications.

The mission of the AOF would be to serve as an informal setting in which representatives of Arctic and non-Arctic states could engage in interactions designed to identify emerging issues of mutual concern, frame these issues in a manner conducive to effective policymaking, canvass innovative responses to the issues, and explore the prospects for resolving them in a cooperative manner. The dialogue occurring within the AOF should take the form of a two-way street. The issues considered should involve not only the interests of non-Arctic states in the development of Arctic resources (e.g. the rules governing commercial navigation in the Arctic, the regulations pertaining to oil spill prevention, preparedness, and response) but also the responsibilities of non-Arctic states for actions affecting the well-being of Arctic communities (e.g. the European Union's ban on the importation of seal products, emissions of black carbon). To ensure its relevance to Arctic policymaking, the AOF could organize meetings both in the run-up to Arctic Council ministerial meetings as a means of making known the views of non-Arctic states and in the aftermath of ministerial meetings to consider the broader implications of the council's actions (or inactions).

Some simple terms of reference should suffice to govern the activities of the AOF. A preliminary list might include the following:

- Those attending sessions of the AOF should participate in their personal capacities,
- Participants in sessions of the AOF should include individuals associated with non-state actors (e.g. indigenous peoples' organizations, industry, environmental NGOs) as well as states,
- The AOF would have no authority to make decisions about Arctic issues, formal or otherwise,
- Chatham House rules should apply to all proceedings of the AOF,
- Although sessions of the AOF might take place in a variety of settings, some of the sessions should take place in accessible Arctic locations (e.g. Iqaluit, Longyearbyen, Murmansk).

The A8 and key non-Arctic states as well as the European Union could launch the AOF as a joint venture. In the case of the A8, the way forward may be to assign the deputy ministers of the Arctic Council the task of exploring a range of informal mechanisms for listening to the voices of the non-Arctic states and coming up with recommendations to be considered at the 2013 Arctic Council ministerial meeting in Kiruna. Sweden, the current chair, is particularly well-placed to lead such an effort. Sweden is a member of the A8 but not the A5; it is a member of the European Union as well as the Arctic Council; it has a longstanding record of playing the role of facilitator rather than joining any particular coalition at the international level. Finding a way to recognize the growing links between the Arctic and the global system and adjusting existing arrangements for promoting international cooperation with regard to Arctic issues would be an important contribution of a sort that would be compatible with Sweden's traditional role in international affairs. Such an initiative would be compatible as well with the idea emanating from the May 2012 meeting of the deputy ministers suggesting that the 2013 Arctic Council ministerial meeting should adopt a "ministerial statement" reaffirming the terms of the Ottawa Declaration but also recognizing the changes that have occurred since 1996 and providing strategic direction for the next phase of international cooperation regarding environmental protection and sustainable development in the Arctic.

Conversely, key non-Arctic states (e.g. China, Japan, and Korea along with some of the European states) could take steps to launch this enterprise as a meeting ground allowing for dialogue and for the exploration of innovative arrangements for listening to the voices of non-Arctic states in Arctic Ocean governance. Given the argument of this chapter, any such effort must concentrate on effective communication rather than on the mobilization of pressure to consider changes in existing arrangements like the Arctic Council. One ongoing topic of interest would be evaluating the performance of the emerging Arctic Ocean regime complex in which different groupings of actors address issue-specific concerns (e.g. shipping, fishing, tourism) in the interests of moving the complex over time toward the integration end of the integration-fragmentation spectrum.

An intriguing option would be to get the ball rolling quickly and with a minimum of procedural complications by adopting the practice of Track 2 or back channel diplomacy and staging gatherings in which individuals from the Arctic states and key non-Arctic states are able to interact informally in the absence of elaborate preparations or any explicit approvals (Davidson and Montville 1981-1982).[20] In this connection, the North Pacific Arctic Conferences (NPAC) taking place at the East-West Center in Honolulu may constitute a promising development. The August 2012 session, for example, included thoughtful and well-connected individuals from Canada, Norway, Russia, and the United States and from China, France, Japan, and Korea who engaged in a substantial dialogue in their personal capacities over two days dealing with a range of Arctic issues. The East-West Center, formally an American organization, is dedicated to "... bringing people together to exchange views, build expertise, and develop policy options."[21] The center has a particular interest in cross-cultural communication. It is premature to make any predictions regarding the effectiveness of this informal meeting ground. Yet there is much to be said for proceeding in this realm on a highly informal basis that makes it possible to move forward quickly and to create conditions that allow a mix of individuals to form the personal connections and develop the sense of trust needed to foster substantive discussions of complex issues that do not degenerate into reiterations of well-known and uncompromising positions. An added benefit of this mode of engagement is that it would accommodate the inclusion of representatives of non-state actors, including indigenous peoples' organizations, industry, and environmental NGOs.

IN CONCLUSION

There is no simple solution to the puzzle of listening to the voices of non-Arctic states in Arctic Ocean governance. But simply ignoring the issue will not do. The transformative changes now taking place in the Arctic are tightening the links between this region and the global system. Whether we like it or not, the fate of the Arctic will be determined by our ability to manage these links in a manner that is responsive to the rights, responsibilities, and resources of all parties concerned. A strategy of attempting to govern the Arctic as a closed system cannot work. Finding ways forward that allow key non-Arctic states to have a voice in Arctic affairs while recognizing the legitimate interests of the Arctic states and supporting rather than interfering with the efforts of the Arctic Council must be a priority for the coming decade. Fortunately, there are ways forward that offer reasons for hope on the part of those endeavoring to solve this increasingly important puzzle.

Notes

1. An essay prepared for presentation at the "2012 North Pacific Arctic Conference," Honolulu, Hawai'i, 8-10 August 2012 and revised for publication in September 2012.
2. Research Professor, Bren School of Environmental Science and Management, University of California (Santa Barbara), 4518 Bren Hall, Santa Barbara, CA 93106-5131, USA—email: oran.young@gmail.com
3. Iceland is also a member of NATO but not generally regarded as an Arctic coastal state.
4. The 1996 Ottawa Declaration on the Establishment of the Arctic Council, for example, includes a footnote stating that "The Arctic Council should not deal with matters related to military security"—text available at www.arctic-council.org.
5. September 2012 brought a new record low in the proportion of the Arctic Ocean covered by sea ice.
6. The US Geological Survey, in a widely cited report, projects that the Arctic may contain up to 13% of the world's undiscovered oil, 30% of the undiscovered natural gas, and 20% of the undiscovered natural gas liquids (USGS 2008; Gautier et al. 2009). But it is important to note that these projections are not based on extensive fieldwork, much less exploratory drilling.
7. The shale gas revolution in North America, for example, has made the large gas cap on the North Slope of Alaska uneconomical to produce and ship for the foreseeable future. Developments in European energy markets appear to be playing a significant role in delaying the development of the supergiant Shtokman gas field in the Barents Sea.
8. For an account exploring both opportunities and risks associated with

Arctic development from the perspective of the business community see Emmerson with Lahn 2012.

9. See Young 2011 for a review of a collection of recent popular books on the future of the Arctic.
10. In 2012, the Chinese icebreaker “Snow Dragon” transited the Northern Sea Route from East to West in the course of a scientific expedition.
11. Brazil has signaled its intention to ratify the 1920 Spitsbergen Treaty as an initial step toward developing a presence in the Arctic.
12. Issues relating to the delimitation of coastal state jurisdiction over the seabed in the Arctic are under active consideration in the Commission on the Limits of the Continental Shelf established under Article 76 of UNCLOS.
13. Chinese commentators often draw a distinction between Arctic issues “... of a regional nature and those that have global implications” (Yang 2012).
14. Recent discussions of the agenda for the Canadian chairmanship of the council, which begins in 2013, have focused attention on the importance of strengthening the role of the Permanent Participants by providing them with the resources needed to play an active role in all the council’s activities (Gordon Foundation/Munk School of Global Affairs 2012).
15. The new criteria and rules pertaining to observer status are set forth in full in the Senior Arctic Officials (SAOs) Report to Ministers, Nuuk, Greenland, May 2011 (SAO Report 2011).
16. The Spitsbergen Treaty currently has 40 signatories. An earlier regime, the four-nation agreement on the conservation of fur seals breeding on islands in the Bering Sea established in 1911, collapsed in 1985 (Young and Osherenko 1993).
17. The Agreement on Cooperation in Aeronautical and Maritime Search and Rescue in the Arctic was signed at the Arctic Council ministerial meeting in May 2011. In formal terms, however, the council did not adopt this agreement (Arctic Council 2011).
18. These are the 1990 International Convention on Oil Pollution Preparedness, Response and Cooperation and the 1973/1978 International Convention for the Prevention of Pollution from Ships (MARPOL). Current thinking calls for an Arctic agreement on oil spill prevention, preparedness, and response to be linked to Article 10 of the 1990 convention.
19. The Arctic Ocean Review, scheduled for completion in 2013, is an Arctic Council project that may lead to innovative proposals regarding the integration of the Arctic Ocean regime complex. Information available at: http://www.aor.is.

20. Originally proposed as a means of addressing situations characterized by severe conflict, Track 2 diplomacy has come to refer to any situation in which informal engagement is used to avoid the rigid and somewhat stylized interactions of formal negotiations.
21. Information on the East-West Center, established in 1960 under the terms of an act of the US Congress and located adjacent to the University of Hawaii in Honolulu, is available at www.eastwestcenter.org.

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Comments on Chapter 6: American perspective

Robert W. Corell

The opening sentence of Professor Young's chapter sets a proper and vitally important framing for his contribution and the entire conference and presents a strategic governance issue that is a foundational consideration for the eight nations and indigenous peoples of the Arctic region:

> "An increasingly important puzzle confronting those concerned with Arctic Ocean governance centers on the search for an effective means to pay attention to the legitimate concerns of non-Arctic states, without interfering with or distorting existing cooperative arrangements like the Arctic Council."

The Arctic Council provides an institutional setting for such consideration, but may not be adequate in the view of its founding terms of reference that stated that the Arctic Council is a "High Level Forum" to promote cooperation, coordination and interactions amongst the eight Arctic nations and the six indigenous peoples' organizations of the Arctic. Its decision-making authority is limited to a consensus mode, though it has used the Arctic Council framework to develop a search and rescue agreement that is treaty-like. It is led by the directive of a bi-annual meeting of the ministers of foreign affairs of the eight Arctic nations, with the engagement of the presidents of the six indigenous peoples' organizations of the Arctic. The Council's actions are limited to those formally taken by the ministers of foreign affairs. The ministers and the Arctic officials give special considerations to the six indigenous peoples' organizations in all matters before the council as they are Permanent Participants in the work of the Council. During Council meetings, comments by Official Observers are invited (there are a few non-Arctic nations that are Official Observers with no authority other than to state their perspectives). In my view, the Arctic Council has historically been insular with respect to the issues of nations and peoples outside its own formal participants so it is imperative to address the increasingly important governance issues for other nations, as raised in the chapter, with attention to their socioeconomic interests, particularly in the northern hemisphere. As the chapter poignantly notes,

> "Major non-Arctic states (e.g. Brazil, China, India, Japan, Korea, and several European states) and intergovernmental

> bodies (e.g. the European Union), on the other hand, have growing interests in the Arctic Ocean relating to activities like commercial shipping, oil and gas development, industrial fishing, and ship-based tourism and feel that they have a legitimate claim to be consulted when it comes to addressing matters relating to the governance of such activities."

These are critical issues to be addressed and the chapter sets the tone for discussions at the conference on these vital governance and socioeconomic issues. These issues should, or perhaps, must be on the international foreign policy agenda for all the relevant and interested nations and peoples at least within the northern hemisphere. As Young's chapter states, adequate and effective resolutions will be difficult to address, and hence will require the development of an adequate institutional framework within which to address them.

MORE DETAILED OBSERVATIONS

The chapter posits an important idea that is described as the new Arctic policy agenda. After underlining the policy implications of the transformative changes now occurring in the circumpolar Arctic, Professor Young presents a section that describes the stances of the Arctic states regarding Arctic Ocean governance and argues that their current position does not provide an adequate institutional framing for an effective solution. Young then advances an analysis of alternative ways to move forward by describing two distinct, but not mutually exclusive, strategies. One strategy centers on roles that issue-specific international forums (such as the International Maritime Organization and the International Arctic Science Committee) can play in addressing specific matters relating to Arctic Ocean governance. The other strategy emphasizes the value of informal mechanisms that can provide a means for effective communication without running into the political difficulties that afflict efforts to devise more formal solutions. The concluding section proposes a practical way forward that all parties concerned may want to pursue in the near future.

Professor Young quite properly posits a series of well-documented issues that will set the foundations for developing an adequate solution for increased engagement of the non-Arctic states in Arctic Ocean governance. In summary, they include:

- ***There are unavoidable Arctic policy issues emerging:*** It has become clear that there arevery likely Arctic policy issuesemerging broader than those solely of interest to the eight Arctic nations and their peoples. Among the family of Arctic and non-Arctic nations these issues cannot be avoided.

- ***Climate and other and global change findings are now important:*** The Arctic has become a focus of global attention with the opening of the Arctic Ocean seaways due to the realities of global climate change.
- ***Arctic maritime shipping and related trade are now apparent:*** Marine issues have taken center stage, providing socioeconomic transformations for the five coastal Arctic nations (i.e., Canada, Finland, Norway, Russia and the United States and their peoples), while at the same time sustaining the deep interest and concern of the other three Arctic nations (i.e., Iceland, Finland and Sweden). What is transformational is that there now are many non-Arctic nations (e.g., Brazil, China, India, Japan, Korea, and several European states and the European Union as an international body, as well as the already mentioned Arctic Council observer nations of France, Germany, the Netherlands, Poland, Spain, and the United Kingdom) that have unavoidable socioeconomic interests in Arctic maritime shipping and related trade, as well as the rich natural resources (e.g., oil and gas as well as fisheries) of the Arctic Ocean and its nearby terrestrial environment.
- ***Sustainable development of the Arctic region may be at risk:*** Managed development is already overshadowing sustainable development for the region. Some of these issues are likely to be increasingly resolved by bilateral (e.g., the resolution of the disputed lands in the deep offshore of Norway and Russia as well as a fisheries agreement between these two nations), and multilateral agreements (e.g., Barents Euro-Arctic Council and the Barents Regional Council). Of equal and more substantive importance to non-Arctic nations will be international agreements or treaties that exercise their authority within the Arctic oceanic basin, such as International Maritime Organization (IMO) that as an United Nations specialized agency with responsibility for the safety and security of shipping and the prevention of marine pollution by ships or by United Nations Convention on the Law of the Sea UNCLOS (the United States has ratified but is not a member). Both have powerful potential for resolving issues in the Arctic oceanic region, for example the UNCLOS has the power of an international treaty that covers issues such as: ***(a) Internal waters*** at covers all water and waterways on the landward side of the baseline. The coastal state is free to set laws, regulate use, and use any resource. Foreign vessels have no right of passage within internal waters, ***(b) Territorial waters,*** set

by treaty to be out to 12 nautical miles (22 kilometers; 14 miles) from the baseline, where the coastal state is free to set laws, regulate use, and use any resource, ***(c) Contiguous zone*** which notes that beyond the 12 nautical mile limit there is a further 12 nautical miles from the territorial sea baseline limit, the contiguous zone, in which a state can continue to enforce laws in four specific areas: customs, taxation, immigration and pollution, ***(d) Exclusive economic zones*** (EEZs), which extend from the edge of the territorial sea out to 200 nautical miles (370 kilometers; 230 miles) from the baseline. Within this area, the coastal nation has sole exploitation rights over all natural resources, and ***(e) Continental shelf*** is defined by UNCLOS as the natural prolongation of the land territory to the continental margin's outer edge or 200 nautical miles from the coastal state's baseline, whichever is greater. Hence, a state's continental shelf may exceed 200 nautical miles until the natural prolongation ends. It is clear that some of the evolving maritime issues in the Arctic oceanic region may be addressed and resolved by either IMO or UNCLOS outside the purview of the Arctic Council. These are powerful matters to consider with respect to governance issues in the Arctic Ocean.

- ***Arctic policy is now on the front burner:*** As the chapter argues, Arctic policy is becoming a matter of high politics. Far more than ever before, Arctic nations have developed national Arctic policy documents (e.g., United States Arctic Policy of 2009, the European Union's Arctic policy that sets three main policy objectives: (a) protecting and preserving the Arctic in unison with its population, (b) promoting the sustainable use of resources, and (c) international cooperation). Further, there has been a number of conference (e.g., ranging from NATO's Conference on Environmental Security in the Arctic Ocean (2010) to the Newly Emerging Arctic Security Environment Report (2010) that was prepared at the request of the Canadian Defense & Foreign Affairs Institute and a book by James Kraska on Arctic Security in an Age of Climate Change and anArctic Security Public Opinion Survey on Rethinking the Top of the World). It is clear that Arctic policy and governance is now a hot topic from the self-interests of nations and analyses by third-party organizations.

- ***The Arctic nations are viewing policy as within their exclusive purview*:** The chapter makes a strong argument that the stance of the Arctic states is not tenable. As it is argued, that the strategy the five Arctic coastal nations the (the Arctic 5 or A5) have adopted and articulated with particular clarity is in the language of the

Ilulissat Declaration (May 2008). It amounts to arguing simultaneously that others should acknowledge their preeminence with regard to Arctic Ocean governance and that the A5can be trusted to handle Arctic policy matters in a manner that proves beneficial to the Arctic Ocean as well as to all those interested in the use of its resources.

- ***Non-Arctic nations have rights and interests:*** Various international treaties and agreements make it clear that non-Arctic states have acknowledged rights and interests in the Arctic, as a simple review of the substance of UNCLOS and IMO will confirm. The International Covenant on Civil and Political Rights in the UN Charter provides an overarching framework for the rights and prerogatives of nations.
- ***Non-Arctic nations also have Arctic responsibilities:*** Non-Arctic states also have Arctic responsibilities: first, as signatories of international treaties and agreements (e.g., IMO) and also as major contributors to the changing global climate conditions. Nations outside of the Arctic contribute substantially to these changes. For example, carbon emissions from fossil fuels are now demonstrably affecting conditions in the Arctic, such as the major reduction in the extent of sea ice and the melting of land-based glaciers that are contributing to sea level rise globally.
- ***The geopolitical realityis changing substantially:*** Geopolitical shifts are hard to ignore as major socioeconomic "powers" evolves to include the Plus Five nations (i.e., Brazil, China, India, Mexico, and South Africa), some of which have major interests in the Arctic region. The advent of "soft power," whereby nations are able to get others to share their desired outcome by co-opting rather than coercing them, contrasts with "hard power," which is the use of coercion and payment. There is emerging evidence that more soft power will be deployed by nations to obtain their ends.
- ***The membership in the Arctic Council appears to be set:*** The chapter argues convincingly that the Arctic Council membership is not negotiable. Observing the simple act of non-Arctic nations seeking official observer status in the Arctic Council seems to support the argument that the Arctic Council sees its membership fixed to the eight Arctic Nations, the permanent participants of the six indigenous peoples organizations, and the official observers who have no authority to influence policy other than interventions in the discussions. Little has been done to change this and it is not likely to change in the years ahead.

- ***Arctic Council observer status is a weak and ineffective mode for policy development:*** Clearly, for many of the issues discussed above it is clear that permanent Arctic Council observership is not the solution as it does not give status to nations in the normal fashion essential to policy development and adoption.

A WAY FORWARD

As noted earlier, Professor Young posits two ways forward that are worthy of serious consideration. One strategy involves focusing on the development of an Arctic regime complex as a means of addressing a variety of specific issues relating to Arctic Ocean governance. The other strategy features the development of an informal consultative mechanism that allows for non-Arctic voices to be heard without undermining or detracting from the work of the Arctic Council. The author suggests that these strategies are distinct but by no means mutually exclusive, but that an Arctic Ocean regime complex is possible.

The author's first approach is to explore the idea of developing what is known as a "regime complex" for the Arctic Ocean in which a number of issues are addressed through differentiable, yet related, governance arrangements. These regime complexes are collections of non-hierarchically related governance arrangements that deal with various aspects of a recognized issue domain or spatially-defined area, such as climate change. Where they have been deployed in Antarctica, the regime complex arrangements for governing the conservation of seals and the management of commercial fishing have been handled under the provisions of conventions (the Convention on the Conservation of Antarctic Seals and the Convention on the Conservation of Antarctic Marine Living Resources) that are not subordinate to the 1959 Antarctic Treaty. The management of ship-based tourism in Antarctic waters was implemented through the efforts of the International Association of Antarctic Tour Operators (IAATO) a non-governmental organization that has succeeded in establishing and implementing well-defined regulations covering the activities of owners and operators of ships carrying tourists in Antarctic waters. Similar issues are present in the Arctic from the now established Search and Rescue agreement to yet to be resolved issues such the management of ship-based tourism in Arctic, oil spill and pollution of Arctic oceanic waters, and conditions for transiting Arctic Ocean whether along coast waters or straight across the central Arctic Ocean. These are unresolved and may be candidates for "regime complex" agreements that do not challenge the prerogatives of the Arctic Council, but do address serious Arctic governance policy matters.

The author raises another strategy to enhance Arctic governance prospects that focuses on the development of "informal consultative mechanisms" that allow for non-Arctic voices to be heard without undermining or detracting from the work of the Arctic Council. While there is not a range of experiences from which to draw guidance, the author suggests that there are issues that can potentially provide guidance for the voices of non-Arctic states to be heard in Arctic Ocean governance, such as (a) a working group along the lines of the Working Group on Arctic International Relations, (b) a committee like the Standing Committee of Parliamentarians of the Arctic Region, (c) the Commission on Security and Cooperation in Europe, (d) the North Sea Conferences operating within the ambit of the OSPAR Convention, (e) the World Economic Forum and the World Social Forum, and (f) an Arctic caucus or a North Pacific Arctic caucus operating within a broader forum like the G20. These constructive proposals should be to be explored.

A CONCRETE PROPOSAL TO EXPLORE ENHANCED WAYS TO ENGAGE NON-ARCTIC NATIONS IN RELEVANT ARCTIC OCEAN POLICY DEVELOPMENT

The author posits the establishment of an Arctic Ocean Forum (AOF) and notes that Arctic Ocean development, including commercial shipping as well as the extraction of oil and gas, will move forward in the coming years. The involvement of non-Arctic states and multinational corporations in this process is essential. The Arctic Ocean Forum (AOF) should be designed to serve as an informal venue for non-Arctic states to set forth their views and in which dialogue may be fostered among representatives of both non-Arctic states and Arctic states. The Northern Forum provides such a mechanism for articulating the concerns of subnational units of government (e.g. states, counties, territories, oblasts) and for allowing representatives of these units to interact both with one another and with representatives of national governments. The Arctic Ocean Forum could become an informal meeting ground for the discussion of Arctic developments that have international implications along with broader international developments that have Arctic implications. The AOF could serve as an arena in which representatives of Arctic states and non-Arctic states could engage in regular interactions designed to identify emerging issues of mutual concern, frame these issues in a manner conducive to effective policymaking, canvass innovative responses to the issues, and explore the prospects for resolving them in a cooperative manner. The issues considered should involve not only the interests of non-Arctic states in the development of Arctic resources (such as the rules governing commercial navigation in the Arctic, the regulations pertaining to oil spill prevention, preparedness, and response) but also the responsibilities of non-Arctic states for actions affecting the well-being of Arctic communities (for example, the ban on the importation of seal products, and emissions of black carbon). To facilitate the development of such a forum, the Dr. Young posits Terms of Reference (TORs) sufficient to govern the activities of the AOF. The establishment of the Arctic Ocean Forum would enable considerations of both creating a "regime complex" and formation of "informal consultative mechanisms."

SUMMARY THOUGHTS

The author has set forth a set of constructs and ideas that has the potential to stimulate serious dialogue and discussion at the 2012 North Pacific Arctic Conference. To suggest additional ideas for such discussions, the following is offered to stimulate such. The Arctic Governance Project (AGP), in which Dr. Young played a leadership role, developed a set of five policy recommendations that address issues relevant to this chapter and these discussions. They are outlined below with my comments based on perspectives gained over the past years that go beyond the AGP recommendation, and which hopefully address the central issues of the chapter and the conference dialogue.

1. **Honor, implement, and enhance existing Arctic governance systems**
   The AGP notes that good governance in the Arctic will be best served, at least for now, by honoring, implementing, and enhancing existing treaties among nation states, e.g. the United Nations Convention on the Law of the Sea (UNCLOS) and the United Nations Framework Convention on Climate Change (UNFCCC), other intergovernmental agreements, treaties and other arrangements between states and indigenous peoples, and relevant practices that together constitute a living network of relationships designed to promote sustainability, environmental protection, social justice, and responsible economic development in the Arctic and to recognize the rights of indigenous peoples to participate in decision-making.

   Comments
   The chapter and the discussions above reinforce the centrality of this recommendation of the AGP. While the Arctic Council has been a consensus-based forum, it has not and is not likely to become a central player in the development and implementation of Arctic Ocean policies. This is a strong recommendation and will likely serve the interest of non-Arctic nations.

2. Strengthen the Arctic Council

The AGP notes that the Arctic Council has been remarkably successful as a policy-shaping body. But there are opportunities to strengthen the Council's mission, scope, structure, and functions, including:

a. Reaffirm the primacy of the Arctic Council as the principal forum for the consideration of Arctic policy issues.

b. Reframe and broaden the mandate of the Arctic Council to include issues relating to security, health, and education and to highlight stewardship as the overarching objective of Arctic governance.

c. Take steps to enable the full participation of the Permanent Participants in all Arctic Council activities, including providing a funding mechanism to cover the costs of such participation.

d. Admit key non-Arctic States (e.g. China, Italy, Japan, Korea) as well as the European Commission to Permanent Observer status in the Arctic Council.

e. Establish more systematic and efficient procedures for communicating with local and regional authorities and administrators in the Arctic.

f. Create explicit mechanisms to provide regular input from the business community and environmental organizations in the deliberations of the Arctic Council.

g. Institutionalize integrative and holistic perspectives in Arctic policyprocesses; assemble data and develop analytic tools needed to do so.

h. Establish a reliable funding mechanism for the Arctic Council, so that the Council can select and launch projects without relying on the willingness of individual members to contribute to projects on a case-by-case basis.

i. Establish a permanent secretariat for the Arctic Council located in a member state.

j. Hold a meeting of the Arctic Council at the level of heads of state and government at the first available opportunity.

Comments

The chapter and the discussions above reinforce the centrality of this recommendation of the AGP. The ministers of foreign affairs at their 2011 ministerial meeting in Nuuk, Greenland addressed some of these recommendations and hence strengthen their role in Arctic affairs. However, the agenda of the 2012 North Pacific Arctic Conference and the interests of many of the non-Arctic nations attending will not be adequately served by existing Arctic Council strategies. I believe that the Arctic Council has the potential to better serve all Arctic interests for Arctic and non-Arctic nations in the long term. I suggest that greater pressures should be placed on the Arctic Council to more effectively serve these broad interests. This might include, subject to adequate Terms of Reference, raising the status of non-Arctic nations to a level adequate to enable the non-Arctic nations to directly participate in policy development (for example, to the level of Associate Arctic Nation). Further, the official observer status should be redefined so that there is differentiation among the various types of observers from the scientific and technical to NGOs. All have profoundly important roles to play in the deliberations of the Arctic Council and to the development of Arctic policy. The UN bodies might be venues to suggest these expansions of the roles and mandates for the functioning of the Arctic Council.

3. **Establish regulatory mechanisms to address proactively key functional and sectoral issues through appropriate international bodies**
The AGP notes that there are good reasons to establish regulatory mechanisms in anticipation of economic development and industrial activities in the Arctic along with the emergence of new issues of environmental protection. The way forward in this realm is to work through existing intergovernmental bodies where possible and to focus on the most important and promising areas first. Developing a legally binding Polar Code covering Arctic shipping and including strong environmental protection measures under the auspices of the International Maritime Organization is a good place to start. Legally binding agreements on search and rescue (SAR) and emergency responses should be included as a part of this effort. Other areas, such as fishing and tourism, may require the development of free-standing bodies, much like the International Association of Antarctic Tour Operators (IAATO).

Comments
The chapter and the discussions above reinforce the centrality of this recommendation of the AGP and this recommendation is well discussed in the author's chapter including the "regime complex" and the "informal consultative mechanism." The Polar Code would be an added benefit established in the spirit of the UN's legally binding agreements and treaties.

4. Institutionalize the science/policy interface in the Arctic
The AGP notes that science has played an important role in the development of Arctic policy. The work of the Arctic Monitoring and Assessment Programme (AMAP) is a clear case in point. But there is a need to establish a closer relationship between science and policy to ensure that research agendas focus on issues of clear relevance to policy and that scientific findings are conveyed on a regular basis to policymakers in a manner that emphasizes their implications for making and implementing policies. The Arctic Council provides an excellent forum for experimenting with procedures designed to achieve this goal. This should lead over time to the development of a broader Arctic science agreement to promote, on a cooperative and transparent basis, enhanced interactions between science and policy relating to the protection of ecosystem services, the pursuit of sustainable human-environment relations, and, more generally, the achievement of stewardship in the Arctic.

Comments
The chapter suggests the centrality of this recommendation of the AGP. Science and knowledge developed therein are a fundamental foundation for the development of Arctic policies, particularly those regarding the Arctic Ocean. A far reaching action by the Arctic Council would be to establish the International Arctic Science Committee (IASC), the International Arctic Social Sciences Association (IASSA), and possibly others when appropriate as official scientific advisors to the Arctic Council. A range of arrangements should be considered, from a special category of science advisors to the Arctic Council to creating associate working groups of the Council with responsibilities that parallel the Council's current working groups but augment their range of responsibilities. The motive is simply to strength the direct input of science from responsible bodies into the policy development process. An adequate set of Terms of Reference would be essential.

5. Create non-governmental Arctic stakeholder forums or roundtables to-build trust and stimulate dialogue on Arctic issues
The AGP notes that there is a need for mechanisms to promote interactions among individuals interested in the Arctic in off-the-record and relaxed settings to build trust among a wide range of actors, to facilitate knowledge exchange, to encourage innovative thinking, and to stimulate learning among those concerned with Arctic issues. The goal is to enrich the efforts of bodies like the Arctic Council rather than to dilute ordetract from their efforts.

Comments
The chapter and the discussions above reinforce the centrality of this recommendation of the AGP. Dr. Young effectively addresses many of these issues in his chapter.

The chapter, “Listening to the Voices of Non-Arctic States in Arctic Ocean Governance: Sorting out the role of non-Arctic states in Arctic Ocean governance presents a puzzle” by Oran R. Young presents a powerful set of issues for the 2012 North Pacific Arctic Conference.

Comments on Chapter 6: Canadian perspective

Bernard W. Funston

INTRODUCTION

Professor Young’s chapter, entitled “Listening to the Voices of Non-Arctic States in Arctic Ocean Governance,” presents a very useful identification and analysis of a number of current Arctic governance issues. He examines the high-level political forum constituted by the Arctic Council and its relationship to Arctic Ocean governance. The chapter offers practical suggestions for ways forward.

This commentary supports many of the conclusions in Professor Young’s chapter but differs on the potential role of the Arctic Council to accommodate non-Arctic state voices. On the one hand, Professor Young rejects the Arctic Council as a body to handle many aspects of Arctic Ocean governance (“The Council lacks the capacity to make authoritative decisions, and its access to material resources remains limited.”). On the other hand he concludes that efforts to reform or evolve the Council to better accommodate non-Arctic state voices are “non-starters” or are inadequate to address the governance issues he identifies.

He sets the stage by observing that: “Major non-Arctic states⋯have growing interests in the Arctic Ocean relating to activities like commercial shipping, oil and gas development, industrial fishing, ship-based tourism, and environmental protection and feel that they have a legitimate claim to be consulted when it comes to addressing matters relating to the governance of such activities.”

However, the chapter notes that: “The Arctic states and especially the five Arctic coastal states⋯have taken vigorous steps to assert their control over all matters of governance relating to the Arctic Ocean and its marginal seas."

Interestingly, Professor Young acknowledges that an "Arctic Ocean regime complex" is emerging. Indeed, it has been in place for some time. As the Arctic Council's *Arctic Ocean Review Phase I Report* (2009) illustrates, there are numerous binding and non-binding international and regional instruments relating to the Arctic, not the least of which is the UN *Convention on the Law of the Sea*. This is indeed what the group of five Arctic states were driving at when they issued the *Ilulissat Declaration* in May 2008.

By its very existence, an Arctic Ocean regime complex goes some way to refuting suggestions that non-Arctic states have had no voice in Arctic governance. As member states to international instruments, they have already played a significant role in establishing the legal frameworks and principles which constitute the governance regime in this region. Contending that non-Arctic states have no voice in Arctic affairs overlooks the ongoing roles they play in implementing and regulating trade, commercial shipping, oil and gas development, trans-boundary pollutants, industrial fishing, ship-based tourism, climate change and environmental protection under existing conventions such as the International Maritime Organization, United Nations Framework Convention on Climate Change, United Nations Convention on the Law of the Sea and so on.

However, in speaking about Arctic Ocean governance it is important to distinguish between global and regional or local matters. Professor Young's chapter seems to call for a greater role for non-Arctic states in governing affairs and setting policy within the region, notwithstanding the sovereignty and sovereign rights of Arctic states, through some sort of comprehensive forum for coordinated policy discussions. One task for this more inclusive policy forum, it appears, would be better integration of the elements of the existing Arctic Ocean regime complex. His chapter does not go into detail as to what a greater role for non-Arctic states would entail.

Although the title of Professor Young's chapter seems to be about seeking a solution to the puzzle of non-Arctic states having a voice in Arctic governance, the new Arctic Ocean Forum (AOF) he proposes appears to be oriented more towards civil society having a voice in Arctic governance. He suggests that participants appear "in their personal capacities" and observe Chatham House rules. So presumably any Arctic or non-Arctic government officials who attend would not be representing state interests.

This proposal for a new Arctic Ocean Forum begs several questions: Would states really want to send their officials to participate in their personal capacities? Would such a forum be afforded any weight among Arctic or non-Arctic states? Would representatives of NGOs, business and indigenous groups also appear in their personal capacities or would they be expected to represent their organizations' interests? What would such a forum add in relation to enhancing non-Arctic State voices in Arctic Ocean governance?

The process of creating a new forum could be expected to raise the same sorts of time-consuming issues the Arctic Council faced during its founding negotiations: who is allowed in; what would be the rules of procedure; how will the forum speak on complex issues where there is no consensus; who will organize and pay for the meetings; how will the forum conduct its intersessional work; would there be a role for Permanent Participants from non-Arctic states; etc., etc.? Would Arctic states want to participate in both the Arctic Council and a new AOF?

If an Arctic Ocean Forum were constituted along the lines recommended in Professor Young's chapter, the high level of informality could work at cross-purposes with the overall objective stated by Professor Young, namely more integration and formalization of the Arctic Ocean regime complex.

Nonetheless, there will always be a role for dialogue and information sharing, particularly in relation to emerging Arctic issues. Professor Young is quite correct when he articulates the global importance of the Arctic region. An Arctic Ocean Forum could be a useful mechanism, but respectfully it does not seem to be the solution to the puzzle posited in Professor Young's chapter.

THE PROMISE OF THE ARCTIC COUNCIL

It must be recalled that the Arctic Council itself is an existing informal mechanism for high-level policy discussion on the Arctic. Some suggestions are offered in this commentary for the creation of "trans-regional mechanisms" within the Arctic Council to foster greater scientific cooperation among Arctic and non-Arctic interests as a means to realize the contributions of Observers, in particular, non-Arctic states, within the Council. This scientific cooperation can advance policy-relevant dialogue between Arctic states and the international community, just as it has done so among Arctic states within the Arctic region. These trans-regional mechanisms have the potential to strengthen the Arctic Council without unduly altering the delicate balances among Arctic States, Permanent Participants and Observers within the Council.

Professor Young's chapter characterizes the current situation as a "puzzle." Characterizing the current geopolitical situation as a puzzle is actually a helpful, positive approach that offers hope of a solution. A puzzle can be 'solved' by the correct movement and orientation of the pieces. However, some puzzles are more complicated than others.

I would characterize the situation as a "paradox" rather than a "puzzle." A paradox is defined as "A thing conflicting with perceived notions of what is reasonable or possible." The early promise of the Council as a regional forum that could engage the international community on Arctic issues of a global nature has retreated at the very time when it should be moving forward. What accounts for this paradox?

On the one hand, there is some evidence that many of the Arctic states were caught unprepared by the speed of change in the Arctic and the dramatic escalation of global interest in the region. One indicator of this unpreparedness was the issuing of the Ilulissat Declaration in May 2008. The need for the Ilulissat Declaration arose from a growing perception outside the Arctic region that there was a governance void at the top of the world. To the consternation of Arctic states, this misperception had fuelled calls for some sort of Arctic treaty or Arctic charter to correct the situation. The Ilulissat Declaration was meant to show that everything was under control.

A second indicator of unpreparedness was the sudden outpouring of Arctic policies and strategies after 2009. Admittedly many of these strategies and policies had been in preparation for a number of years but there had been no real urgency to complete them. Again, the desired effect was to demonstrate that everything was under control.

The awkward handling of the Observer issue within the Arctic Council is arguably a third indicator of unpreparedness. If we look at the original political consensus that formed the Council (see below), it is arguable that the intention was indeed to include non-Arctic states and non-Arctic voices. However, through a series of internal missteps this original purpose has been frustrated.[1]

Some of the other factors that have created this paradox are well documented in Professor Young's chapter.

IS THE ARCTIC COUNCIL A GOVERNANCE BODY?

Professor Young's chapter correctly identifies a suite of issues within a rubric of Arctic governance. Governance is a deceptive word and at times suggests a level of order and clarity that belies reality. The Arctic Council is characterized in its founding Declaration as a "high level political forum." However, for the first decade of its existence the Council was more of a cooperative science body than a policy or governance body. The expectation that the Council should play a role in governance is arguably a recent one. Some commentators[2] (Molenaar 2012) have argued quite convincingly that an Arctic Council System, akin to the Antarctic Treaty System, has slowly emerged. Professor Young's description of an Arctic Ocean regime complex echoes this conclusion.

BACKGROUND

The observer issue was one of the most protracted items of discussion during the negotiations of the Arctic Council Rules of Procedure from 1996 to 1998. At the time, concerns tended to focus on the potential of NGOs to disrupt the work of the Council. The admission of non-Arctic states to the roster of Observers was not particularly troublesome.

Only four years after the Council was established the Barrow Declaration in 2000 requested "that the SAOs with assistance from the chairs of the Arctic Council subsidiary bodies, consider and recommend, as appropriate, ways to improve how work is structured in the Arctic Council and present a report at the next Ministerial Meeting."

The Haavisto Report[3], prepared during the Finnish Chairmanship from 2000 to 2002 in response to this Ministerial request, noted under the heading "The Arctic goes Global": "In recent years there has [sic] been significant processes in international politics which have highlighted the role of the Arctic and brought the Arctic issues on to the global stage. When planning the future of the Arctic cooperation, these trends shouldn't be neglected. Even if globalisation can be seen as a threat from the Arctic perspective, it can also create new possibilities for further developing Arctic cooperation."

The 2006 SAO Report to Ministers contained the following recommendations:

- "Encourage the Chairman of the SAO's to continue, in that capacity, outreach efforts of the Arctic Council aimed at the international community, regional organizations and academic and research communities with the aim of increasing awareness of the work of the Arctic Council and exploring possibilities for cooperation."
- "Continue to strengthen relations with Arctic Council observers and review applications of countries and others interested in becoming observers to the Arctic Council."

At the Arctic Council meeting in Copenhagen in May 2010 the Deputy Ministers tasked the SAOs to produce a document to address four issues, one of which was: "The role of observers and the format for their participation". This document was to be presented to the Ministers at their meeting in Nuuk in 2011 and was to be the basis of decisions to resolve the Observer question. However, in Nuuk the

Ministers decided, within a new "Framework for Strengthening the Arctic Council," to impose new criteria on the admission of Observers. The Nuuk Declaration states: "Adopt the recommendations of the Senior Arctic Officials (SAOs) on the role and criteria for observers to the Arctic Council as set out in Annexes to the SAO Report, and decide to apply these criteria to evaluate pending applicants for observer status."

EVOLUTION OF THE ARCTIC COUNCIL

It is natural for a body such as the Council, that was in many ways ahead of its time, to attract more attention as the issues which it addresses grow in national, regional and global importance. This evolution was anticipated in the founding declaration and the original Rules of Procedure of the Arctic Council. The preamble to the 1996 Declaration contains various commitments and recognizes certain realities. The general goal of the states was summarized in the preamble as "Desiring to provide for regular inter-governmental consideration of and consultation on Arctic issues." Article 1 of the 1996 Declaration stated, inter alia, that:

> The Arctic Council is established as a high level forum to:
> provide a means for promoting cooperation, coordination and interaction among the Arctic States, with the involvement of the Arctic indigenous communities and other Arctic inhabitants on common arctic issues, in particular issues of sustainable development and environmental protection in the Arctic.

The 1996 Declaration also included certain structural and procedural elements:

- The Council is to be composed of Arctic states, Permanent Participants and Observers.
- Decisions of the Arctic Council are to be by consensus of the Members states.
- The Arctic Council should regularly review the priorities and financing of its programs and associated structures.

Can current realities and issues surrounding Observers be resolved through normal evolution of the processes and structures established by the original framework for the Council, or are reforms and amendments to this framework needed? Many, if not all, current challenges could probably be met through creative approaches based, for the most part, on the founding documents and existing Rules of Procedure of the Council.

The Arctic Council emerged from scientific cooperation under the Arctic Environmental Protection Strategy. In its first decade of operation (1996 to 2006), it is arguable that the Arctic Council was, to a large degree, a body for scientific cooperation, albeit with important policy relevance. The relatively low national and international profile of Arctic issues during this initial decade allowed the Council to develop a remarkable corpus of cooperative scientific work.

However, the upsurge in Arctic awareness in national and global affairs after 2006 appears to have created even greater pressures in many quarters for the Council to become a high-profile policy body.

The continuity of the Arctic Council has come primarily through the substantive work of the Council's working groups. There have been many changes of governments in the Arctic states and many changes to the various positions and approaches to the issues facing the Council.

Amidst this change, scientific cooperation has allowed working groups to complete numerous impressive assessments, projects and activities in a relatively neutral realm. It is the shared achievements on this substantive scientific work, it can be argued, which have increasingly facilitated cooperation on policy issues at higher levels in the Council.

The debate as to whether science should lead policy, or follow it, is not particularly fruitful. Science can inform policy and policy can help direct science. There are strong examples both ways. In the context of the Arctic Council, the scope and nature of cooperation in general has been a success story.

Nonetheless, a range of pressures appear to be pushing the Council to question its structures and operations with some of the following consequences:

- There is an apparent growing gap between the priorities and agendas of the SAOs and those substantive scientific work elements assigned to Working Groups in their work plans and Ministerial Declarations.
- There appear to be an increasing number of occasions when Working Groups are outside the room for key discussions.
- Confusion has arisen as to the appropriate number and role of Observers within the Council. (For example, the apparent decision during the Danish chairmanship, 2009-2011, to make all Observers ad hoc created uncertainty as to whether they could properly attend working group meetings during the inter-sessional period between SAO meetings. *Ad hoc* Observer status under the original rules expired at the end of each SAO meeting. Therefore, techni-

cally *ad hoc* Observers were no longer accredited under the Rules of Procedure to attend any Working Group meetings which might fall between SAO meetings.)

- There are concerns among some Permanent Participants that their roles could be marginalized if more voices are heard around Arctic Council tables.
- Pressures and expectations appear to be growing, in various quarters, for the Council to speak with a collective voice about Arctic issues and to act more like a governance body.
- Pressures and expectations also appear to be growing, in various quarters, for the Council to increase its profile and become more visible regionally and globally.

THE ROLE OF OBSERVERS AND THE FORMAT FOR THEIR PARTICIPATION

The Observer question is not a new one. The role and format for Observer participation was a key part of the original negotiations leading to the creation of the Arctic Council. What was the original political consensus respecting Observers at the time the Arctic Council was established? This consensus of the Arctic states is contained in the founding declaration signed in Ottawa in September 1996 and in the Rules of Procedure agreed to in Iqaluit in September 1998.

It is important to make a clear distinction between questions relating to whether or not a particular entity should be granted Observer status within the Council in the first place, and questions relating to their participation and contributions following admission.

The category of Observer was created for entities "that the Council determines can contribute to its work." [Rule 36].

It would be anomalous to require Observers to contribute to Council work, but then create conditions that prevent them from doing so. In considering how best to address the issue of the role of Observers and the format for their participation, it is necessary to determine how this existing requirement (namely that they contribute to Council work) can best be operationalized.

It was clear from the negotiations to establish the Council that the decision as to which entities could become Observers was a purely political one. The formulation of a broad test, together with the consensus rule, made this so. Openness and transparency were to be constrained by the need for consensus.

Some early political tensions between certain NGOs and certain Arctic states were quietly resolved in bilateral discussions and resulted in eventual Observer accreditation of the NGOs in question. Whereas other organizations that had objectives at odds with the Arctic states or the Permanent Participants, as was the case with some animal rights organizations, were repeatedly denied observer status. The test as to whether a potential observer "can contribute to its [the Council's] work' was never intended to be based on a set of objective criteria.

The Nuuk decision in 2011 to adopt Observer criteria has not really added objectivity to the process. The new criteria have simply imposed some difficult-to-measure conditions which are still evaluated within a political framework. Indeed, it is arguable that some of the new criteria might not, in some cases, be met even by some of the Arctic states themselves.

There do not appear to be any structural defects in the Rules that prevent Observers from contributing to the work of the Council. Rather, as a matter of practice, the Council and its Chairs have applied Rule 38 to allow short interventions from some Observers at the end of the meeting after substantive agenda items have been concluded.

However Rules 37 and 38 contain language which could support a broader engagement. Rule 37 provides that "Observers shall be invited to the Ministerial meetings and/or to other meetings and activities of the Arctic Council." Rule 38 permits them to "submit relevant documents to the meetings." These rules apply not only to SAO and Ministerial meetings, but also to the meetings of the working groups, task forces and other subsidiary bodies.

Therefore, within the existing rules and structures of the Council, there is room to be creative about the mechanisms to ensure that Observers can play a role commensurate with the requirement that they contribute to the work of the Council. Any such mechanisms would need to take into account the number of Observers currently recognized by the Council as well as the range of issues that are likely to be of common interest to them and Council.

An important objection to increased Observer engagement has been raised in relation to potential overshadowing or reducing of Permanent Participant engagement. However, it must be recalled that the role of Permanent Participants is not in jeopardy. It is set out in clear terms in the 1996 Declaration and also in Rule 5 which states:

"Rule 5: In accordance with the Declaration, the category of Permanent Participation is created to provide for active participation and full consultation with the Arctic indigenous representatives within the Arctic Council. This principle applies to all meetings and activities of the Arctic Council."

Historically, funding and capacity issues have been the major obstacles to realizing active participation and full consultation with the Arctic indigenous representatives within the Council. Efforts to enhance the effectiveness and efficiency of the Council therefore also need to include ways to address these issues.

In the proper circumstances and with well-designed mechanisms, Permanent Participants could actually have their voices enhanced, not diminished, by finding ways to facilitate Observer contributions to the work of the Council and to better engage in dialogue with them on these important trans-regional issues.

As the Council has evolved and Arctic issues have become more mainstream in global affairs, trans-regional issues and non-Arctic issues are repeatedly identified as major drivers of change in the circumpolar North.

One driver is generally emphasized above all others: climate change and variability. Another important driver which is often overlooked is globalization. Climate change and globalization are at the root of many of the issues which the Arctic region (and non-Arctic regions) will face in relation to interests in Arctic lands and marine areas in years to come. It is precisely this situation that has both attracted external attention to the Arctic Council and placed pressure on it to provide leadership and responsive attention to Arctic-relevant issues.

The distinction between "Arctic-relevant" and "Arctic-based" issues is an important one. Arctic-based issues, by definition, involve matters that occur in the Arctic. However, as climate change, trans-boundary contaminants, resource demands, expansion of international transportation routes, thermohalene circulation changes, loss of biodiversity, ecosystem changes and other issues illustrate, many of the most profound influences in relation to Arctic change cannot be confined by clear geographical lines.

Opening a broader dialogue that goes beyond the traditional Arctic-based focus will require careful political and technical planning.

TRANS-REGIONAL MECHANISMS

As an initial step to realize the potential contributions of Observers, consideration could given to creating, within the Council and its working groups, one or more "trans-regional mechanisms" to encourage cooperation that will help build information and knowledge relating to non-Arctic issues that affect the Arctic, and Arctic issues that affect other parts of the planet. What might a "trans-regional mechanism" look like? It could have two elements:

a) a mechanism for political cooperation between the Arctic Council (at the level of Ministers, Permanent Participants and SAOs) and the member states of such organizations, for example, as the

International Council for the Exploration of the Sea (ICES) and the *North Pacific Marine Science Organization* (PICES)[4]; and

b) a mechanism for scientific cooperation with the working groups of the Council and the appropriate scientific subsidiary bodies of such organizations, for example, as ICES and PICES, so as to encourage substantive work on agreed upon "Arctic-relevant" issues.

This approach is based on the interconnections between the Arctic region and two important marine areas, namely the northwest Pacific and the North Atlantic. The objective of these trans-regional mechanisms would be to connect the agendas and activities of the Arctic Council and other existing organizations that already engage in cooperative science in the northwest Pacific and North Atlantic.

For example, ICES is the prime source of scientific advice on the marine ecosystem to governments and international regulatory bodies that manage the North Atlantic Ocean and adjacent seas[5]. Members[6] include all coastal states bordering the North Atlantic and the Baltic Sea, including all eight Arctic states, and a number of European states that are Arctic Council Observers. These Arctic and non-Arctic states can build interlocking regional organizations that have mutually reinforcing Arctic-relevant programs. A focus on science could produce the positive policy-relevant interactions that have characterized the Arctic Council's development.

Similarly, PICES is an intergovernmental scientific organization to promote and coordinate marine research in the northern North Pacific and adjacent seas. Its present members are Canada, Japan, the People's Republic of China, the Republic of Korea, the Russian Federation, and the United States of America.

Work volumes, priority setting, meeting frequency, funding issues and so on will have a bearing on operationalizing this approach. However, within the Arctic Council, Observership could become a bond rather than a division. Creating the trans-regional mechanisms within the Arctic Council would also allow Permanent Participants to contribute to the cooperative trans-regional agendas and activities. The reporting out on this work undertaken in the "trans-regional mechanism" could be included in the normal Working Group reports to SAOs and Ministers. Acknowledgement of Observer contributions and perspectives could thereby be taken into account in the main body of the reports to meetings without requiring lengthy interventions by Observers at the conclusion of meetings. Rule 38 would continue to allow the Chair to recognize appropriate interventions by Observers during meetings.

As trans-regional and Arctic issues grow in importance and profile, it will be increasingly important for Arctic states and non-Arctic states to demonstrate broad cooperation on challenging scientific and policy issues.

THE ARCTIC IS NOT A CLOSED SYSTEM

The Arctic should be viewed as a barometer that is highly responsive to other global processes. Quite simply, the solutions to some Arctic problems cannot be implemented by actions in the Arctic. On the other hand, non-Arctic regions may be unable to address some of their pressing problems without giving due attention to the Arctic.

The blurring of the line between the far north and the rest of the planet is a critical development that carries with it a range of important new considerations that mark the transition from a boutique issue to a mainstream issue. The perception of an accessible Arctic has certainly put the region firmly on the global geopolitical agenda. The potential for rapid economic development in the Arctic as a result of high world prices for energy and minerals, and easier access to resources as a result of climate change, raises numerous questions relating to environmental, social, and cultural impacts of development in an ecologically fragile and culturally vulnerable region.

While geographers have ongoing debates about where to draw the dividing line between the Arctic and non-Arctic, this commentary recommends we step back from this debate about dividing lines. The presence of some sort of "Arctic Circle" demarcating the southernmost limit of the Arctic has tended to "ghettoize" the region, setting it aside as a boutique issue that is often viewed in isolation, apart from mainstream national and international affairs. What happens in the Arctic does not stay in the Arctic, and vice versa.[7]

Perhaps the true potential of the Arctic lies in the lessons it provides regarding humanity's voracious appetites. It is a clarion call to a reappraisal of our approach to consumptive growth. The Arctic will not be saved by building a wall around it, nor by focusing only on governance within the region. This is another reason that this commentary has characterized the Arctic as a paradox, not as a puzzle. We need to acknowledge that the Arctic is a region which helps open a dialogue on how we govern outside the Arctic and for this to occur the voices of non-Arctic states must be heard.

Notes

1. However, it is important to note that the Nuuk Declaration established a Task Force to deal with some of these issues.
2. Molenaar, E. J., Current and Prospective Roles of the Arctic Council System within the Context of the Law of the Sea. The International Journal of Marine and Coastal Law 27 (2012) 553–595.
3. Pekka Haavisto, Review Of The Arctic Council Structures, 2001, p. 23

4. ICES and PICES are used here as examples because the member states under these conventions include many of the Arctic states and the non-Arctic states that have shown interest in Arctic affairs.
5. See http://www.ices.dk/aboutus/aboutus.asp
6. The member states are Belgium, Canada, Denmark (including Greenland and Faroe Islands), Estonia, Finland, France, Germany, Iceland, Ireland, Latvia, Lithuania, the Netherlands, Norway, Poland, Portugal, Russia, Spain, Sweden, the United Kingdom, and the United States of America. Each of the member state is represented by two delegates on the ICES Council. The ICES Council is the principal policy and decision-making body of ICES. The Affiliate Countries are: Australia, Chile, Peru, and South Africa.
7. Fenge, Funston, and Young. Promoting Sustainable Development in the Circumpolar Arctic, April 2008, unpublished.

Comments on Chapter 6: European perspective

Arild Moe

The question of appropriate and effective governance of the Arctic Ocean can be approached from different angles. One angle is to ask who should be legitimate participants in governance. The Arctic Council emerged in the wake of larger international processes—the easing of tensions towards the end of the Cold War, as well as growing concern for the environment, sustainable development, and protection of indigenous people. The Council was from the outset not intended as a body addressing "all things Arctic," but had an explicit focus on the environment. After an initial wave of enthusiasm, the Council lived a fairly quiet existence. Lack of interest in ministerial meetings was demonstrated by low-level attendance by some of the members, particularly the US. The studies and reports convened by the Council attracted attention though, but more as broad and solid documentation and production of knowledge than as input to political processes.

This state of affairs came to an end not many years ago. The members of the Council now give much more attention to the Council. The most striking turn has been in U.S. policy. The U.S. government now seems intent to use the A8 format for discussions concerning the Arctic and is ready to expand the scope of activities in the Council. Several countries and organizations are vying to get in and obtain an official status in the Council. The reason for this change is of course the growing interest in the Arctic. As Young says, Arctic policy is becoming a matter of high politics. States and organizations looking for a venue or forum for Arctic issues rapidly see that there is only one game in town, namely the Arctic Council. But the Council has achieved this position to a large extent by default.

Young's analysis of the structure of the Arctic Council amply shows how complicated it is to accommodate the aspirations of non-Arctic states within that framework. A peculiar feature of the structure is the high status given to indigenous peoples' organizations, reflecting the focus of the Council when it was set up. These organizations, as well as the Arctic countries backing them, are concerned that a broadening of participation in the Council would be at the expense of the influence of indigenous peoples.

But there are also other reservations among the members of the Arctic Council. Primary among these is a concern that increasing the number of permanent observers somehow could infringe on the exclusive resource rights given to the Arctic coastal states by the Law of the Sea Convention. But there is not a unanimous stance in this regard. It seems that Russia has the greatest reservations towards expanding the Council based on such reasoning, whereas others like Norway have signaled a more open attitude.

The combination of political apprehension and the structure of the Council makes an expansion of full membership impossible, as remarked by Young, and increasing the number of permanent observers is difficult, and may be not satisfactory for non-Arctic states in any case. It is obvious that there is not a unified European position on these issues since Europe includes one A5, but not EU member (Norway), one A5 and EU member (Denmark), two A8 EU members (Sweden and Finland), one A8 and non-EU member (Iceland) and six permanent observers and EU members (Germany, UK, France, Netherlands, Poland and Spain). Whereas Europe is quite well represented in the workings of the Council, strong pressure for a change has come from the European Commission who wants the EU to be recognized as a permanent observer.

A different approach from discussing who are legitimate players in the Arctic Council is to identify which issues call for broader international cooperation and what needs to be governed. The list of elements in an Arctic regime complex presented by Young shows that there are many Arctic issues already treated in forums other than the Council. Looking at issues more concretely undoubtedly makes it easier to establish who are relevant participants, who are affected, who can contribute.

This discussion could be taken one step further by distinguishing between issues that encompass the whole Arctic and issues of a sub-regional character. Moreover, there are issues which have stronger links to processes outside the Arctic than to other processes in the Arctic. The Arctic as a whole is not always the relevant framework for problems and processes taking place in the Arctic. As argued by Olav Schram Stokke, sometimes the Arctic is too big as a framework and sometimes it can be too small, and 'the eight member-states of the Arctic Council are either too few or too many for dealing effectively with the management challenges associated with greater commercial interest in the Arctic'.[1]

Climate change belongs in the category that extends beyond the Arctic, indeed it is a global issue. It must be handled in global processes and the Arctic dimension must be included there. Regional fisheries regimes encompassing only EEZs in a section of the Arctic represents the other extreme. It does not make sense to treat such issues in a circum-polar or even broader international context. Fishing in high seas is different. Shipping is a global industry and it would not be effective to discuss Arctic shipping in a separate organization. Thus the IMO plays a crucial role, but also recognizes special Arctic needs by way of a Polar Code. Search and rescue preparedness and cooperation falls squarely in the sphere of responsibility of the Arctic states.

When one looks at the broader institutional landscape in the Arctic it seems that non-Arctic states have many other venues for being heard besides the Arctic Council. Nevertheless, much depends on which processes and institutions will be given weight and energy by the Arctic states.

The members of the Arctic Council face a dilemma. If they want to expand the scope of work in the council a restrictive attitude towards broader participation becomes more and more untenable.

The alternative could be to rethink the role of the Council within a broader regime complex. Even if the Arctic Council has gained increasing visibility in recent years and now has a permanent secretariat it is not given that all the countries in the Council see an expansion of its role as the only way forward. In Norway, for instance, voices can be heard that argue that the Council is biased in favor of environmental interests and could be an unreliable body if resource extraction issues were put on its agenda. Thus, a more diversified institutional structure can also be in the interest of Arctic states.

An obvious risk in relying on a diversified and specialized institutional architecture is the fragmentation mentioned by Young. There is a need for overview and connecting processes. To some extent, the Arctic Council has had and could continue to have such a function for its members. Deliberations in the Council have directed attention to knowledge gaps and needs for regulation and have channeled political energy into relevant political processes outside the Council.

This does not solve the question raised by Young of establishing a high level informal consultative mechanism which includes key non-Arctic states. Some sort of forum, like the Arctic Ocean Forum, ought to be possible. The Arctic 5 will cautiously protect their exclusive resource rights. But the same law of the sea that gives these rights also ensures the rights of non-coastal states to shipping in general and fishing outside the EEZs. In addition, many environmental issues know no borders. This fundamental realization implies a need for a forum that includes interested non-Arctic states. But it does not imply a need for a general purpose organization for Arctic matters. To become an effective channel for communication a forum would have to focus on a concrete agenda. This would mean that participation not necessarily would be the same from time to time. The goal must be not only to include relevant states, but also relevant authorities and knowledge from these states. The Arctic states should take the initiative to organize such meetings.

A set up as suggested by Young where the G20 is used as a framework for consultations would exclude the smaller Arctic States and thus represent another extreme in Arctic governance. It is easy to predict the position of European Arctic states to such a proposal: Non-starter!

Notes

1. Olav Schram Stokke: 'Environmental Security in the Arctic: The Case for Multi-Level Governance' International Journal, Vol . 64, No 4, 2011, pp. 835-848.

Comments on Chapter 6: Chinese Perspective

Peiqing Guo

On May 12, 2012, the Senior Arctic Officials (SAO) Report issued in the Seventh Ministerial Meeting of the Arctic Council in Nuuk, Greenland, set up new criteria for admitting observers and defined roles for their participation in the Arctic Council. Countries eligible to apply to be observers of the Arctic Council must meet very demanding requirements which include recognitions of the "sovereignty, sovereign rights and jurisdiction" of the Arctic countries ("three 'must' recognitions" or "three recognitions," hereafter). To be observers, non-Arctic states must submit their application "no later than 120 days" before a ministerial meeting. At present, non-Arctic states are standing at a crossroads. Observer status is an important matter for non-Arctic states and is closely related to their national interests in the Arctic so they must weigh the advantages and disadvantages of this type of participation in the Council before they make their decision.

INTERPRETATION OF THE NEW CRITERIA OF THE "THREE 'MUST' RECOGNITIONS"

The "three 'must' recognitions" are the most rigorous, harsh, and ultimately unprecedented requirements in the history of international organizations. Investigating all other international organizations, no other international organization sets similar standards to the Arctic Council's for observer. In other cases, requirements on the observer are very lenient. Before the Arctic Council Nuuk Conference, only the Economic and Social Council (ECOSOC) put forward one recommendation to set up stipulations about the obligation and responsibility of non-governmental (NGO) observers. However, the stipulations were very simple and loose:

1. The NGO observer should submit one progress report every four years;
2. ECOSOC encourages the NGO observer to extend their activity to more regions around the world.

ECOSOC's stipulations also include withdrawal mechanisms for NGOs to relinquish their observer status. If NGOs have committed infractions recognized by the international community, such as illegal drug trade, money-laundering, or arms trading, or if an NGO abuses the observer status, or contributes nothing to the work, they will be removed from observer status.

It is necessary to clarify one term before we go further. "Sovereignty, sovereign rights and jurisdiction" in the Arctic can be understood as single national sovereignty, the sovereign rights and jurisdiction claimed by single nation, instead of collective or alliance of eight or five Arctic states. We usually hear the term "collective security, or alliance defense rights," but never "collective sovereignty, sovereign rights and jurisdiction." Another term, "three 'must' recognitions," means "one package recognition", but not selective recognition in the time and scope because "three-must" does not clarify existing sovereignty, sovereign rights and jurisdiction declared by Arctic states, or potential sovereignty to be claimed by them in the future. In addition, non-Arctic observers must recognize all Arctic states' sovereignty, sovereign rights and jurisdictions, instead of recognizing Arctic Country A but neglecting Arctic Country B.

THE ANALYSIS OF THE "THREE 'MUST' RECOGNITIONS"

1. Sovereignty: internal water and territorial waters

Except for the tiny Hans Island there are scarcely territorial sovereignty disputes around the Arctic. That is to say, it is almost no problem for non-Arctic states to recognize Arctic states' sovereignty including territorial land, internal water, territorial water and territorial air. However, in the future, the disputes will likely occur in the over-length straight baseline, most of which is not in the line with customary law reflected in the British-Norway Fishery Case 1951. The longest straight baseline has not exceeded 54 nautical miles in the British-Norway Fishery Case. However, as far as we know, lots of straight baselines around Arctic islands exceed 54 nm, which causes problems around transit passage and innocent passage. As we know there are differences between them.

2. Sovereign rights: outer continental shelf and exclusive economic zones

A larger question is the sovereign rights in the Arctic, which are strongly related to outer the continental shelf and the exclusive economic zone (EEZ). The delimitation of the outer continental shelf of will probably bring contentious debates among Arctic countries. An equally serious problem is the clarification of sovereign rights within an EEZ. A large amount of "residual rights" are not defined clearly, such as remaining fishery rights, and legality of military uses of the EEZ. UNCLOS does not give a clear answer on which country should hold residual rights, but it is recognized that the coastal state does not have full residual rights in the EEZ. The rights of the coastal state in its EEZ are listed in Article 56 of the Convention. In principle, stakefolders are not allowed to exercise the rights prohibited by international law apart from rights not prohibited because the EEZ's legal status is different from territorial water and high seas. Article 59 of UNCLOS set up that the disputes "should be resolved on the basis of equity and in light of all the relevant circumstances, taking into account the respective importance of the interests involved to the parties as well as the international community as a whole." As a result of the uncertainty of sovereign rights within an EEZ in Arctic, there is much flexibility and many significant differences concerning jurisdiction among the countries. While it is true that there are disputes in warm waters, the few EEZs in the Arctic will meet more challenges due to the harsh climate in the Arctic.

Besides the sovereign rights within an EEZ and the continental shelf, there are a few disputes of sovereign rights such as that between the US and Canada in the Beaufort, between the US and Russia in the Bering Strait. In these cases, which side non-Arctic states expected to take? Whose sovereign rights should non-Arctic states recognize? Unfortunately, the "three 'must' recognitions" do not give us an answer.

Some may argue that non-Arctic states should keep far away from the Arctic's internal disputes. However, the matter is not so simple. The most ironic contention is around the legal status of the EEZ and continental shelf around the Svalbard Islands. Neither UNCLOS nor the Svalbard Treaty signed in 1920 give the exact answer to the legal status of Svalbard EEZ and continental shelf. Many Arctic states, including Russia, Iceland and Denmark, maintain that the Svalbard Treaty is applicable to the EEZ and continental shelf, as well as outer continental shelf. Norway has insisted that the treaty is limited to the Svalbard Islands and territorial waters. Which side should non-Arctic states take? Whose sovereign rights should non-Arctic states recognize? Can we say the matter still has nothing to do with non-Arctic states? Korea, Japan and China are all parties of the treaty, and have equal rights of economic development and scientific investigation in the islands and the related waters. The legal status of the EEZ and continental shelf, including the outer continental shelf, has an important bearing on the interests and rights of China and other non-Arctic states. They are keeping a close eye on the progress. Obviously, "three 'must' recognitions" neglects history and, therefore, are illogical and self-defeating.

WEIGHING THE PROS AND CONS

How might a non-Arctic state benefit from observer status? What do non-Arctic states suffer from "three-recognition"? It is worth considering the advantages and disadvantages:

Advantages include being able to sit behind the conference table, being able to receive some early documents to have access to information in advance. Additionally, observers may be able to exchange with representatives from Arctic states and take part in the activity of working groups of Arctic Council. Disadvantages include the fact that observer status may give non-Arctic states no real privileged information since most of the information and discussion in Arctic Council meetings is public. It may not be possible to maintain the communication efficiency some non-Arctic states have hoped for. Oran Young notes, "Representatives of the observer states are seldom allowed to speak in meetings of the Arctic Council managed by the chair of the Senior Arctic Officials, much less in the biennial ministerial meetings of the council. Nor do they have access to discussions among the Senior Arctic Officials themselves or in meetings of the deputy ministers, a recent innovation in the practice of the council." The present author fully agrees with Young on this point.[1]

Is it possible to have the effective engagement of the non-Arctic states in the Arctic Council? According to Young, "There is no established practice that provides opportunities for meaningful engagement regarding specific issues, and the environment of council meetings is not conducive to real dialogue."[2]

Does attendance at the scientific activities of working groups make sense for non-Arctic observer states? Oran Young comments further that, "⋯activities of the working groups do not provide an effective venue for real dialogue regarding issues on the new Arctic policy agenda. Representatives of all the non-Arctic state observers regard this situation as highly unsatisfactory."[3]

The reality has proven it is only wishful thinking that non-Arctic states will profit from observer status in the Arctic Council. "All six states that are currently permanent observers have found this status unsatisfactory and generally frustrating in terms of providing opportunities for substantive engagement regarding issues now emerging on the Arctic policy agenda."[4]

Non-Arctic states are not able to obtain what they wish as Arctic permanent observers. To make matters worse, non-Arctic states will likely lose the initiative and flexibility of the diplomacy because they have recognized Arctic states' "sovereignty, sovereign rights, and jurisdiction" in advance, particularly in one package. Such recognition amounts to offering more sovereignty rights than Arctic states have ever dreamed of but without them having to pay any price. It is like sending a blank check to Arctic states, and indulging them to sign by themselves at their will. Arctic states will be overjoyed by non-Arctic states' subjection. In coming international negotiations, non-Arctic states will be in a very disadvantageous position. The "three-must-recognitions" means one package of recognition, not selective admission. If you were the observer, you would have no choice but to act as an obedient student!

The question is what a non-Arctic state can get from observer status by paying such a price. Many interests and rights enjoyed in the Arctic Ocean can be gained according to existing recognized international instruments. Is it worthwhile to get a poor seat behind the Arctic Council table by sacrificing such valuable diplomacy resources? Worst of all, non-Arctic states are marketing with their future rights and interests! In a word, the observer status will bring them much obligation but no rights and benefits. Non-Arctic states should understand that it is impractical to combine their own rights and interests with observer status.

In conclusion, the observer status of Arctic Council is not an optimal choice for non-Arctic states currently. Perhaps it is one practical alternative to apply for ad hoc observer, at least now.

ARE THERE ANY OTHER WAYS FOR NON-ARCTIC STATES TO TAKE PART IN ARCTIC GOVERNANCE?

Because of different geography and geopolitics, it is difficult to form a comprehensive legally binding framework like the Antarctic Treaty in the foreseeable future. Arctic governance will be fragmented in the coming years, which offers much opportunity for external actors to take part in Arctic governance. What is clear is that the Arctic cannot go its own way, carving out a developmental path independent of global forces. The impacts of climate change and globalization have also intensified interactions between the Arctic and other parts of the planet.

There is a trend of external actors moving from the periphery to the center of Arctic affairs and this is logical as many of the existing impacts in the Arctic originate from outside the region. Arctic is majorly affected by global climate change. For example, climate warming is a global problem requiring international consensus (at least theoretically) to reduce CO_2 emissions from industrialized and developing countries. In a similar vein, shipping is an international sector that requires consensus on the development and implementation of instruments to reduce environmental impacts, guarantee safety of navigation, and develop economically efficient activities.[5]

In the meanwhile, the Arctic is the driver of the global climate change. For instance, the Arctic Oscillation seriously affects climate in the middle latitudes covering China, Korea and Japan, as well as western European countries. It is necessary to find the mechanism of atmospheric circulation and ocean current relationship between the Arctic and mid-latitudes. It's fair to say non-Arctic states have legitimate scientific interests in the Arctic to say nothing about navigation, fishery interests, and so on. The Arctic has been covered by lots of international instruments and entities. The role of global maritime and environmental instruments such as UNCLOS, the International Maritime Organization, and the United Nations Framework Convention on Climate Change (UNFCCC) will play an integral and critical role in shaping the future of the Arctic governance. Existing multilateral treaties such as the Svalbard Treaty provide the strong foothold for non-arctic states like UNCLOS. In particular, the central Arctic Ocean is beyond the jurisdiction of Arctic nations. No country or group of countries has sovereignty over the North Pole or the Arctic Ocean around it.[6] Any party of UNCLOS is entitled to fish in the doughnut, and so, any multilateral and regional fishery agreements or treaties have no legally binding force or enforcement to non-Arctic states that is not included. Ironically, staying outside of the Arctic Council creates the freedom for non-Arctic states relying on existing international instruments.

Even though it is difficult to set up one comprehensive treaty, it does not mean it is impossible to establish one agreement concerning certain areas, such as Arctic fisheries. A plausible scenario appears to be the one where Arctic and non Arctic states negotiate to address gaps in the Arctic regime on an issue-by-issue basis.

What will happen if Arctic states stick stiffly to obstructing the participation of non-Arctic states? If they continue to do so, the challenges now facing the Arctic Council may mean that it will gradually be supplanted by evolving sectoral governance regimes. The Arctic Council stands very much at a crossroad. "The Arctic Council is in danger of being perceived as an exclusive club, making major decisions about the Arctic with little regard for the concerns and interests of non-Arctic states. The existing approach risks creating the conditions whereby non-Arctic states could simply disregard the arrangements, rules, and codes of conduct that the Arctic Council creates for the Arctic and instead work outside existing frameworks."[7] The "Arctic Council will need to become a forum not just of the Arctic nations but for all countries and organizations with a genuine interest in the region."[8] If so, the Arctic Council will attain strong soft power and public calls around the world.

Obviously, the Arctic states have "stronger interests and a greater say in the future of the Arctic."[9] But they need to take into account the legitimate interests of non-Arctic states. In the meanwhile, non-Arctic countries need to consider reasonable concerns of Arctic states and respect their sovereignty, sovereign rights and jurisdiction on the basis of recognized international treaties and various dialogues. Nonetheless, only when both Arctic and non-Arctic states find the balance based on mutual respect and understanding, will there be a prospect of settling the Arctic issue.

Notes

1. "Listening to the Voices of Non-Arctic States in Arctic Ocean

Governance", by Oran Young, Research Professor, Bren School of Environmental Science and Management, University of California (Santa Barbara), 2012 North Pacific Arctic Conference, August 9, 2012, p. 17.
2. Ibid, p. 18.
3. Ibid, p. 18.
4. Ibid, p. 17.
5. Clive Schofield and Tavis Potts, "Emerging Arctic Navigational Opportunities and Arctic Governance," CCLR 4, 2009, p. 479.
6. Communication from the Commission to the European Parliament and the Council: The European Union and the Arctic Region, Brussels, November 20, 2008, COM (2008) 763 final, p. 9.
7. Kristofer Bergh, "Arctic cooperation must become more inclusive," July / Aug 11, SIPRI, http://www.sipri.org/media/newsletter/essay/julyaugust11
8. Ibid.
9. Ibid.

Comments on Chapter 6: Japanese perspective

Fujio Ohnishi[1]

INTRODUCTION

To begin with, I would like to express my gratitude for this opportunity to take part in discussions on one of the most important and topical issues in current Arctic International Relations. Being a student of international relations with a special focus on the Nordic regional arrangements both in Scandinavia and the Barents Euro-Arctic region, I am an avid follower of Professor Young's research. He is not only a respected scholar but has long maintained a strong commitment to Arctic issues.

In attempting to solve a puzzle to find a way forward that satisfies the essential concerns of both Arctic and non-Arctic groups, the considerations and recommendations in the chapter by Professor Young are very persuasive and appear largely compatible with Japanese interests in Arctic. In particular, his recommendation on establishment of an Arctic Ocean Forum (hereafter AOF), a consultative body with no decision-making powers, is in line with Ocean Policy Research Foundation's (OPRF) opinion expressed at the 2011 East-West Center/Korea Transport Institute Conference, that ocean governance for the Arctic

Ocean should be engaged in not only by the coastal states but by all countries relatively close to the polar region, such as those in the area of the North Pacific. This commentary gives a brief overview of the Japanese relationship with the Arctic and then proceeds to consider the analysis submitted by Professor Young. At the end, the commentary considers how best the idea of an AOF might be realized.

JAPANESE INVOLVEMENT IN THE ARCTIC

Briefly speaking, Japanese involvement centers mainly on the scientific fields. Japan has engaged in polar science for more than half a century. This long standing interest has naturally prompted research in the Arctic as well. More recently, there are growing economic prospects centering on the importation of oil and gas resources as well as the shortened passage between Europe and Asia. Japanese companies have started to look at the Arctic as a place of opportunity. However, Japan's economic involvement is weaker than its scientific involvement, since it still remains within the realm of possibility rather than fact. It is expected that a political initiative would mitigate a variety of risks and promote Japanese involvement in the Arctic.

Aside from the brief sketch mentioned above, however, a closer look reveals that Japan has in fact been involved in a variety of Arctic affairs for the past century. There are five milestones. The first historic involvement of Japan in the Arctic dates back to the Spitsbergen Treaty signed in 1920. As one of the High Contracting Parties to the Treaty, Japan holds certain rights and obligations under its legal regime, including rights of fishing and hunting in the territories and the territorial waters (Art.2), liberty of access and entry (Art.3), establishment of an international meteorological station (Art.5) and same treatment with the nationals of Norway with regard to methods of acquisition, enjoyment and exercise of the right of ownership of property, including mineral rights in the territories (Art.7). In practice, these rights cannot be executed unilaterally but in accordance with the relevant Norwegian jurisdiction.

Currently, some conflicts have been renewed among signatory parties, to some extent, as to interpretation of the Treaty's applicability regarding the EEZ and continental shelf around Svalbard. Unfortunately, perceptions on the strategic importance of Svalbard have been weak in the Japanese Ministry of Foreign Affairs. However, current developments in the High North increase the strategic importance of Svalbard for all signatories; to this, Japan is no exception.

Japan's second important involvement in the Arctic came in the field of science. During the Cold War, there were several examples of collaborative research on the Arctic atmosphere, ocean, and fauna and flora between Japan and the US and Japan and Canada. After the Murmansk speech by Gorbachev in 1987, the political atmosphere regarding Arctic research changed drastically, increasing the interest in the Arctic among natural science researchers. In Japan, the National Institute of Polar Research (hereafter NIPR) established the Arctic Environment Research Center in 1990, and opened a research station at Ny-Ålesund on Svalbard in 1991 in collaboration with the Norwegian Polar Research Institute[2]. Joining the International Arctic Science Committee from 1991, NIPR began to engage in a variety of national and international research activities in the Arctic. While NIPR focused on terrestrial fields of research, the Japan Marine Science and Technology Center (currently, JAMSTEC: Japan Agency for Marine-Earth Science and Technology) began marine research in the Arctic from 1991 in collaboration with the U.S. JAMSTEC conducted its first research cruise with the oceanographic research vessel 'Mirai' (Future) in 1998. Since then, invaluable observational studies have resulted from ten Arctic expeditions by JAMSTEC[3]

More recently, faced with the increasing effects of climate change in the Arctic Ocean and their potential impact on the Arctic terrestrial environments, as seen in the accelerated retreat of the Arctic ice cap, Arctic research in Japan has been revitalized. In May 2011, the Consortium for Arctic Environmental Research was founded by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) to bolster Arctic research activities in Japan. In June 2011, in the course of a governmental initiative for facilitating green innovation and environment-friendly technologies, MEXT initiated the Green Network of Excellence, within which the five year Arctic Climate Change Research Project was begun[4]

A third important involvement in the Arctic was also given impetus by Gorbachev's proposal regarding opening of "the North Sea Route." To examine all the possibilities of the NSR as an international commercial sea-lane, the Ship & Ocean Foundation (currently OPRF), aided by the Nippon Foundation, carried out the 'International Northern Sea Route Programme (INSROP)' from 1993 to 1999. INSROP was an international project of close collaboration among Japan, Norway and Russia, with participating researchers numbering 390 from 14 countries pursuing multi-disciplinary study of the NSR. Phase I of INSROP was carried out from 1993 to 95 and Phase II over the two-year period from 1997 to 98. Four sub-programmes were implemented in Phase I: a) Natural Conditions and Ice Navigation, b) Environmental Factors and Challenges, c) Trade and Commercial Shipping Aspects of the NSR, and d) Political, Legal, Cultural and Strategic Factors. Each sub-programme produced some 20 to 40 studies[5]

In Phase II, integration of the results of the studies in Phase I was carried out, together with supplemental work suggested by an international evaluation group. INSROP GIS (Geographical Information System) was formulated in Phase II on the basis of extensive data accumulated in both Phases. Another outcome of Phase II was navigation simulation in the NSR, which evaluated the NSR operations by making use of sea ice statistics on the routes and newly developed algorithms for ship performance prediction in ice-infested waters. An experimental voyage was performed with an ice-strengthened cargo ship, the Kandalaksha (14,700 DWT) from Yokohama to Kirkenes in Norway, during which observations and measurements of various items by a research team of eighteen experts and specialists on board from Japan, Russia, and Canada were made. The voyage afforded a good chance to deepen understanding of natural conditions and ship performance through the NSR. In advance of the establishment of the Arctic Regional Hydrographic Commission in 2010, INSROP pioneered charting of the shipping route in the Arctic[6]

A fourth involvement can be seen in efforts for establishing a Japanese Arctic policy agenda. In line with increasing prospects of development in shipping and exploitation of oil and gas in the Arctic Ocean, Japan officially declared its application for Observer Status of the Arctic Council in April 2009[7]. Since then, the Japanese government attends meetings of the Arctic Council as an ad-hoc observer. The Arctic Task Force was established in the Ministry of Foreign Affairs in September 2010 as an aid to identifying the Japanese interests in the Arctic[8]. To date, however, an official strategy toward Arctic Ocean governance has not been launched.

In line with efforts for drawing up a Japanese policy agenda, OPRF launched 'the Arctic Conference Japan' in 2010, with experts in international law, security, science, shipbuilding, shipping and climate. Over the past two years, conference members have continued to meet to establish a unified view of multifaceted Arctic issues and to address Japan's Arctic policy and strategy so as to meet the interests of Japan and the world. In its proposals released on April 25, 2012, the Arctic Conference Japan urged government to:

1. establish a "playmaker" for Arctic policy,
2. engage actively in Arctic Ocean management,
3. be actively involved in environmental protection of the Arctic Ocean,
4. reinforce involvement in Arctic natural resources development,
5. bolster Arctic research,

6. promptly respond to logistical changes by the opening of Arctic seaways,
7. design a new security program in response to opening of the Arctic seaways,
8. contribute to the establishment of order in the Arctic Ocean,
9. intensify Japan-Russia dialogue.[9]

When it comes to business and investment in the development of shipping and exploitation of gas and oil, the incentives for Japanese companies seem rather unpromising compared to companies in other non-Arctic states such as China and Korea. The main reason is that economic incentives are less apparent due to the low level of economic profitability. As to oil and gas from the Arctic, its estimated costs are higher than for resources from the Middle East.[10] The commercialization of shale oil also decreases the prospects of importing energy resources from the Arctic. Since the Great East Japan Earthquake in March 2011, the demand for oil and gas as alternatives to nuclear power plants has increased. The attractiveness of the Arctic as a producer of oil and gas resources will increase when all nuclear power plants are deactivated for the long term. Currently, the Japanese government has decided to restart some nuclear power plants and has not made clear its new long term energy policy.

In terms of shipping, the Northern Sea Route (hereafter NSR) is potentially important option for shipping industries, especially those involving tanker and bulk carrier operations that are taking advantage of the shortened passage between Europe and Asia. However, uncertainty regarding passage costs on the NSR reduces the attractiveness of the shorter distance[11]. Government support in efforts to clarify shipping costs for the NSR is hoped for by the shipping industries[12]. This may take various forms. Concluding a special agreement regarding passages in the NSR with Russian authorities is one option.

Summarizing the overview of the Japanese involvement, one should distinguish actual involvement and potential interests in the Arctic. As to actual involvement, science has been the main focus. This means that climate change and its global impact is of such high concern in Japan that the Arctic is an important research field. A potential interest is also growing in the area of business and investments. What is expected of the government is formulation of a cross-cutting strategy that integrates the policy priorities for science, environment, transport, industries, energy, foreign affairs, and defence. More recently, a nonpartisan group of parliamentarians on Arctic policy has been formed. This can be considered a first step in this new direction.

PROFESSOR YOUNG'S CHAPTER

In turning to the chapter by Professor Young, Section one included the highly significant observation that the search for an effective means to address the legitimate concerns of non-Arctic states, without interfering with or distorting existing cooperative arrangements such as the Arctic Council, is an increasingly important puzzle. In Section two, the chapter addressed the past and current postures of Arctic politics. I agree with the following four descriptions by Professor Young: that the Arctic has become a focus of global attention, that marine issues have taken center stage, that managed development is overshadowing sustainable development, and that Arctic policy is becoming a matter of high politics. In Section three, Professor Young argues that current attitudes of the Arctic states are not tenable. Japan, as a non-Arctic state, is concerned about a move to draw a clear line between the Arctic states and non-Arctic states in addressing Arctic policy agenda issues. Professor Young's observation in the same Section that non-Arctic states have acknowledged rights and interests in the Arctic is also highly welcome. This observation is very important as these rights and interests are the legitimate foundation for non-Arctic states to engage in Arctic Ocean governance. In addition, non-Arctic states also have responsibilities regarding matters of environmental protection and sustainable development in the Arctic, as Professor Young pointed out. Tightening of the links between the Arctic and the global system would enable more involvement of non-Arctic states in Arctic Ocean governance.

Regarding proposals for solving the puzzle in Section four, I agree with the analysis by Professor Young that Arctic Council membership is not negotiable and that permanent observer status in the Arctic Council is not the solution. It is in the interest of non-Arctic states to obtain a seat, which would secure a more efficient mechanism for our voices to be heard in Arctic Ocean governance. Therefore, the two alternatives he offers in Section five, which are not exclusive, deserve due consideration here. Sketching the emerging Arctic Ocean regime complex, Professor Young argued for the Arctic Council as an integrative force in this regime complex. We hope that the Arctic Council can function as an integrative force across a number of issue-specific regimes so that Arctic Ocean governance will be managed in a more effective manner. Since non-Arctic states take part in some of these regimes, better functioning of the Arctic Council would indirectly promote the effective integration of non-Arctic states voices into Arctic Ocean governance as a whole.

In considering an AOF as a consultative body, the proposed plan in Section six would seem desirable in meeting the request that non-Arctic states' voices be heard. The idea of an AOF is important for five reasons. First, it is a new idea. Second, it is based on the understanding that not only the A8 but also non-Arctic states have legitimate rights, interests and obligations. Third, by doing so, the idea of an AOF achieves differentiation in commitment between the A8 and non-Arctic states. Namely, an AOF would serve as a very practical compromise between both sides, which is hard to find in other forms. Fourth, the idea of an AOF skillfully avoids the issue on who are included in non-Arctic states by adding a term of reference on participation at their own expense. An issue on who the key non-Arctic states are may become a matter of concern in future, but currently participation in an AOF should be open to everyone. Such an informal forum would better serve than a formal framework in terms of membership.

VITAL POINTS FOR REALIZING THE AOF IDEA

To proceed with our discussion on how to enhance the idea of an AOF, there are three points to consider. First, it is important to take a serious first step in concrete initiatives. Both the A8 and non-Arctic states need to participate in this. Non-Arctic states might be invited to participate in the North Pacific Arctic Conference (hereafter NPAC) to discuss how best to establish an AOF. On the initiative of NPAC, governments of non-Arctic states may then meet together to discuss the idea of an AOF.

On the other hand, it would also be a very important step if an initiative is put forth from the side of the A8. Without consent of the A8, any likely concept of an AOF would be stillborn. As Professor Young suggests, the current Chair of the Arctic Council, Sweden, is competent to fulfill this innovative task, given its many and varied contributions to international society in the past. We hope that Sweden would combine the current discussion on the status of observers in the Arctic Council with the idea of an AOF, thus initiating a dialogue with non-Arctic states.

Second, the robustness of an AOF would depend on the degree of how effectively the Arctic Council takes into consideration the voices of non-Arctic states that are expressed in an AOF setting. Professor Young said in his chapter that any such effort must concentrate on effective communication rather than on the mobilization of pressure. I agree with this view. An AOF should be a forum where the A8 and non-Arctic states might equally express their respective concerns. However, it should be underscored that if the Arctic Council fails to sufficiently listen to the voices of non-Arctic states, it might create a situation where the non-Arctic states feel they must pursue a more empowering platform. It would be regrettable if the ineffectiveness of an AOF lead to establishment of a non-Arctic Council.

Third, while focusing on the establishment of an AOF, it is also important to figure out appropriate priorities for its meetings. While the basic features are already outlined in Professor Young's chapter, I would suggest that a start-up meeting consider the range of themes that would be included in an AOF conference. There should be a variety of options. One option would be Marine Scientific Research in the Arctic. As Japanese involvement centers on scientific fields, inclusion of this topic would be highly recommended. There has already been a potential conflict regarding the rights of all states to conduct marine scientific research as stipulated in Section 13 of UNCLOS and the jurisdiction of coastal states. Rules and procedures of coastal states differ regarding the granting of consent for marine scientific research. This might lead to be insistent demands to settle claims between some non-Arctic states and Arctic coastal states. This topic should definitely be included in an AOF conference, a view consistent with Japan's experience in the Arctic. I would appreciate hearing the voices of other non-Arctic states regarding possible structures of an AOF. Finally, I believe that the A8 and non-Arctic states would succeed in building constructive relationships in Arctic Ocean governance.

Notes

1. The views expressed in this commentary are those of the author and do not necessarily reflect the official position of the Ocean Policy Research Foundation.
2. Takashi Yamaguchi, "Hokkyoku tanken kara chikyu ondanka saizensen he"(From Arctic Expedition to Global Warming Research), Kisho kenkyu noto(Meteorogical Research Note), No.222 (2011) pp.5-6.
3. Ocean Policy Research Foundation, Nihon hokkyoku kaigi hokokusho (Report of The Arctic Conference Japan) (Tokyo: Ocean Policy Research Foundation, 2012) p. 28.
4. Ibid., pp. 25-26.
5. More information about INSROP is available below: Ship and Ocean Foundation, The Northern Sea Route: The Shortest Sea Route linking East Asia and Europe (Ship and Ocean Foundation, 2001) http://www.sof.or.jp/en/report/pdf/200103_rp_ar0103e.pdf/ (as of 24.07.2012).
6. See more detail information. Ocean Policy Research Foundation, New Era in Far East Russia and Asia (Tokyo:Ocean Policy Research Foundation, 2006) http://www.sof.or.jp/en/activities/index6_1.php (as of 24.07.2012).
7. It may be worth noting that Japan holds observatory status in the Barents Euro-Arctic Council established in 1993. However, its interest in the BEAC had declined until the end of the 1990's. Hokkaido prefecture joined the Northern Forum, which was formally launched

in 1991.
8. http://www.mofa.go.jp/mofaj/press/release/22/9/0902_01.html (as of 24. 07. 2012).
9. About press release, see OPRF's blog. http://blog.canpan.info/oprf_en/(as of 24.7.2012). About proposals, please see the material below. Nihon Hokkyoku Kaigi (The Arctic Conference Japan), Hokkyokukai no jizoku kano na riyo ni muke nihon ga tadachi ni okonau beki sisaku (*Policy Proposals : Actions and Measures Japan is To Take With a View to Ensuring Sustainable Use of the Arctic Ocean)* (Tokyo: Ocean Policy Research Foundation, 2012), pp. 1-9. Currently, these proposals are available only in Japanese. The English translation will be provided through OPRF internet portal.
10. Charles Emmerson and Glada Lahn, Arctic Opening: Opportunity and Risk in the High North (Lon- don: Lloyd's and Chatham House, 2010) p. 23.
11. Interview with an expert of planning section in the shipping industries, Tokyo, 31.07.2012.
12. *Ibid.*.

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1. Takashi Yamaguchi, "Hokkyoku tanken kara chikyu ondanka saizensen he"(From Arctic Expedition to Global Warming Research), Kisho kenkyu noto(Meteorogical Research Note), No.222 (2011) pp. 5-6.
2. Ocean Policy Research Foundation, Nihon hokkyoku kaigi hokokusho (Report of The Arctic Conference)
3. Ibid., pp. 25-26.
4. More information about INSROP is available below: Ship and Ocean Foundation, The Northern Sea Route: The Shortest Sea Route linking East Asia and Europe (Ship and Ocean Foundation, 2001) http://www.sof.or.jp/en/report/pdf/200103_rp_ar0103e.pdf/ (as of 24.07. 2012).
5. See more detail information. Ocean Policy Research Foundation, New Era in Far East Russia and Asia (Tokyo: Ocean Policy Research Foundation, 2006) http://www.sof.or.jp/en/activities/index6_1.php (as of 24.07.2012).
6. It may be worth noting that Japan holds observatory status in the Barents Euro-Arctic Council established in 1993. However, its interest in the BEAC had declined until the end of the 1990's. Hokkaido prefecture joined the Northern Forum, which was formally launched in 1991.
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9. Charles Emmerson and Glada Lahn, Arctic Opening: Opportunity and Risk in the High North (London: Lloyd's and Chatham House, 2010) p.23.
10. Interview with an expert of planning section in the shipping industries, Tokyo, 31.07.2012.
11. Ibid..

Comments on Chapter 6: Korean perspective

Sung-Jin Kim

As a former Minister of Maritime Affairs and Fisheries of the Republic of Korea I am convinced that the topics of Professor Young's chapter are important: they are directly related to all of the Arctic Ocean agenda items that we have been discussing in the past two years. He examines the limits of the current Arctic governance system as new and diverse agenda items have emerged. He notes the global demand for new economic and commercial opportunities of the Arctic Ocean and offers a comprehensive analysis on the current governance system. In addition, he points out that the rights and responsibilities of emerging non-coastal global players have become more important and offers a new direction on how best to reflect their capabilities and opinions on the Arctic Ocean governance.

Professor Young points out that the current international system is inadequate in solving the emerging international conflicts relating to the Arctic Ocean and needs to be revised to coordinate different national interests. The ultimate goal of Arctic Ocean governance is, according to Young, to find a rational way of using the Arctic Ocean in a sustainable and peaceful way by satisfying various national interests of all Arctic coastal and non-Arctic coastal states without interfering with existing status of the Arctic Council (AC).

As seen by Professor Young, the Arctic Circle countries would like to maintain their exclusive vested interest in the region while the non-Arctic circle countries have their own interests in developing sea routes and resources. He concludes that instead of focusing on the role of observers at the AC the non-Arctic countries should actively leverage a regime complex and informal negotiation procedures. Given that the policies of Article 5 coastal states under the United Nations Convention on the Law of the Sea (UNCLOS) have a pivotal role in the Arctic governance, the AC will continue to enjoy its unique status. In addition, Professor Young proposes a system in which high-level officials of the eight Arctic countries participate in the AOF and have access to discussions where the AC reviews the opinions. While I highly praise Professor Young's presentation I would like to add some of my own personal thoughts below. First, Professor Young mentioned the conflict between the Arctic coastal (A5) countries and non-coastal states (Finland, Iceland and Sweden). It seems to be in line with the international trend where coastal countries are strengthening and expanding their maritime jurisdiction to secure marine resources under UNCLOS. He points out that a shift to A5 from A8 countries within the AC can be seen as following the trend of the times. Then, in a mid- and long-term perspective, the AC will be likely to lose momentum due to tension or conflicts over member states' interests. And, in this line of thought, it is likely to be more efficient for Korea and other non-Arctic countries to concentrate on boosting cooperation with individual A5 countries than focusing on joining the AC. I basically agree with Professor Young for the same reason but believe that an observer status at the AC has a limited yet significant meaning as it allows a country to have an official access to general discussions on the diverse Arctic issues. In addition, the new body that Professor Young proposes might take some considerable time to be established. I, therefore, believe that the countries also need to pursue an observer status so that they can formally participate in the discussions as timely as possible.

Professor Young also proposes that non-Arctic countries make every effort to establish an Arctic Ocean regime complex, informal negotiation procedures, and various conferences and forums. As indicated earlier I believe this approach is the best practical and realistic alternative for non-Arctic states within the AC framework. What I want to stress is that diverse voices from non-Arctic countries must not ring hollow and disappear but be heard and accepted by Arctic states. In order for that to happen, the various public discussion venues Professor Young suggested are necessary and they need to be more systematically framed and developed. This is the right time for producing tangible outcomes instead of sweet rhetoric. Here is a good example: non-Arctic states such as Korea which have interests in the Arctic routes and resource development can coordinate their opinions and forward their shared interest to the AC member states. But it would, it seems, take quite a while to reach this stage with significant amounts of preliminary discussions and cooperation. The Asian Forum on Polar Sciences with scientists from Korea, China, Japan, India and Malaysia already exists but its influence on decision making seems rather limited.

While Professor Young noted the main economic interests of non-Arctic nations including marine routes and resources, I would like to point out that there are much broader issues. One such issue is the climate change in the Arctic Ocean and its impact on the Arctic, its neighboring areas, and the entire planet. For example, changes in the Arctic Ocean currents are altering fisheries in the northwest Pacific and significantly transforming coastal economic activities of the region including the livelihood of fishermen. The North Pacific countries must make concerted efforts to respond to these changes, including sharing scientific information and data relating to the Arctic region. In Korea, we are under a direct influence of climate change in the Arctic: we have experienced unprecedented cold spells and heavy snow storms, changes in the marine ecosystem and altered courses of typhoons following changes in sea water temperatures. Professor Young's alternative, the AOF, is very significant for these reasons. I particularly agree with his point that responsibilities of non-coastal countries and discussions on securing the livelihood and the role of indigenous peoples, who will be directly affected by these development, must be included in the AOF. I would like to add to these points by suggesting the scope of the AOF's participants. A comprehensive membership is required that include not only the proposed A8, non-coastal and EU countries but also indigenous peoples, scientists and policy experts as well as representatives from businesses and international organizations. I believe further in-depth discussion on this matter is also called for at NPAC. In addition, making it a G20 summit agenda item is, in my opinion, desirable. However, what practical benefits can be achieved under the current structure is not clear. It is questionable how the A8 countries stand on this as the G20 summit has more authority than the ministerial body of the AC. In addition, we need to review ways to discuss the issue at regional economic forums such as the APEC ministerial meetings or at comprehensive conferences such as World Ocean Summit (held in Singapore in February, 2012).

QUESTIONS FOR DEVELOPMENT AND SUGGESTIONS

I would like to point out that many controversial issues still remain regarding the membership of the AC even though Professor Young noted them on the chapter and I, too, mentioned them earlier. For example, countries are expected to continue to make effort to secure an observer status even though negative opinions are prevalent on the effectiveness of such status and the possibility of adding more observers. There is also the possibility that the existing observers may express more complaints. Therefore, to some extent it is important to improve the governance of the AC in terms of better reflecting the observers' opinions on the Council or adding more observers to it. I would like to invite Professor Young's views on this matter.

In addition, given the current thawing conditions, bilateral agreements between relevant countries can solve most of the main economic issues for a while such as the Arctic routes, energy and fisheries resources development. I want to learn what the AC's stance is on this and which stance will be more desirable.

The issue of the Arctic Ocean governance that Professor Young presented may be called a result of the past discussions at NPAC. Moving forward, the most important task is how we can deliver our findings to the relevant authorities such as the AC and non-AC states in order to formulate a new mechanism like the AOF.

For this we need to concretely develop the "Terms of References" Professor Young suggested. For example, we can set up the so-called Small Technical Group inside NPAC to lead the discussions as well as to identify technical items including Terms of References. We can also have more open, detailed and substantial discussions on regional basis led by experts from Korea, China and Japan.

Last but not least, I would like to propose a step-by-step approach to find ways resolving the difficult puzzle in the Arctic Ocean Governance. Clearly, the first step should be taken by NPAC.

Active participation and dialogue among relevant nations, experts and corporations are needed. We also need to form a cooperative body (or bodies) that can handle these matters comprehensively. When Neil Armstrong first stepped on the Moon 43 summers ago, he said that it was "one small step for man: one great leap for mankind." I am confident that NPAC will become one giant leap for mankind in resolving puzzles and showing us the possibilities of a bright future.

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