

1. Introduction and Overview

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BACKGROUND

Climate change and economic globalization are transforming the Arctic. Reductions in sea ice in the Arctic Ocean are opening new shipping routes. This development is enabling the growth of new trade routes and the expansion of tourism, and is facilitating resource exploitation. The global demand for natural resources and increased economic efficiency makes these opportunities attractive. But the growing exploitation of Arctic resources raises issues relating to pollution control, protection of biological diversity, the recognition of indigenous rights, and governance more generally that can only be addressed through international cooperation. The challenge is to find a way forward that respects the rights of Arctic stakeholders and protects the natural environment while allowing managed development of Arctic resources to proceed.

Although commercial shipping in the Arctic is technologically feasible, there is a lack of both hard and soft infrastructure needed to make this option commercially attractive. Not only are aids to navigation, port facilities, and emergency services underdeveloped, but there is also a need for more developed administrative arrangements dealing with traffic management, procedures for avoiding sensitive areas, fee structures, insurance, and liability systems. Destinal traffic may include shipments of oil and gas, hard-rock minerals, fish products, and even fresh water. Through traffic may eventually involve the shipment of commodities between Asia and Europe. 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. The role of governments in financing infrastructure and supporting economic development in the Arctic will be a key factor in determining the future of Arctic shipping. This volume will address the logistical challenges of Arctic shipping, analyze factors effecting future development of Arctic Sea routes, and explore short to medium term scenarios regarding use of the Northern

Sea Route (NSR). It also covers the central challenges for the Arctic states and global maritime community regarding international cooperation to address issues of safety and environmental protection associated with Arctic shipping.

The Arctic contains globally significant reserves of oil and gas. But Arctic hydrocarbons are expensive to produce and deliver to urban markets. Oil spills under Arctic conditions pose severe threats to biophysical and socioeconomic systems. Both economic forces, such as the shale gas revolution, which is affecting world market prices, and public policies designed to minimize environmental impacts and protect the well-being of coastal communities, will determine the prospects for hydrocarbon development in the Arctic. The calculations of global companies (e.g., Shell, ExxonMobil) and the fate of efforts to reach international agreements on reductions of greenhouse gas emissions will also affect the pace of oil and gas development in the Arctic. This volume will focus on the international dimensions of Arctic oil and gas development. What role will global energy markets play? What is the likely impact of the U.S. shale gas revolution on the competitiveness of Arctic oil and, especially, gas? What technological issues arise in accessing and transporting Arctic oil and gas? Are there any ways to develop Arctic oil and gas that would satisfy environmental concerns about the danger of oil spills under Arctic conditions? How will oil and gas development in the Arctic affect coastal communities? Are Arctic hydrocarbons important in meeting the long-term needs of China, Japan, and Korea?

The fisheries of the Barents and Bering seas have long been among the largest in the world. Climate change is already affecting these marine systems in important ways. Cod stocks are moving northward in the Barents Sea, and patterns of change there are less clear. Little is known about the impact of climate change on living resources in the central Arctic Ocean and its marginal seas. Some observers advocate imposing moratoriums on fishing in the Arctic Ocean until the effects of biophysical changes are better understood. Others see a need to restructure existing regional fisheries management organizations in the North Atlantic or to create a new organization to cover a sizable area in the western Arctic. In each case, the way forward is unclear. This book will explore what is known about the dynamics of fish stocks in the Arctic Ocean, scenarios dealing with future developments regarding these stocks, and the implications of these developments for management.

Turning to questions of governance, the present volume will consider responses to the changing Arctic on a number of levels. What strategies are available to Arctic communities that seek to benefit from economic opportunities but also protect traditional lifestyles and avoid shocks caused by the actions of remote decision makers? Are there lessons to be drawn from comparing the responses of those in the North Pacific region and those in the North Atlantic region who are seeking to come to terms with similar issues relating to Arctic development? How can the Arctic Council play an effective and constructive role in meeting the challenges of the maritime Arctic? Are there roles for global organizations, such as the International Maritime Organization (IMO), and for non-Arctic states operating singly or in combination that will contribute to sustainable development in the maritime Arctic?

This volume attempts to answer some of these questions, which are clearly of great importance for the future of the Arctic. Part I of the volume consists of two chapters and seven comments examining potential Arctic shipping. Part II contains eight international perspectives on potential Arctic oil and gas development. Part III presents three interdisciplinary perspectives on potential Arctic fisheries. The two Inuit perspectives in Part IV address how to build resilient communities in the Arctic. The one chapter and five commentaries in Part V examine the evolution of Arctic governance as well as possible future directions for the management of human uses that have an impact on the Arctic marine environment. A brief Conclusion identifies future directions in the ongoing dialogue on these topics.

PART I: THE FUTURE OF ARCTIC MARITIME SHIPPING

In Chapter 2, entitled “The Future of Arctic Marine Operations and Shipping Logistics,” Bjørn Gunnarsson begins by addressing transport and logistical challenges to natural resource development and shipping in the Arctic.

The author identifies several operational, logistical, technological, and infrastructural challenges to natural resource development in the Arctic. Regarding shipping, Gunnarsson presents several deficiencies in the current Arctic marine transport infrastructure that need to be overcome. The author emphasizes that commercial activities in the Arctic should also be

balanced with environmental protection in the coming years.

To utilize the Arctic Ocean as a transportation corridor and a new trade route between Europe and Northeast Asia in the future, the author advocates the need for a new Arctic marine transportation and logistics system, including physical infrastructure, information infrastructure, response services, and Arctic vessels. The urgent task is how to provide the needed safety and reliability of marine operations and adequate pollution prevention.

The author proposes three steps in addressing logistical challenges. To satisfy safety and environmental requirements, Gunnarsson argues that the first step is to embark on a detailed assessment study of existing logistics and transport infrastructure, as well as resource exploitation infrastructure, in the Arctic. This fact-finding study is essential to design a new circumpolar Arctic logistics and transportation system based on predicted future activities.

Based on this initial assessment (fact-finding) study on the lack of adequate marine transportation and resource exploitation infrastructure in the Arctic, the second step, according to Gunnarsson, is to carry out circumpolar Arctic modeling and an effective visualization study of the needed infrastructure for reliable and safe cargo transport and proposed natural resource extraction. The author suggests that the modeling study of a new marine transportation and logistics system should be undertaken jointly by industry and the academic community. As the third step in addressing logistical challenges in the Arctic, the author proposes to carry out a cost and financing study to estimate the costs of the various infrastructure components and suggest mechanisms to finance long-term, capital-intensive infrastructure in the Arctic. Gunnarsson first proposes a sovereign wealth fund as a cost-sharing mechanism among the eight Arctic nations, international shipping and natural resource companies, other nations, and industries that benefit from better access to Arctic resources and shorter trade routes. As a second viable solution for financing long-term, capital-intensive Arctic infrastructure, the author strongly suggests exploring the greater use of public-private partnerships between Arctic nations and energy and mining companies operating in the Arctic.

Turning to the main determinants for Arctic routes to develop into commercially viable trade routes, Gunnarsson identifies the availability of cargo, transport safety and reliability, and competitive cost levels compared to other, more southerly routes (Cape, Suez and Panama canals) as the key

factors.

Next, the author examines factors affecting future development of Arctic Sea routes. He identifies 12 key factors: sea-ice reduction; energy and mineral resource development; the freight market, price differences and time sensitivity of markets and cargo; time and cost savings by using the NSR vs. Suez; reduced greenhouse gas emissions on the NSR; the availability of ice-class ships in different segments and sizes; the importance of Arctic icebreakers; the inaccessibility and poor conditions of existing Arctic ports; the importance of transshipment hubs for the NSR; navigation and communication; limited SAR and oil spill response capabilities; and the significance of the IMO Polar Code for Arctic shipping.

The author discusses each of these factors with particular reference to future development of the NSR.

Gunnarsson also addresses the significance of sea ice reduction for future Arctic navigation. Diminishing sea ice and rapidly melting multi-year ice will further promote shipping activity in the Arctic, and particularly along the NSR. The year-to-year variability of sea ice will initially remain a challenge during the current navigational season. Relatively thin seasonal sea ice could be navigable by high ice-class carriers and icebreakers during the winter and spring.

Moving on to energy and mineral resource development in the Arctic, Gunnarsson indicates that extraction of hydrocarbon and mineral resources will be the main driver for increased Arctic shipping in the coming decades. A large part of this resource potential is in the Eurasian Arctic at the western gateway of the NSR.

The author contends that high commodity prices and demand in the Far East are the current drivers of cargo transport along the NSR eastwards. A prerequisite for increased growth of transit shipping is the availability of cargo transport in both east and west directions. Dry bulk carriers and tankers follow less-predictable schedules than container ships, and they will be the most common means of cargo transport along the NSR.

The author argues for time and cost savings by using the NSR vs. Suez. About 40% of travel time, fuel and freight shipping costs can be saved between Northern Europe and Asia. Overall cost savings depend on the type of cargo being transported – a shorter shipping route for an expensive LNG tanker can add up to substantial savings. Marine insurance costs on the NSR are expected to go down in line with increased traffic, transport volumes, and infrastructure development. Official NSR tariffs are currently

much higher than Suez Canal fees, but are listed as maximum rates subject to negotiations – in the future the tariffs need to be similar to Suez fees to make the NSR a commercially competitive option.

Reduced greenhouse gas emissions on the NSR contribute to make it a commercially competitive option. The shorter transit route implies lower stack emissions into the lower atmosphere on a global scale, but there are local pollution effects, such as from black carbon.

One of the main determinants for the commercial viability of the NSR, the author emphasizes, is the availability of ice class ships in different segments and sizes. A limited number of vessels with an adequate ice class will represent a limitation to the utilization of Arctic sea routes during the short navigational season, making the NSR vulnerable to competition from much larger vessels going via the Suez or Cape. Large-scale investment is needed for the construction of a fleet of large, powerful ice class cargo vessels based on seasonal navigation only, or year-round operation.

The author also stresses the importance of Arctic icebreakers. Icebreakers are essential in the Arctic today to provide ice pilotage and icebreaking services for vessels, but also to act as “floating” support infrastructure to ensure safety of navigation and support to vessel operations if needed. Russia’s three planned powerful nuclear icebreakers could open the NSR for commercial traffic on a year-round basis.

He also discusses the inaccessibility and poor conditions of existing Arctic ports. Adequate port infrastructure and support facilities for commercial shipping – such as deep-water access, places of refuge, marine salvage, port reception facilities for ship-generated waste, and towing services – are rarely available in the Arctic. Draft limitations make most Russian ports along the NSR inaccessible for larger cargo ships, suggesting the need for floating and mobile support infrastructure.

The author emphasizes the importance of transshipment hubs for the NSR. Future increases in destination and transit shipping on a year-round basis will require the establishment of transshipping hubs on either side of the NSR. Such hubs will fully utilize specialized Arctic vessels in the most economically efficient way, provide needed storage capabilities, and promote industrial activities.

Gunnarsson argues that in light of increasing destination and transit traffic along the NSR, major improvements are still needed in support of navigation and better communication. Russian icebreakers and ice pilots (navigators) provide the best available navigational information, knowledge

and safety of passage for Arctic commercial shipping.

According to Gunnarsson, all eight Arctic states, faced with limited response capabilities, have agreed to cooperate on SAR operations and oil spill response in the Arctic, but the needed infrastructure is currently very limited. Russia is currently building up new onshore marine rescue coordination centers along the NSR equipped with oil spill response equipment, while Russia's icebreakers and six planned ice class rescue vessels will also act as "floating" SAR and oil spill response units.

One of the key factors for Arctic routes to develop into commercially viable trade routes, Gunnarsson notes, is the significance of the IMO Polar Code for Arctic shipping. Arctic marine safety and environmental protection will be greatly enhanced with the adoption and full implementation of a mandatory IMO Polar Code. As key environmental risks the code should address, the author lists use of heavy fuel oil (HFO), black carbon and other emissions, ballast water, routing measures and speed reductions, particularly sensitive areas and places of refuge, emergency response, and discharge of garbage and pollutants. Commercial shipping has expressed worries that if too strict or costly environmental regulations are imposed in the Arctic – which do not apply to alternative, more southerly routes – it will make the NSR and other Arctic transit routes uncompetitive from the start.

Gunnarsson next turns to the short to medium term scenario for the NSR. Regarding this new industrial frontier and Arctic shipping, he claims that the abundance of both energy and mineral resources in the same geographical locations in the Eurasian Arctic ("where gas meets ore") will open up the possibility of value-added industrial processing in situ before shipment via the NSR. Furthermore, intra-Arctic and destination Arctic shipping on the NSR will be the most relevant activities on the route in the short to medium term; that is, transport of natural resource materials from ports within the Arctic region to markets in the Far East, and resupplying Arctic coastal and Siberian communities with goods and providing trade options.

It is clear from the session discussion that sea ice retreat (due to anthropogenic warming) is increasing Arctic marine access and facilitating a lengthening of the navigation seasons in the Arctic. What is driving much of this traffic remains Arctic natural resource development (and high global commodities prices), and the linkages of these resources to global markets. Shipbuilders, including many in Korea, have the capability to construct safe

and efficient Polar class ships for use in Arctic waters, and specifically for use along the NSR.

Heike Deggim provides the IMO perspective on Gunnarsson's Chapter 2 for environmental protection issues, oil spill response in ice and snow conditions, and the availability of hydrographic charts. A mandatory IMO Polar Code for ships operating in polar waters is necessary to greatly enhance Arctic marine safety and environmental protection. Some important elements will be developed separately in annexes to the major IMO conventions. Key work will be done to make training and certification of ice navigators mandatory and will be included in the STCW. Important emission controls and regulations for Arctic ships will come later in the IMO process.

In commenting on Gunnarsson's chapter from a Russian perspective, Aril Moe discusses icebreakers and independent carriers. Many of the new ice-going/ice class carriers are designed to operate without icebreaker support; these ships are in fact icebreakers in their own right. Russia has promoted the operational concept that icebreakers leading convoys of ships along the NSR remains the key way to move commercial ships. Even along the western NSR, Norilsk class carriers operate independently (without icebreakers), sailing year-round between Dudinka and Murmansk. It will be interesting to see if the Russian NSR authorities will allow ships to sail the length of the NSR without any icebreaker escort.

Commenting on Chapter 2, Lawson Brigham presents the operational perspective for the NSR regarding the length of the navigation season. One very clear outcome is that the opening of the NSR is real, and the Russian Federation is determined to make use of its national Arctic waterway to move the region's natural resources out of the Russian Arctic to global markets, principally to Asia and around the Pacific. The use of the NSR for container ship operations is much less clear, and the early indications of recent passages include oil tankers, LNG ships, bulk carriers (some from northern Norway) and very few container ships. During the 2012 season a Polar class LNG carrier sailed along the NSR eastbound during October/November from Hammerfest, Norway to Japan, a key operational success. The NSR may be available for trans-Arctic voyages year-round. However, a more realistic navigation season is six months, and that is what the Russian authorities are aiming for. Although technically a six-month season may be attained, it is unclear if using the NSR will be economically feasible, and more research is needed here. The NSR will require Polar class ships for the

foreseeable future.

Commenting on Chapter 2 from the coastal communities and environmental perspectives, Martin Robards and Denise Michels discuss critical aspects of food security and the impacts of Arctic marine operations on coastal communities. They present a full range of impacts: noise pollution, the interaction of marine mammals with ships, oil spills, and interactions of hunters with ships. Regional measures to mitigate such impacts need to be developed in each of the Arctic coastal states, and the maritime industry must be involved in perhaps taking voluntary measures to mitigate some of these risks.

Xu Hua, Toshiyuki Kano and Takahiro Majima, and Sung Woo Lee comment on national Arctic strategies, natural resources, and the NSR from Chinese, Japanese, and Korean perspectives, respectively. China, Japan, and Korea require natural resources (oil and gas, hard minerals) to fuel their national economies. As an example, Korea gets perhaps 95% of the natural resources it requires from global sources, and all of these resources are carried by ship. The NSR appears to be an alternative, seasonal maritime trade route to bring northern European and Russian Arctic natural resources to these three nations; their national Arctic strategies will no doubt focus on this important opportunity and change in maritime trade.

Xu Hua and Sung Woo Lee comment on intermodal aspects of Eurasian trade, discussing alternative (and intermodal) transport options to the NSR. Land bridges across the continent include the trans-Siberian railroad. Other routes from China to Europe are presented, including rail to ports in the Russian Arctic such as Tiksi, Dundinka, and Murmansk. It is noted that the Russian maritime and rail authorities (ministries) have not been known to coordinate and cooperate to develop such intermodal transport options.

Chapter 3 in Part I is “International Cooperation in Arctic Marine Transportation, Safety and Environmental Protection,” by Lawson Brigham.

Brigham focuses extensively on international perspectives related to Arctic maritime shipping, operations, safety, environmental issues and, most importantly, international institutions relevant to Arctic maritime shipping. The author also presents thoughts about current and future NSR operations.

Brigham begins by identifying the key drivers of Arctic marine navigation. He argues that the primary driver of today’s Arctic marine traffic is principally Russian Arctic natural resource development, which is influenced by global commodity prices (global economic factors and the

process and acceleration of economic globalization). As large oil tankers, chemical bulk carriers and LNG carriers will soon sail in Arctic waters in greater numbers, the author advocates that such future voyages urgently require complex regulatory measures and drastically improved Arctic marine infrastructure for safe navigation. He also emphasizes much greater cooperation between maritime states and marine industry.

Brigham then turns to Arctic marine accessibility. It is not an ice-free environment that is to be regulated, but one with sea ice that may be more mobile. Therefore, future ships navigating in Arctic waters will most likely be required to have some level of polar or ice class capability so that they can safely and efficiently sail for potentially extended seasons of navigation. Recent research has focused on how changes to Arctic marine access can be evaluated by using global climate model sea ice simulations and a range of Polar class ship types.

Changing sea ice conditions by mid-century may also allow lower Polar class vessels (Polar Class 6) and perhaps even non-ice-strengthened (open water) ships to cross the Arctic Ocean in September. However, none of these results indicate regular trade routes are possible, just that certain types of ships may or may not have marine access for select times of the year given a range of climatic projections. The types of cargoes and the economics of global shipping, along with governance and environmental factors, will determine which Arctic routes might be viable.

Brigham addresses cooperative research in Arctic marine transportation. He indicates that international cooperation in Arctic marine transportation research is an opportunity for public-private partnerships. The author recommends that new research ventures should be explored that could include multinational partners and maritime research institutes and think tanks. The five major themes in Arctic marine transportation in need of robust and creative research, he says, are: Arctic marine shipping economics; marine infrastructure (planning, investment and technology); marine safety systems; environmental protection measures; and emergency response strategies. Comprehensive economic studies, specifically cost-benefit-risk analyses, are essential for all potential Arctic routes (for both trans-Arctic and destination shipping).

Brigham also addresses the roles of non-Arctic state observers in the Arctic Council. A key challenge for the Arctic states and these observers is how to facilitate non-Arctic state contributions into the work of the council. How can experts from the non-Arctic states bring meaningful and

useful concepts and information to the council's working groups?

The observers see firsthand the role of the Permanent Participants on the council and how indigenous issues are woven into the council's deliberations. Of key importance is that "observers may, at the discretion of the Chair, make statements, present written statements, submit relevant documents and provide views on the issues under discussion." Thus, the Arctic Council is facilitating and encouraging the observers to make contributions, primarily at the working group/subsidiary body level.

The author also discusses the IMO regarding cooperation on Arctic issues. All of the Arctic states and the non-Arctic state observers to the Arctic Council (20 states) are IMO members. These states all have a rich maritime heritage and an active involvement in global maritime operations and cooperation. The IMO is central to any discussion of Arctic marine safety and environmental protection. A unified approach by the Arctic states to the evolving, mandatory Polar Code at IMO is required; the non-Arctic state observers to the Arctic Council, all key maritime states, can assist in this process by aligning their Arctic interests and contributing their expertise to shaping a necessary and urgent instrument to protect Arctic peoples and the marine environment. One of the evolving challenges for Arctic states is to identify areas in the Arctic marine environment where special IMO provisions may be implemented.

Brigham turns to how to bridge the North Pacific, Arctic and North Atlantic for cooperative opportunities. The author emphasizes the importance of the Coast Guard Forums and notes that such forums now exist both in the Pacific and Atlantic, and are making efforts to address some of the issues central to international maritime affairs. However, are they working at policy, best practices and/or implementation levels? Are they working at day-to-day levels on Arctic maritime issues, and how can they strengthen cooperation?

The areas of focus for the North Pacific Coast Guard Forum (NPCGF) and the North Atlantic Coast Guard Forum (NACGF) include maritime security, illegal migration, illegal drug trafficking, fisheries enforcement, search and rescue, and environmental response. Joint operations have been a key, visible activity. All of the areas of focus have relevance to Arctic operations and future response strategies to increasing Arctic marine activity. The advantage of these forums is that they focus on the practical and operational aspects of marine safety and security. The meetings bring together technical experts and the heads of the coast guards (or equivalent

maritime organizations). Expanding their dialogue and joint exercises to include Arctic operations and transportation issues would be an important and logical extension.

In conclusion, Brigham recommends that a greater understanding of Arctic issues and proactive cooperation by the Arctic states must be developed among non-Arctic states and a host of stakeholders and actors in the global maritime community. Key international cooperation can be fostered by gaining support for a uniform and mandatory Polar Code for all ships; involvement of experts from non-Arctic state observers to the Arctic Council; unified approaches to Arctic marine environmental protection; Arctic indigenous peoples having new partnerships with non-Arctic states; addressing the Arctic marine infrastructure deficit; the Coast Guard international forums; creative public-private strategies; and partnership investments in marine infrastructure.

According to Brigham, one of the clear benefits of closer international cooperation in Arctic marine transportation is the fostering of regional stability. Close cooperation between Arctic and non-Arctic states on the practical aspects of Arctic marine safety and environmental protection sets the stage for the development of uniform rules and regulations (at the IMO).

In his comments on Chapter 3, Captain David A. Vaughn notes that the U.S. government has enduring national interests and responsibilities in the region, including national and homeland security, search and rescue, law enforcement, humanitarian assistance, scientific research, diplomacy, and marine environmental protection. As the Arctic Ocean becomes increasingly navigable, according to Vaughn, new routes for global maritime trade and increased access for resource exploration are changing the strategic landscape of the region and adding new urgency to attempts to establish a functional governance structure and infrastructure. He further notes that the White House approved a “National Strategy for the Arctic Region” in May 2013 that focuses on three primary strategic objectives:

1. Advance United States Security Interests,
2. Pursue Responsible Arctic Region Stewardship, and
3. Strengthen International Cooperation.

Commenting on Chapter 3, Jiayu Bai presents the Chinese perspective on international cooperation in Arctic marine transportation, safety and environmental protection.

What China can contribute to the development of Arctic shipping

regulation? Bai discusses at global level, regional level and national level. At global level, China possesses the 4th largest fleet in 2012. The involvement of Polar Code and participation of IMO initiatives by China is of great significance for the stable sustainable development of world shipping. At regional level, China was just granted observer status of Arctic Council on 15th May 2013. Bai thinks that it is meaningful to participate in the Arctic Council's working groups and task forces because of its influential statue in the field of Arctic environment protection. Bai notes that at a national level, China has established bilateral arrangements with Russia, Canada, and other Arctic States that have proven helpful for the prospective "Designation bulk cargo transportation and transit container transportation." Bai concludes that Arctic shipping and its regulation is in a dynamic development process and that China will contribute to the sustainable and peaceful use of Arctic passages and prosperous development of world shipping.

Kiyoshi Nakashima comments that economic issues in Arctic marine transportation are essential to understand, and he further notes, in his view, that the Arctic routes are now broadly recognized as a shortcut linking Asia with Europe and the east coast of North America. However, such a geographical advantage would be meaningless unless it was economically justified. The question, he notes, would be whether the world shipping industry can really enjoy the reduced sailing costs and time through use of the Arctic routes.

The shortcut offers benefits in saving navigation costs and transit time. Investments in the Arctic on safety (icebreakers, navigation aids, meteorological observation, SAR, and shelters) and environmental protection (oil spill prevention, reducing emissions, and research on environmental impacts) will bring benefits to shipping lines and cargo ship owners.

Nakashima recommends that the pricing of service charges should be reasonable and transparent, that consensus needs to be built among service providers and service users, and that the shipping industry needs to keep persistent watch over the service providers to ensure they comply with the principles of UNCLOS.

In commenting on Chapter 3, Jong Deog Kim remarks that in considering the major roles of China, Japan, and Korea in the global LNG and fisheries trades and logistics market, they have become major stakeholders in Arctic issues, and their long-term perspectives are necessary. To them, it is of vital importance to be endorsed as observer in the Arctic

Council. He notes that Korea established a new Arctic policy in July 2013, the Comprehensive Arctic Policy Framework Plan, a set of pan-governmental initiatives led by the MOF. The plan focuses, inter alia, on cooperation with the Arctic Council and Arctic states as well as global, regional, and local communities. Korea is in the process of establishing an Arctic Policy Master Plan by the end of 2013.

He agrees with the author that meeting the need for ice breaking services is a limiting factor of the NSR. Kim also proposes utilizing the traditional knowledge of indigenous people in safe navigation. He raises the urgent tasks of how to evaluate environmental carrying capacity in sensitive areas for sustainable development, and how to incorporate the SAR ability of non-Arctic states into safer shipping in the Arctic Ocean and its neighboring seas. Kim focuses on the need for substantially enhanced emphasis on more comprehensive oceanographic, climate, and weather information. These sources of information and observations are addressed on behalf of governments, businesses and industry, and more broadly, civil societies, local governments, and institutions have the need to collect and share data.

In commenting on cooperation in Arctic shipping presented in the 2009 AMSA report, Kim begins with facilitating development of the Sustained Arctic Observing Network (SAON). He explains that Korea has good experience in building an ocean waste monitoring system through cooperation with the local communities of islands and remote areas, and has been using the system for marine environmental management. On building a database on ship accidents in the Arctic Ocean, he proposes to designate certain areas as special risk zones and involving risk can be lowered. He also proposes to survey the economic validity studies on major potential routes of trans-Arctic shipping. Finally, Kim suggests that NPAC can provide candid, informal, and open discussion opportunities for innovative approaches to these challenges, including those suggested by the AMSA report.

PART II. THE FUTURE OF ARCTIC OIL AND GAS DEVELOPMENT

In Part II, the seven panelists discuss the international dimensions of Arctic oil and gas development related to seven key questions.

What role will global energy markets play in the development of Arctic oil and gas?

Fereidun Feshareki argues that the key driver is the price of oil. At oil prices of, say, USD \$100-\$120 and above, everything works. At prices of USD \$70-\$80/bbl, Arctic oil is likely to be economically viable even at the lower range of the price. The big question mark is about Arctic gas developments. Given new gas supplies from conventional sources (Qatar: 77 mmt, Australia: 80-90 mmt) and unconventional/new supplies (United States: 70-80 mmt, Canada: 20-30 mmt, Mozambique: 30-40 mmt), Arctic gas projects may not work. According to FACTS Global Energy's long-term Dubai oil price outlook, the oil price is forecast to bottom out at USD \$80/bbl in 2017 and gradually rise to nearly USD \$100/bbl in 2029. In considering that the LNG business is based on "20 years take or pay" contracts, we should look to the future beyond 20 years in order to evaluate the competitiveness of Arctic gas projects. Even if the oil price may hold back many projects, strategic government deals may spur development of others, for instance in Russia.

What is the likely impact of the U.S. shale gas revolution on the competitiveness of Arctic oil and, especially, gas?

Lucian Pugliaresi presents a discussion of America's perspective on the future of Arctic oil and gas development. He explains that if the oil price environment is favorable and advances in technology can reduce development costs, substantial financial and technical risks arising from Arctic oil and gas development can be managed. However, two forces are now in play that are likely to delay many higher-cost and risky Arctic projects. The first is an economic environment that is constraining sustained growth in the price of oil, especially at levels above USD \$100/bbl. There is growing evidence that advanced economies are adjusting to these price levels through lower economic growth. Economic adjustments to rising natural gas prices can also constrain price increases, but demand adjustments for natural gas are more likely to involve lower-cost fuel substitutes (e.g., coal) than lower economic growth. Pugliaresi emphasizes that an often overlooked feature of shale resource development is that financial and project risks are low because the U.S. does not require massive capital outlays for long periods of time before

initial production. The second constraint to widespread development of Arctic resources is competition from lower cost resources from the U.S. shale gas revolution. According to the U.S. Energy Information Administration, shale gas production is likely to see sustained increases over the next 20 years even in a period where natural gas prices remain priced well below USD \$6-\$7/mcf. On the other hand, Pugliaresi remarks that the unique circumstances (favorable geology, liquid gas market, private land ownership, lower population density, and well-developed infrastructure) that allowed the U.S. shale gas boom to happen so quickly cannot be replicated easily in other markets. New studies of source rock suggest that reserves of shale gas worldwide are going to increase, but it is still unknown. We are at the early stages, but the progression of technology suggests that these new resources will be an issue of competition for Arctic resource development. These developments will likely postpone major development of Arctic resources to a much later date, i.e., outside of some unique high-value opportunities in Alaska or offshore Norway--and even these are likely to move very slowly now. In addition to price and cost risks, the development of the U.S. Arctic faces regulatory risks.

What technological issues arise in accessing and transporting Arctic oil and gas?

According to Arild Moe, the industry believes that technological challenges in the Arctic can in principle be tackled with existing technologies, but the risk level requires the highest quality and redundancy on all levels. Strong technological development in multi-phase transport of mixtures of oil, gas and water is expected to further increase transportation distances to shore. The challenge is seen to be not so much the technology itself, but operation systems and procedures that can enhance safety. Transportation technologies are also known, but advances in ship design may increase the season for sailing without icebreaker assistance.

How important is Arctic energy development in their national economic strategies? Are they likely to encourage projects, offer concessions to attract investment? Are there domestic forces that would limit development?

Moving on to national policies, Moe explains that Norway is currently pursuing an active licensing policy that is of paramount importance to the Norwegian economy. There may also be additional interest in developing a previously disputed area in the Barents Sea in anticipation of cross-boundary fields. In Russia, development of Arctic resources has been given high priority in official plans and statements over the last 10 years. However, there have been other important developments in Russian energy policy. Legislation in 2008 granted Rosneft and Gazprom a monopoly on operating new offshore projects. There is a contradiction between Russia's declared goal of rapidly developing its Arctic offshore petroleum resources and the constraints imposed by national control and monopolization. The Rosneft deals preempted attempts at liberalizing access to the Russian continental shelf. Extensive offshore licensing was given to Rosneft and Gazprom in 2012-2013. Openings for private Russian companies are hard to imagine without unbundling the activities of Gazprom and Rosneft.

In the U.S., the urgency of Arctic energy development is much lower than it was a few years ago, due to the revolution in unconventional gas and oil. The market for production in the Arctic would probably have to be LNG exports to Asia. In principle, the U.S. government is prepared to sell leases offshore Alaska, but it is evident that environmental considerations loom larger than they did before the Mexican Gulf catastrophe.

The situation in Canada is much the same. The development of the Alberta oil sands is at the center of attention, and Arctic offshore energy development does not seem to be a high priority. Environmental concerns and potential impacts on native communities are extremely important as well.

Greenland connects its prospects for becoming fully independent from Denmark to future petroleum revenues. Despite this, recent developments have shown that environmental counter-arguments also carry weight.

What are the most pressing environmental challenges associated with Arctic petroleum activities?

Alexander Shestakov presents a conservation perspective on Arctic petroleum activities. Petroleum activities in the Arctic will bring numerous environmental challenges (impacts) associated with every stage of hydrocarbon development both in onshore and offshore operations.

From an environmental point of view, the level of cumulative risks from petroleum development in the Arctic is unacceptable, a position that resonates with the general public. According to Shestakov, a recent study conducted by World Wildlife Fund (WWF) provides evidence that the risk is not just from oil extraction – gas and gas condensate extraction carry significant environmental impacts that are still not fully understood and require further research.

Currently there are no reliable technologies to fully deal with an oil or gas condensate spill under, in, and to a great extent on the sea ice, or with oil in the water mixed with ice. As for containment of oil spills in the Arctic offshore, there is either no or poor infrastructure, no reliable technologies to deal with oil spills under ice, no experienced personnel, and no harmonized sector, Arctic-specific standards. Experience so far comes from the Norwegian Barents Sea, which is open waters, and shallow sea operations in Alaska with artificial islands. Standards must also take distance into account for search and rescue. Without proper regulation of operations, available proven techniques for prevention and response to oil spills, and adequate knowledge about Arctic systems, environmental NGOs such as the WWF believe that there should be no new development of hydrocarbons in the Arctic offshore.

Are international environmental agreements likely to affect the development of Arctic energy projects? According to Shestakov, the WWF believes the Arctic Council can play a very significant role in putting in place Arctic-specific regulations. However, there is no coordinated and harmonized system of regulations at the international level that is Arctic-specific (can fully address Arctic conditions) and can provide a full necessary governance regime for Arctic exploration. It is crucial to make national regulations at the highest possible level, as well as to meticulously work on the obligations agreed to under the Arctic Council Agreement.

Have international oil companies made changes in risk management or norms that affect their Arctic operations and strategies? Shestakov explains that companies are working internally and also joining their efforts to develop new technologies and to reduce different risks. However, it is difficult for the public to assess progress, as most of this work is not transparent. Many announced developments and tools are not confirmed by real-life tests with full public access.

Shestakov concludes that in the Arctic, the risks of exploiting hydrocarbons are clear, both on a local and a global basis. Therefore, the

WWF believes that without proper regulation of operations, available proven techniques for prevention and response to oil spills, and adequate knowledge about Arctic systems, there should be no new development of hydrocarbons in the Arctic offshore.

How will oil and gas development in the Arctic affect coastal communities?

Edward Itta outlines a community perspective on Arctic offshore oil and gas development while protecting native people's subsistence values. As offshore oil and gas development is expanded, so will the extent of impacts to the underwater ecosystem. There will be more stress on migrating whales as the level of underwater noise and habitat disruption interferes with all marine populations. When the bowhead whale is under stress, the Inupiat are under stress. Itta argues that the Inupiat and the oil companies have different priorities. The companies want to extract oil to create wealth in the cash economy while protecting the ecosystem. The Inupiat want to continue hunting bowhead whales to sustain their subsistence economy while participating in the cash economy.

The question raised by Itta is this: Can the companies and the federal government honor and protect native subsistence values at the same time that they allow and promote offshore development? First, the economic value of subsistence of Arctic coastal communities is to be recognized. Second, we need to identify areas so biologically productive for subsistence purposes that they are withdrawn from consideration for petroleum development. A third consideration is for the creation of a system to replace the subsistence value lost by offshore development with some sort of economic equivalent, which could include an ownership stake. But it is also important to recognize the importance oil and gas projects have had in some places. Development in the North Slope in particular and Alaska in general has benefitted greatly from oil and gas revenues.

Are Arctic hydrocarbons important in meeting the long-term oil and gas needs of China, Japan, and Korea?

The panel discussion by Kang Wu, Fereidun Fesharaki, Tomoko Hosoe, and

Seong-Min Lee presents the three Northeast Asian countries' perspectives on the future of Arctic oil and gas development.

The three non-Arctic countries of the North Pacific (China, Japan, and Korea) are net energy importers. China is currently the largest energy consuming country in the world and the second largest oil importer in the world. Japan is the world's largest importer of LNG, the second largest importer of coal and third largest importer of oil. Korea is the world's second largest importer of LNG and the sixth largest oil importer in the world. Worse yet, Japan and Korea import nearly 90% of their crude supply from the Middle East, while China imports more than 60%. Because they have far more dependence than any other major importing region in the world, Chinese, Japanese, and Korean customers have been paying a premium for Middle East crude oil relative to those in the U.S. and EU. In turn, higher crude oil prices also lead to higher prices for other energy commodities such as LNG and coal, which are typically linked to oil prices. The issue of challenges to Northeast Asian energy security is exemplified by the debate over the existence of what some refer to as the "Asian Premium."

The three major Arctic countries of the Northeast Pacific (Russia, Canada, and the U.S.) could represent potential new supply sources for the three Northeast Asian states, and having secure markets in Northeast Asia is an important factor in potential Russian and North American investments on the supply side. This raises possibilities for mutually beneficial energy trade and investment between the three exporters and three importers and a more integrated North Pacific energy market.

Fereidun Fesharaki and Tomoko Hosoe note that in Japan, gas imports have been soaring recently due to the temporary shutdown of nuclear plants, but will also increase in the future since many nuclear plants will reach retirement age. This process will start already in 2016. Given nuclear power's role as Japan's "home-grown" solution to fighting the issue of energy import dependency, nuclear power's uncertain future in Japan is a bitter pill to swallow. It also makes the urgency of fossil fuel supply procurement from new sources more urgent. According to Seong-Min Lee, Korea is well covered by gas imports until 2024, and then a need for new deliveries will appear. Discussions of pipeline gas via North Korea have turned out to be fruitless. In addition to the diversification issue, Arctic gas could possibly also offer another advantage: large volumes and long-term commitments. Arctic gas must be regarded as an important long-term

strategic resource base for Japan and Korea. But it remains a problem for companies to generate investments for such a long term when they have to show results in the short term. Yamal LNG will have substantially lower transportation costs to Northeast Asia than gas through the Panama Canal, if the same ships can be used. But additional shipbuilding and production costs probably mean the project needs an oil price above USD \$100 to be feasible.

The Arctic can also become important in addressing China's rising energy security concerns and can help the country diversify sources of imports in the future. China is a net importer of all three types of fossil energy. Net imports of oil are huge, and net gas imports are growing fast. The Arctic is one of the new frontiers for Chinese NOCs to pursue overseas investments, and Chinese companies can possibly also supply manpower in major Arctic development projects. Chinese companies are likely to be more willing to invest for the long term and less concerned about short-term results than Japanese and Korean companies. But there is still some uncertainty about the degree to which China is welcome in the Arctic. The relationship with Russia is crucial, as that country already supplies 10% of China's oil, and Russia is also actively promoting oil and gas projects in the Far East, Sakhalin, and Okhotsk Sea that may to some extent compete with the Arctic for Asian customers.

According to Kang Wu, diversification of oil and gas supply sources and increasing overseas oil and gas investments stand out not only as important but also relevant to Arctic oil and gas development. As such, seeking supplies from the Arctic, if they are available and economically viable, fits naturally into this strategy. To alleviate the pressure of transporting the majority of its oil imports through the Strait of Malacca, China has been searching for new routes for quite some years. Any potential new supply from the Arctic for China will thus satisfy the Chinese government's desire for a continuous import diversification strategy.

Turning to China's overseas energy investments, Wu explains that the Chinese NOCs are increasingly running out of opportunities to strike big in reaching traditional deals to explore conventional oil and gas. They have to turn to areas such as shale gas, deep-water drilling, Canadian oil sands, and most recently the Arctic for new potentials. China can play an important role as both an energy buyer and investor in the development of Arctic energy. According to Wu, China does prefer to deal with Russia, and for that matter other Arctic countries, on a bilateral basis. However, it is time

for China to step outside this traditional thinking and consider enhancing cooperation with other potential buyers and investors, particularly Korea and Japan, and companies from these countries. Together, Asian buyers and investors can have a bigger say in Arctic affairs and impact on oil and gas developments in the region. Russia is currently the largest pipeline oil exporter to China. It is the third-largest oil exporting country to China (accounting for 9% of China's total in 2012) and a minor gas (LNG) exporter (around 1% of China's total gas imports in 2012). Canada is the only other Arctic Council member country that exports any oil to China.

PART III. POTENTIAL ARCTIC FISHERIES

Part III, entitled "Potential Arctic Fisheries" addresses the future of Arctic fisheries, primarily those in the Central Arctic Ocean (CAO) in areas beyond national jurisdiction. It has not yet been determined that there are commercial stocks in the CAO. The three panelists present interdisciplinary perspectives on future commercial fisheries in the CAO.

The panel discussion by Harald Loeng provides a scientific examination of some of the factors and conditions relevant to the migration of various species into the CAO and the prospects for future commercial fisheries there. Loeng concludes, for a range of reasons, that only a few species are likely to migrate into the CAO, and that the populations of these species would be unlikely to support commercial fisheries for some time to come. This raises issues in respect to appropriate fisheries management mechanisms for the CAO and the urgency of establishing such mechanisms.

Loeng highlights the various factors hindering the substantial movement of sub-Arctic fish stocks into the Arctic Ocean in the near future. These factors include the cold water pool in the Bering and Chukchi seas, the general low primary production of Arctic waters, and the prevalence of deep ocean areas. Despite the fact that many species have evolved temporal patterns of feeding and reproductive behavior that maximize survival, climate change that shifts the temporal match with key aspects of life history may affect survival. The important environmental factors include the spatial distribution of suitable thermal conditions, the availability of prey, and the depth of migration corridors into or out of the Arctic Ocean. Key life history and behavioral characteristics include growth potential, fidelity to spawning sites, foraging plasticity, thermal tolerances, habitat

depth, and projected spawning stock size.

According to Loeng, the immigration of species from further south in the near future is not likely because the Arctic Ocean has hitherto had low primary production and is a deep ocean. But even if these or other stocks of pelagic fish and other deep-water species were to enter the Arctic Ocean during the feeding season, the chances that a fishery based on those stocks would develop are low. Since these species would be accessible in greater concentrations further south during their spawning season or during migration to and from the spawning areas, which would be much nearer to the home ports of fishers, it would probably not be economically viable to fish for those stocks in the Arctic Ocean, even though it would be possible to do so. If future temperatures in the sub-Arctic areas rise to a level that drives stocks living there today to move northward to survive, a scenario featuring fishing for pelagic species in the Arctic Ocean is conceivable. But for the stocks to survive in such a situation, their whole life cycle would have to change, giving rise to a new life cycle with new spawning, nursery, wintering, and feeding areas, and new migration routes for adult fish and passive transport routes for eggs and larvae. This process would probably take many decades or even centuries. Most likely, stocks would barely survive such a period, and we would be unable to maintain any fishing while they gradually establish their life cycle in a new environment.

Turning to the management and control regime for potential Arctic fisheries, Loeng argues that in a situation where resources have moved into the Arctic Ocean, either during part of the year or permanently, fishing there could be profitable, and the management regime in force today would have to be amended to include the peripheral areas adjacent to the shelf seas to the south within the exclusive economic zones of Russia, Norway, Denmark, Canada and the United States. Fishing within these zones would not require any change from the present management and control regime. If fishing developed in the high seas beyond the jurisdiction of coastal states, management would have to be carried out by an organization such as the North East Atlantic Fisheries Commission (NEAFC), or by a new management regime established by the countries surrounding the Arctic Ocean.

While Loeng argues that the lack of a fisheries management regime for the high seas in the CAO is not a problem on the grounds that central Arctic fisheries do not exist yet, that there is no evidence that the region will ever be home to large stocks of commercially desirable fish, and that

there is scant motivation for fishers to travel that far in search of fish, a strong counter viewpoint is also evident.

Such a counter viewpoint to Loeng's argument is the conservation perspective by Henry Huntington. While there is uncertainty in estimating future fishable resources in the Arctic Ocean, fisheries management is fundamentally about managing human activities, and here there is less uncertainty. In the absence of regulation, overfishing is the typical outcome, not the exception. These two patterns – a global tendency toward overfishing and the practice of imposing rigorous management only after a problem has occurred – pose a serious challenge in the CAO.

With reference to Atlantic fish and a future in which open water “probably would occur” first within the EEZs of coastal states, in the Pacific sector, according to Huntington, the future is already here: open water has extended well into the high seas area each summer since 2007, including over 40% of the CAO in 2012. Moreover, the Pacific sector is shallower than the Atlantic sector, providing more areas that may be attractive both to fish and to fishermen.

Furthermore, the most common fish in the Arctic Ocean is Arctic cod, which has been seen in large aggregations in the CAO beneath Russian ice stations. Most of the cod catch has been used for dog food, fish meal, and oil, with some for human consumption. But innovations are always possible, and it is not hard to imagine an increased interest in an untapped source of protein. Arctic cod are central to the Arctic Ocean food web. This means that the impacts of CAO fisheries could include diminished human well-being in the Arctic, alongside any possible economic benefits from a fishery.

Loeng states that fishermen are unlikely to go all the way to the Arctic high seas if they can catch more fish within the EEZs, closer to home. This is true, but only for fishermen who can legally fish within Arctic EEZs. Fishermen from other nations, such as those on the Pacific Rim, cannot stop within, say, the U.S. EEZ and start fishing. They would have to continue to international waters. Currently, there is nothing to stop them from doing so.

There is much room between having no fish and having large fish stocks, or between no fishing and sustainable fishing. Recognition of the preceding points has already given rise to discussions among the five Arctic coastal states regarding an international agreement for fisheries in the CAO. The role of non-Arctic countries in this discussion is not yet clear,

but the increased interest in Arctic affairs shown by China, India, Japan, the Republic of Korea, Singapore, and others suggests that they, too, have a stake in what takes place in the international waters of the Arctic. Norway is hosting a scientific meeting in October 2013 to assess the current level of scientific (biological and ecological) understanding about the CAO. The Pacific Rim nations can contribute through their existing and future research efforts in the Arctic.

Huntington concludes that avoiding overfishing means regulating fisheries, and preventing overfishing in the first place means creating a management regime before fishing starts. Establishing such a regime for the CAO would help achieve that rare thing: effective management before a crisis occurs.

Launching from Loeng's scientific perspective on the future of Arctic fisheries governance, David VanderZwaag's social science perspective provides additional details on the future governance of Arctic fisheries, with a focus on the North Pacific Arctic and CAO. The nautical image that largely captures the fishery governance seascape is that of a "restless sea."

VanderZwaag presents five unsettled dimensions to the future governance of marine biodiversity beyond national jurisdiction. The first is the multiplicity of governance options. A broad array of future governance options for the CAO has surged from academics, NGOs and others without producing any obvious consensus. The second dimension is concerns by Norway regarding the appropriateness of using the Arctic Council versus the Arctic 5 as the proper forum for addressing fisheries issues in the Arctic Ocean. The third is that the representatives of the five Arctic coastal states did address CAO governance tangentially at their meeting in Ilulissat, Greenland in May 2008, and opined that there is no need to develop a new comprehensive international legal regime to govern the Arctic Ocean. Building on meetings of Arctic 5 officials in Oslo in 2010 and fisheries science experts in Anchorage in 2011, officials from Canada, Denmark, Norway, the Russian Federation and the U.S. met again from April 29 to May 1, 2013, in Washington, D.C. to discuss possible future fisheries in the CAO. The Washington meeting certainly leaves a "restless sea" in its wake.

Norway offered to host a further scientific workshop in October 2013, and Denmark offered to convene the next meeting of Arctic 5 officials to continue policy discussions before the end of 2013. Fourth, scientific research into changing Arctic fisheries appears to be quite fragmented and continually evolving. For the North Pacific, scientific research efforts are

spread across a number of entities, including the North Pacific Marine Science Organization (PICES), the Scientific and Technical Committee on the Conservation and Management of Pollock Resources in the Central Bering Sea, and the North Pacific Anadromous Fish Commission. Fifth, the two main bones of contention are whether marine genetic resources located beyond areas of national jurisdiction are subject to the freedom of the high seas regime under the law of the sea, and whether there should be a new implementation agreement attached to the UN Convention on the Law of the Sea focusing on marine biodiversity beyond national jurisdiction. VanderZwaag concludes that the future evolution of Arctic fisheries governance at the national, regional, and perhaps even global levels will likely depend on two main drivers, the impacts of climate change and globalization, which promise to propagate an ongoing “restless sea.”

PART IV. BUILDING RESILIENT COMMUNITIES IN THE ARCTIC

Part IV, “Building Resilient Communities in the Arctic,” addresses the human communities of the Arctic, their role in the development of the region’s resources, and their ability to maintain resilience in a rapidly changing world. The two Inuit panelists argue that the future of the Arctic must be determined with the consent of the peoples of the Arctic, and that there is much that can be done to enhance the resilience of Arctic communities in the face of rapid change.

According to Duane Smith, it is essential to recognize that Arctic peoples are rights holders who have a voice in Arctic development and whose prior informed consent is required for any major projects to go forward. In some cases (e.g., in Greenland), this is a matter of established legal and political rights. In all cases, it is a matter of human rights. But this does not mean that Arctic peoples are opposed to all forms of economic development. Even in areas where subsistence practices remain prominent, Arctic communities must also live in a cash economy. They require income to provide community infrastructure and services and to ensure a good standard of living for their residents.

Smith emphasizes that what is needed are partnerships between Arctic communities and regional bodies (such as the North Slope Borough in Alaska and the government of Nunavut in Canada) on the one hand and

developers (oil, mining, and shipping companies) on the other hand that allow development to proceed in a manner that is not only beneficial to the developers but that also protects the natural environment and proves beneficial to the residents of Arctic communities.

Such partnerships may involve the creation of jobs within communities, the initiation of training programs, payments of taxes or fees, the protection of areas that are especially important for subsistence purposes, and so forth. What seems feasible is the development (formally or informally) of a set of rules of engagement governing relations between Arctic communities and developers. Critical to the success of such rules will be a firm commitment to applying them to specific cases, such as the development of new mining operations in Greenland or exploration for offshore oil and gas in the Beaufort and Chukchi seas.

Turning to the conditions of resilience, Smith explains that peoples and communities in the Arctic are known for their ability to adapt to many changes in the natural environment. However, the current biophysical and socioeconomic changes that are occurring are generating severe challenges to the resilience of these communities.

There is considerable variation in the experiences of individual communities. Some have fared better than others in coping with the changes occurring today. A number of factors explain these differences. Among the most important factors are education, language retention, links to the land, a sense of controlling fate, and the maintenance of social bonds.

According to Smith, some of these factors are difficult to control effectively. But in other cases, there are opportunities to take steps to strengthen the resilience of communities. Local ownership and control of natural resources makes a difference. Measures to ensure food security and to improve education at the local level are needed in some communities. Providing viable roles for young males in order to narrow the gender gap at the local level is an important factor in many communities. He emphasizes that what is needed is an approach that respects the rights of communities and allows them to make their own decisions, while at the same time ensuring that they have the resources needed to initiate and implement measures to strengthen resilience.

Turning to an Arctic community's ability to build and maintain resilience, Smith recommends five characteristics: flexibility and adaptability; the ability to quickly and effectively harness local resources and expertise; local ownership over preparation, planning, and response

when faced with a threat or incident; the ability to access and draw upon local knowledge; and the existence of trust and cooperation between public and private sector actors and community members.

Finally, Smith recommends a bottom-up approach to building resilient communities in the Arctic. Resilience is best established through the engagement, interaction, and initiatives of individuals and organizations within communities. Inuit must increasingly take firm control of their own destiny, while at the same time work collaboratively and harmoniously with those that seek to interact with them. This is the Inuit way. Smith also argues that integrating traditional knowledge with Western scientific traditions is not a straightforward process, as the two see the world very differently. Inuit want to build research capacity to design and undertake research for their own needs and to provide a foundation of knowledge for informed decision making. In doing so, Inuit welcome research partners that wish to engage in participatory and mutually beneficial research projects. Inuit are open to mutually beneficial collaborations, partnerships, and alliances to address the challenges and to take advantage of the opportunities of the rapid Arctic changes.

Sara Olsvig also advocates that the future of the Arctic be determined by the peoples of the Arctic, who have a duty to develop the Arctic responsibly. A human rights approach is fundamental, and core rights such as the right to self-determination and the right of giving free, prior, and informed consent must be recognized, protected, implemented, and respected. Olsvig acknowledges that businesses, investors, and the international community play important roles.

Turning to change and resilience, Olsvig emphasizes that change is inevitable and resilience is crucial. Community resilience is also about political resilience. Arctic community resilience and international engagement are interdependent. Olsvig argues that we must build resilient Arctic economies based on local capacities and strong partnerships between local communities and civil society, the governments of the Arctic, investors and businesses, and international society. On the rights and responsibilities of the peoples of the Arctic, Olsvig argues that transparency is crucial and open and fair decision-making processes are necessary. The lack of active, strong NGOs challenges the current decision-making system of Greenland. The UN's "Protect, Respect, and Remedy" Framework, the UN Global Compact, CSR principles, and other international initiatives are good tools if they are used by all actors.

Olsvig moves on to shared international interests and responsibilities. Although Arctic peoples are non-states, they insist on being full and equal participants in the international community. The Arctic Council must consider the self-governing nations and peoples of the Arctic, as must the rest of the international community. Cases of interest include the International Whaling Commission, the EU's seal product ban and Inuit exemption, and Greenland's boycott of the Arctic Council. According to Olsvig, access to research and fact-based knowledge is vital in building democratic processes and resilient communities in the Arctic. Increased cross-boundary research across East-West borders is also crucial.

PART V. THE EVOLUTION OF ARCTIC OCEAN GOVERNANCE

In Chapter 4, Oran Young addresses the broad topic of how governance of the Arctic Ocean has evolved to date and possible future directions for the management of human uses that impact the Arctic marine environment. The author characterizes the issue as being whether the Arctic will continue to be a zone of peace or will become one of conflict. He concludes that the Arctic will be a zone of peace for the foreseeable future. On the matter of Arctic governance, he observes that “governance is a social function centered on steering societies toward socially desirable outcomes and away from socially undesirable outcomes.” Young encourages us to think about “the pursuit of governance without government,” rather than just state-centric systems.

According to Young, the constitutive foundation of Arctic governance is the United Nations Convention on the Law of the Sea (UNCLOS). A comprehensive Arctic Ocean treaty is neither feasible nor necessary. Based on this foundation, Young identifies a three-part regime complex. First, a complex and rather fragmented mix of international agreements and arrangements, particularly global ones, has evolved to address many of the human activities impacting the Arctic, largely from outside the region. For example, the Stockholm Convention on Persistent Organic Pollutants (2001) seeks to eliminate or restrict the uses and emissions of more than 20 toxic substances of concern because of their persistence in the environment and long-range transport characteristics. The UN Framework Convention on Climate Change, the Kyoto Protocol, and subsequent negotiation processes

seek to address greenhouse gas emissions, while a new global convention on controlling mercury uses and emissions is expected to be formally adopted in October 2013. A second level of governance cooperation includes the Arctic Council, with its six working groups, task forces, and ministerial meetings. An emerging “third leg” is the involvement of non-Arctic states at the regional level, for example, through the admission of five Asian states as observers to the Arctic Council in May 2013.

According to Young, significant achievements in Arctic regional governance have occurred through the Arctic Council. The council has moved from being just a study and discussion forum to a policy-shaping institution. Through council-appointed task forces, two regional agreements have been concluded on cooperation in Arctic search and rescue (2011) and marine oil spill response (2013). The 2009 Arctic Marine Shipping Assessment (AMSA) has become a “living document,” with its 17 recommendations being subject to periodic review and many follow-ups already occurring, such as the ongoing negotiations within the International Maritime Organization (IMO) for a legally binding Polar Shipping Code. A Circumpolar Business Forum is to be established under Canada’s chairship of the council. Task forces on black carbon emissions, scientific research cooperation and oil pollution prevention have been established, with governance-related recommendations expected by the 2015 ministerial meeting. However, the council is still in need of strengthening, for example, in ensuring accountability and implementation of accepted commitments and further addressing the representation and capacities of Arctic peoples.

Young suggests that multiple forums for addressing Arctic issues may be valuable. Various initiatives to enhance international dialogues on Arctic issues, such as the Russian-led forum “The Arctic: Territory of Dialogue,” and the “Arctic Circle” forum initiated by Iceland, are generally viewed as positive. However, some concern has been expressed about the possibility that such forums will compete with Arctic Council processes and activities. Some of the greatest governance challenges remain outside the Arctic. Various global pressures have serious future implications for the Arctic, including climate change, population growth, an expanding middle class in many developing countries (with their associated resource consumption demands), and continued globalization in economic trade and investments.

In dismissing the Arctic Council as inadequate to incorporate the voices of non-Arctic states on trans-regional issues, Young suggests that a new informal consultative mechanism can prove “both politically feasible

and functionally effective.” He suggests the development of a mechanism outside the council to facilitate future dialogue among Arctic and non-Arctic states, indigenous communities, and various stakeholders. Young calls for a greater role for non-Arctic states in governance and policy matters within Arctic marine areas, based on the rationale that these states have valid rights and interests in international law in the high seas areas of the Arctic Ocean. The author argues that there is an urgent need for some sort of comprehensive forum among Arctic and non-Arctic states for coordinated policy discussions. Young identifies better integration of the elements of the existing Arctic Ocean regime complex as the main task for such a policy forum.

To expand on some of the governance issues implied in Chapter 6, Robert Corell advocates that the framing of strategies for the evolution of Arctic governance focus on three inexorably interconnected elements essential to modern societies: the environment, energy, and economics. In addition, Corell points to the role and increased importance of natural capital accounts that will, of necessity, need to be incorporated into the evolution of Arctic Ocean governance.

In commenting on Chapter 4, Bernard Funston says that “the most pressing current Arctic issue is not what the Arctic teaches us about peace or conflict within the region, but rather what it teaches us about political economy just about everywhere else on the planet other than the Arctic.” Unlike Young, Funston is more optimistic regarding the capabilities of the Arctic Council as a forum to engage key non-Arctic states on policy issues of a trans-regional nature. According to him, the recent admission of six non-Arctic states as observers, in addition to the previous six, must be “given a chance” through the council’s working groups. Turning to Young’s proposal for an informal policy forum, Funston argues that he does not go into detail on what a greater role for non-Arctic states in the Arctic Ocean would entail. Chapter 4 does not touch upon how such a forum could assist in the better integration of elements of international ocean regimes, and Funston wonders what role Arctic states might play in this regard.

In commenting on Young’s chapter, Kai Sun opines that to foster mutual understanding between formal platforms and informal channels, more channels should be opened for enhanced communication between Arctic and non-Arctic states, such as the Arctic Circle forum initiated by Iceland’s President Ólafur Ragnar Grimsson. Furthermore, Sun presents China’s participation in the Arctic not only through formal channels such

as the Arctic Council and international organizations, but also through a variety of informal channels such as the China-U.S. Economic and Strategic Dialogue and the China-Nordic Arctic Cooperation Symposium. More informal dialogues, such as the China-Russia Arctic Dialogue and the China-Canada Arctic Dialogue, have been promoted through the initiation of research centers in Chinese universities.

Fujio Ohnishi begins by commenting on which issue areas non-Arctic states can participate in for governance of the Arctic Ocean in the near future. Ohnishi suggests that possible issue areas could be management of fish stocks in the central Arctic Ocean, ship-based tourism in the Arctic Ocean, and exploitation of resources in the seabed under the high seas of the Arctic. He then turns to the impact increases in bilateral cooperation have on Arctic governance. According to Ohnishi, increases in bilateral relations diversify the current pattern of international relations in the Arctic, which is based on multilateral relations, and this diversification will make Arctic governance more complicated. In a worst-case scenario, it might lead to the decreased effectiveness of Arctic governance. The impact of increases in bilateral cooperation on Arctic governance was not discussed in Young's paper. Ohnishi presents a counter-argument to Young's perception of the modes of international relations in the Arctic.

Ohnishi agrees with Young that the Arctic is a peaceful region in the sense that it is marked by stable relations among the Arctic states. On the other hand, he disagrees with Young's view that the major force for peace in the Arctic is the development of a regional governance system, that is, a regime complex for Arctic Ocean governance. But is this argument persuasive? There is no single nexus linking the evolution of Arctic governance to the diffusion of security concerns of the Arctic states, especially in terms of (psychological) military threats. According to Ohnishi's view, the Arctic is in a condition of peace and stability mainly because there are no significant challenges to the current version of the Arctic regional order. This order consists of a pattern of international activities that sustains four major goals: 1) the eight Arctic states' membership in international society, 2) maintenance of rules under the UNCLOS and other relevant international agreements, 3) the absence of war secured by the overwhelming dominance of the United States in its capability of projecting its armed forces into the Arctic Ocean, and 4) a shared understanding of functional fields where the Arctic states can cooperate (e.g., environmental protection and sustainable development

with a special preference for indigenous peoples).

The commentary by Sung Jin Kim offers four concrete suggestions for moving toward a more comprehensive governance framework for the Arctic. His first proposed initiative, under the umbrella of the North Pacific Arctic Conference (NPAC) process, is a small organization called “The Forum for Arctic Ocean Governance,” to further develop Young’s proposal for an informal forum. Second, Kim proposes the creation of a roundtable of experts from Arctic Council states and observer states in a mutual effort to contribute to the activities of the council through the process of building consensus. Third, Kim proposes the development of research working groups or task forces on priority Arctic issues through online seminars. The fourth initiative recommended by Kim is to establish a regional cooperative mechanism on the challenges and opportunities in the Arctic among research institutes in Asian observer states. In particular, China, Japan and Korea may share many common perspectives on Arctic issues. As we are aware, they have well-organized Arctic scientific capacities and facilities, including science stations, ice-breaking research vessels, and research institutes. And they have high-end technology for the sustainable development of the Arctic, such as ship building, offshore plants, telecommunications, and construction.

CONCLUSION

We began this volume by posing five challenging questions regarding the future of the Arctic. To those, we found some tentative answers from the 2013 North Pacific Arctic Conference (NPAC 2013). The future direction in the ongoing North Pacific Dialogue on international cooperation in a changing Arctic is to address Arctic natural resource development and linkages to global markets using Arctic shipping as a facilitator, taking a broader perspective on business and the investment environment in the Arctic. The North Pacific Dialogue will also compare the national Arctic strategies of key Arctic states (Canada, Russia, and U.S.) and those of key non-Arctic states (China, Japan, and Korea), focusing on what their overall Arctic development strategies are and how they intend to implement their strategies. The Dialogue will then examine not only the experiences of the observer states in the AC but also the pros and cons of various options for Arctic state/non-Arctic state engagement. How can the non-Arctic

state observers be most effectively bringing their ideas & expertise to the working groups?

The Dialogue will review developments in the area of R&D and ask about their implications for the Arctic marine shipping and infrastructure. The Dialogue will draw special attention to both the importance of enhancing the understanding of non-Arctic actors regarding Arctic peoples and exploring opportunities for cooperation across this divide. The thrust of the 2014 North Pacific Dialogue is to explore opportunities for international cooperation in a changing Arctic, emphasizing discussion of concrete options from various perspectives.