



2013

North Pacific Arctic Conference Proceedings



The Arctic in World Affairs

A North Pacific Dialogue on the Future of the Arctic



Edited by

Oran R. Young

Jong Deog Kim

Yoon Hyung Kim

 KOREA MARITIME INSTITUTE



EAST-WEST CENTER
COLLABORATION • EXPERTISE • LEADERSHIP

The Arctic in World Affairs: A North Pacific Dialogue on the Future of the Arctic addresses future developments in five areas: Arctic maritime shipping, Arctic oil and gas development, potential Arctic fisheries, the resilience of Arctic communities, and Arctic Ocean governance. Bringing together prominent experts from the three North Pacific Arctic coastal states (Canada, Russia, and the United States) 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 maritime issues and move them from paper to practice.

Regarding shipping, the book addresses the logistical challenges of using Arctic shipping routes, paying particular attention to factors affecting the prospects for both destination and transit shipping in the Northern Sea Route. It also explores the central challenges for the Arctic states and the global maritime community regarding international cooperation needed to address issues of safety and environmental protection associated with Arctic shipping.

On the future of Arctic oil and gas development, the book focuses on the international dimensions of seven key concerns: global energy markets; the impact of the shale gas revolution on the competitiveness of Arctic hydrocarbons; relevant technological developments; the effects of public policies in the Arctic states; environmental issues associated with the extraction of Arctic oil and gas; the impacts of such development on Arctic coastal communities, and the long-term energy needs of China, Japan, and Korea.

In the case of potential Arctic fisheries, the book provides a scientific examination of factors and conditions relevant to the migration of various species into the central Arctic Ocean and the prospects for future commercial fisheries there. Turning to issues of management, contributors ask 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 building resilient communities in the Arctic, the book considers the changing circumstances of the human communities of the Arctic. It explores their role in the development of the region's resources as well as the determinants of resilience in these communities.

Regarding Arctic Ocean governance, the book addresses the broad topic of how governance of the Arctic Ocean has evolved to date and possible future directions for the management of human activities that impact the Arctic marine environment.

Taken together, the contributions fill gaps in knowledge regarding the maritime Arctic, identify remaining uncertainties, and point to policy innovations that can promote peaceful and sustainable uses of Arctic resources in the future.

The Arctic in World Affairs
A North Pacific Dialogue on the Future of the Arctic
2013 North Pacific Arctic Conference Proceedings

KMI/EWC SERIES ON THE ARCTIC IN WORLD AFFAIRS

The Korea Maritime Institute (KMI) is a government-affiliated research organization under the umbrella of the National Research Council for Economics, Humanities and Social Science (NRCS) in the Republic of Korea. Since its establishment in 1984, KMI has been a major think-tank in the development of national maritime and fisheries policies including shipping and logistics, port development, coastal and ocean management, maritime safety and security, and fisheries affairs. Currently, KMI is building research capacity on the new ocean industries, the so-called Blue Economy, for sustainable coastal and ocean resources development. KMI's international research network covers not only the Asian region but also other regions such as Africa, the Pacific islands, the Americas, Europe, and the polar areas.

The East-West Center promotes better relations and understanding among the people and nations of the United States, Asia, and the Pacific through cooperative study, research, and dialogue. Established by the U.S. Congress in 1960, the Center serves as a resource for information and analysis on critical issues of common concern, bringing people together to exchange views, build expertise, and develop policy options. The Center's 21-acre Honolulu campus, adjacent to the University of Hawai'i at Mānoa, is located midway between Asia and the U.S. mainland and features research, residential, and international conference facilities. The Center's Washington, D.C., office focuses on preparing the United States for an era of growing Asia Pacific prominence.

The KMI/EWC series *The Arctic in World Affairs* publishes work from the North Pacific Arctic Conference, which aims to provide a forum in which key individuals from relevant countries and major stakeholder groups are able to develop relations of trust that allow them to discuss complex and sometimes difficult issues pertaining to the maritime Arctic in a spirit of problem solving rather than advocacy.

The first volume in the series, *A North Pacific Dialogue on Arctic Transformation*, based on the 2011 North Pacific Arctic Conference, was edited by Robert W. Corell, James Seong-Cheol Kang, and Yoon Hyung Kim.

The second volume, *A North Pacific Dialogue on Arctic Marine Issues*, from the 2012 conference, was edited by Oran R. Young, Jong Deog Kim, and Yoon Hyung Kim.

This volume, *A North Pacific Dialogue on the Future of the Arctic*, from the 2013 conference, was edited by Oran R. Young, Jong Deog Kim, and Yoon Hyung Kim.

The Arctic in World Affairs

A North Pacific Dialogue on the Future of the Arctic

2013 North Pacific Arctic Conference Proceedings

Edited by

Oran R. Young

Research Professor, Bren School of Environmental Science and Management, University of California (Santa Barbara), USA

Jong Deog Kim

Research Fellow, Korea Maritime Institute, Republic of Korea

Yoon Hyung Kim

Emeritus Professor of Economics, Hankuk University of Foreign Studies, Republic of Korea and Senior Fellow, East-West Center, USA

KMI/EWC SERIES ON THE FUTURE OF THE ARCTIC

A JOINT PUBLICATION OF THE KOREA MARITIME INSTITUTE
AND THE EAST-WEST CENTER

© Korea Maritime Institute and East-West Center 2013

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical or photocopying, recording, or otherwise without the prior permission of the publisher.

Published by
Korea Maritime Institute
KBS Media center bldg., 45 Maebongsan-ro, Mapo-gu,
Seoul, 121-270, Republic of Korea
www.kmi.re.kr

East-West Center
1601 East-West Road
Honolulu, Hawaii 96848-1601, USA
www.eastwestcenter.org

Published in December 2013
ISBN 978-89-7998-939-7 93300

Contents

List of Tables
List of Figures
Contributors
Preface

1. Introduction and Overview 1
Yoon Hyung Kim, Oran R. Young, and Jong Deog Kim

PART I THE FUTURE OF ARCTIC MARITIME SHIPPING

2. The Future of Arctic Marine Operations and Shipping Logistics 37
Björn Gunnarsson
- Introduction 37
 - First Step in Addressing Logistical Challenges: Assessment Study 38
 - Second Step in Addressing Logistical Challenges: Modeling and Visualization Study 39
 - Third Step in Addressing Logistical Challenges: Costs and Financing Study 40
 - Significance of Sea-Ice Reduction for Future Arctic Navigation 42
 - Energy and Mineral Resource Development in the Arctic 43
 - The Freight Market, Price Differences, and Time Sensitivity of Markets and Cargo 43
 - Time and Cost Savings by Using the NSR vs. the Suez Route 45
 - Reduced Greenhouse Gas Emissions on the NSR 47
 - Availability of Ice-Class Ships in Different Segments and Sizes 47
 - The Importance of Arctic Icebreakers 48
 - Inaccessibility and Poor Conditions of Existing Arctic Ports 49
 - Importance of Transshipment Hubs for the NSR 50
 - Navigation and Communication 51
 - Limited SAR and Oil Spill Response Capabilities 52
 - The Significance of the IMO Polar Code for Arctic Shipping 54
 - New Industrial Frontier and Arctic Shipping 55
 - Destination Arctic Transport on the NSR 56
 - Transits on the NSR 56
 - Conclusion 58

Commentaries

<i>IMO perspective by Heike Deggim</i>	62
<i>Russian perspective by Arild Moe</i>	71
<i>NSR operational perspectives by Lawson Brigham</i>	76
<i>Conservation perspective by Martin Robards</i>	80
<i>Community perspective by Denise Michels</i>	88
<i>Chinese perspective by Xu Hua</i>	94
<i>Japanese perspective by Toshiyuki Kano and Takahiro Majima</i>	103
<i>Korean perspective by Sung Woo Lee</i>	110

3. International Cooperation in Arctic Marine Transportation, Safety and Environmental Protection 115

Lawson Brigham

Introduction	115
Key Drivers of Arctic Marine Navigation	116
Arctic Marine Accessibility	117
Cooperative Research on Arctic Marine Transportation	118
The Arctic Council & Arctic State Cooperation	120
Non-Arctic State Observers: Roles in the Arctic Council	126
International Maritime Organizations: Cooperation on Arctic Issues	128
Bridging the North Pacific, Arctic and North Atlantic: Cooperative Opportunities	133
Conclusions	134

Commentaries

<i>USCG perspective by Captain David A. Vaughn</i>	137
<i>Chinese perspective by Jiayu Bai</i>	143
<i>Japanese perspective by Kiyoshi Nakashima</i>	148
<i>Korean perspective by Jong Deog Kim</i>	151

PART II THE FUTURE OF ARCTIC OIL AND GAS DEVELOPMENT

Perspectives

<i>American perspective by Lucian Pugliaresi</i>	161
<i>Russian and Norwegian perspectives by Arild Moe</i>	169
<i>Conservation perspective by Alexander Shestakov</i>	177
<i>Community perspective by Edward Itta</i>	186
<i>Chinese perspective by Kang Wu</i>	190
<i>Japanese perspective by Fereidun Fesharaki and Tomoko Hosoe</i>	199
<i>Korean perspective by Seong-Min Lee</i>	206

PART III POTENTIAL ARCTIC FISHERIES

Perspectives

- Natural science perspective by Herald Loeng* 215
*Social science perspective: the future of Arctic fisheries
governance – a restless sea by David VanderZwaag* 221
Conservation perspective by Henry Huntington 228

PART IV BUILDING RESILIENT COMMUNITIES IN THE ARCTIC

Perspectives

- Inuit perspective by Duane Smith* 235
Greenland perspective by Sara Olsvig 252

PART V THE EVOLUTION OF ARCTIC OCEAN GOVERNANCE

4. The Evolution of Arctic Ocean Governance 267
Oran R. Young
- What is the Issue? 267
How Should We Think about Governance? 269
What Are the Principal Components of the Arctic Ocean
Governance System? 271
What is the Status of Issue-Specific Arrangements in the Arctic? 273
What Roles Can the Arctic Council Play? 279
Is a Third Leg of the Arctic Ocean Regime Complex Needed? 283
Are There Ways to Strengthen the Foundation of the Arctic
Ocean Governance System? 288
Concluding Observations 292

Commentaries

- American perspective by Robert Corell* 299
Canadian perspective by Bernard Funston 310
Chinese perspective by Kai Sun 323
Japanese perspective by Fujio Ohnishi 328
Korean perspective by Sung Jin Kim 334

List of Tables

Table I-1	Details of potential routes between Shanghai and Rotterdam	100
Table I-2	Select findings of the Arctic Council's Arctic Marine Shipping Assessment (AMSA, 2009)	122
Table I-3	The Arctic Marine Shipping Assessment recommendations by theme: A framework policy for the Arctic Council (AMSA, 2009)	124
Table I-4	Select 2013-15 projects, activities and lead countries for the Arctic Council's Emergency Prevention, Preparedness and Response (EPPR) working group (Arctic Council b, 2013)	127
Table I-5	Select 2013-15 Projects and Lead Counties for the Arctic Council's Protection of the Arctic Marine Environment (PAME) Working Group (Arctic Council b, 2013)	128
Table I-6	Summary of IMO MARPOL Special Areas (IMO, 2012)	130
Table I-7	Member States of the North Pacific Coast Guard Forum (NPCG F) and North Atlantic Coast Guard Forum (NACGF) in 2013	133
Table II-1	Percentage of time during the operating season when no response to in-situ burning, mechanical containment or recovery and areal dispersant application is possible (WWF, 2011)	179
Table V-1	Global trends 2030: An overview	305

List of Figures

Figure I-1	Integrated frame for Arctic shipping assessment	95
Figure I-2	Potential routes between Shanghai and Rotterdam	99
Figure I-3	Market areas of potential routes between Eurasian places and Rotterdam	101
Figure I-4	Values of attained and required EEDI	105
Figure I-5	Outlines of simulation study conditions	106
Figure I-6	EEDI of ice-class vessels and traditional ships	107
Figure I-7	Ship speed reduction by ice	107
Figure I-8	Variation of CO ₂ emission amount ratio of the NSR and SCR	108
Figure I-9	The path of the navigation route of a crude oil tanker on the NSR	108
Figure I-10	Advent of new routes in Eurasia	111
Figure I-11	The Arctic Ocean and marine transportation routes	119
Figure I-12	The Arctic search and rescue agreement areas of Application (Illustrative map)	125
Figure I-13	China, Japan and Korea in the global economy (1)	151
Figure I-14	China, Japan and Korea in the global economy (2)	152
Figure I-15	FTAs with Korea	153
Figure I-16	Shipping agreements with Korea	154
Figure II-1	Challenges to Arctic development by country	161
Figure II-2	U.S. natural gas output likely to continue growth (trillions of cubic feet/year)	163
Figure II-3	U.S. Unconventional oil production forecast	164
Figure II-4	Canadian production growth (millions of barrels/year)	165
Figure II-5	Cost outlook scenarios, growth in exploration and capital expenditures, per barrel	166
Figure II-6	U.S. oil consumption with carrying capacity estimates	167
Figure II-7	China's oil consumption and net import dependence, 2007-2020	191

Figure II-8	China's nature gas use and net import dependence, 2007-2020	191
Figure II-9	Forecast Japanese nuclear capacity declines (MW)	200
Figure II-10	(a) Korean primary energy market and (b) Expected primary energy share	207
Figure II-11	Expected natural gas supply	208
Figure III-1	Arctic Ocean and surrounding shelf seas	215
Figure III-2	Ice extent in the Arctic Ocean in September 2012, in relation to the high seas area of the central Arctic Ocean	229
Figure IV-1	Inuit and circumpolar peoples	239
Figure IV-2	The 2012 Arctic sea ice extent	241
Figure IV-3	The Chinese MV "Xue Long" (Snow Dragon) crossed the Arctic in the summer of 2012 Arctic shipping	242
Figure V-1	History of world primary energy use by source	303
Figure V-2	The hypothesis: There are three issues that are inexorably interconnected	306

Contributors

- Jiayu Bai**, Associate Professor, Ocean University of China (China)
- Lawson W. Brigham**, Distinguished Professor of Geography and Arctic Policy, University of Alaska Fairbanks (U.S.)
- Robert W. Corell**, Principal, Global Environment and Technology Foundation and its Center for Energy and Climate Solutions (U.S.) and Professor II, University of the Arctic (Norway)
- Heike Deggim**, Senior Deputy Director, International Maritime Organization (IMO) (UK)
- Fereidun Fesharaki**, Chairman, FACTS Global Energy (Singapore)
- Bernard W. Funston**, President, Northern Canada Consulting (Canada)
- Bjørn Gunnarsson**, Managing Director, the Centre for High North Logistics (CHNL) (Norway)
- Tomoko Hosoe**, Director of FACTS Global Energy (Singapore)
- Henry Huntington**, Senior Officer, International Arctic, the Pew Charitable Trusts (U.S.)
- Xu Hua**, Professor, Waterborne Transport Research Institute, Ministry of Transport (China)
- Edward Itta**, Secretary/Treasurer of the Arctic Slope Community Foundation Board and Commissioner, U.S. Arctic Research Commission (U.S.)
- Toshiyuki Kano**, Director, Shipping Plan Technology R&D Center, National Maritime Research Institute (Japan)
- Jong Deog Kim**, Director General of Strategy Research Division and Head of Polar Policy Research Center, Korea Maritime Institute (Korea)
- Sung Jin Kim**, Invited Professor, Seoul National University and the former Minister of Maritime Affairs and Fisheries (Korea)
- Yoon Hyung Kim**, Senior Fellow, East-West Center (U.S.) and Emeritus Professor of Economics, Hankuk University of Foreign Studies in Seoul (Korea)
- Seong-Min Lee**, Head, Gas Resources Technology Center, Korea Gas Corporation (Korea)
- Sung Woo Lee**, Research Fellow, Korea Maritime Institute (Korea)

Harald Loeng, Research Director, Institute of Marine Research (Norway)

Takahiro Majima, Head, Logistics Research Group, Navigation & Logistics Engineering Department, National Maritime Research Institute (Japan)

Denise Michels, Transportation Director, Kawerak, Inc. and Mayor of Nome, Alaska (U.S.)

Arild Moe, Deputy Director and Senior Research Fellow, Fridtjof Nansen Institute (Norway)

Kiyoshi Nakashima Senior Researcher, Overseas Coastal Area Development Institute (Japan)

Sara Olsvig, Member both the Danish Parliament (Folketinget) and Greenlandic Parliament (Inatsisartut), and Chair of the Standing Committee of Parliamentarians of the Arctic Region (SCPAR) (Denmark)

Fujio Ohnishi, Assistant Professor, Nihon University (Japan)

Lucian Pugliaresi, President, Energy Policy Research Foundation, Inc. (U.S.)

Martin Robards, Arctic Beringia Program Director, Wildlife Conservation Society, Fairbanks, Alaska (U.S.)

Alexander Shestakov, Director, WWF Global Arctic Programme (Canada)

Duane Smith, President and Vice Chair, Inuit Circumpolar Council (Canada)

Kai Sun, Associate Professor, Ocean University of China (China)

David VanderZwaag, Professor and Canada Research Chair in Ocean Law & Governance, Dalhousie University (Canada)

Captain David A. Vaughn, Chief of Planning and Force Readiness, 14th Coast Guard District (U.S.)

Kang Wu, Senior Advisor, FACTS Global Energy (Singapore)

Oran Young, Research Professor, Bren School, University of California, Santa Barbara (U.S.)

Preface

Climate change is occurring more rapidly in the Arctic than in any other part of the planet. Reductions in sea ice in the Arctic Ocean are increasing access to the region's natural resources and opening new shipping routes. The global demand for natural resources makes these opportunities attractive. But Arctic resources are expensive to produce, and the economics of Arctic shipping are by no means clear-cut. Moreover, the growing exploitation of Arctic resources raises issues relating to pollution control, maintenance of biological diversity, the protection 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 the development of Arctic resources to proceed on a sustainable basis.

Commercial shipping in the Arctic is now technologically feasible. But there is a lack of both the hard and soft infrastructure needed to make this option commercially attractive. Not only are aids to navigation, port facilities, and emergency services underdeveloped, but also more-developed administrative arrangements are needed to deal with traffic management, along with fee structures, insurance, liability systems, and procedures for avoiding sensitive areas. Similarly, the Arctic contains globally significant reserves of oil and gas. But Arctic hydrocarbons are expensive both to produce and to deliver to urban markets. Oil spills under Arctic conditions pose severe threats to biophysical and socioeconomic systems. Economic forces, such as the shale gas revolution, which is affecting world market prices, together with 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. Little is known about the impact of climate change on living resources in the central Arctic Ocean and its marginal seas. We need to learn more 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, what strategies are available to

Arctic communities that seek to benefit from economic opportunities but also to protect traditional lifestyles and avoid shocks caused by the actions of remote decision makers? How can the Arctic Council play an effective and constructive role in meeting the challenges of the maritime Arctic? Now that China, India, Japan, Singapore, and South Korea are officially council observer states, are there roles for non-Arctic states, operating singly or in combination, which will contribute to sustainable development in the maritime Arctic?

The 2013 North Pacific Arctic Conference (NPAC), organized by the East-West Center and the Korea Maritime Institute and held in Honolulu, Hawaii, sought answers to these questions. This volume, entitled *A North Pacific Dialogue on the Future of the Arctic*, contains the proceedings of NPAC 2013. The chapters and commentaries included in the book are based on the presentations of the authors at the conference. In the opening chapter, the editors seek to capture the main themes and to set the entire discussion in a broader context. Substantial chapters by Bjørn Gunnarsson and Lawson Brigham review the future of Arctic maritime shipping. Oran Young's chapter addresses the evolution of Arctic Ocean governance. The volume also includes international and interdisciplinary perspectives on key Arctic issues relating to oil and gas development, potential Arctic fisheries, and resilient communities.

An especially important feature of this volume is the inclusion of a range of commentaries on the papers presented at the conference. Read together with the papers themselves, the commentaries provide a unique window into the different ways in which those coming from a number of countries and various walks of life approach the same issues. This is not a matter of searching for the correct approach to any given issue. Rather, it reminds us of the multiplicity of ways in which it is possible to frame important issues and of the challenge this poses for those seeking common ground as a basis for moving forward cooperatively and avoiding potential conflicts that can be headed off by those who are willing to make the effort to understand the roots of each other's views.

Along with the formal presentations, the North Pacific Arctic Conferences are notable for the opportunities they afford for informal dialogue in a relaxed setting that fosters frank discussion, in contrast to the articulation of negotiating positions on key issues. Dialogue of this sort cannot substitute for the policy debates and institutional bargaining that take place in more formal settings. Yet there is no doubt that nurturing a

community of individuals drawn from Arctic and key non-Arctic states who can communicate easily with one another, who are able to look at emerging issues from a number of perspectives, and who are in a position to share their views with members of the policy community in their own countries can make a positive contribution to ensuring that the Arctic remains a zone of peace and sustainable development during the coming decades. NPAC will continue to play this role in the coming years. NPAC 2014 will focus squarely on identifying and exploring opportunities for international cooperation in a changing Arctic.

We want 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 University of Foreign Studies and senior fellow at the East-West Center for coordinating the conference and preparing this volume for publication. We are grateful to Dr. Nancy Lewis at the East-West Center for her support of the NPAC program. 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.

Sung Gwi Kim
President
Korea Maritime Institute

Charles E. Morrison
President
East-West Center

1. Introduction and Overview

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

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.

PART I

THE FUTURE OF ARCTIC MARITIME SHIPPING

2. The Future of Arctic Marine Operations and Shipping Logistics

Bjørn Gunnarsson

INTRODUCTION

The natural resource exploitation industries in the Arctic are faced with very challenging operational conditions including: a short drilling season, remoteness, extreme cold temperatures most of the year, storms, icing, darkness in winter, changing sea-ice conditions, heavy fog, offshore operations in deep waters, and increased coastal erosion and permafrost thawing in the summer impacting land-based infrastructure (such as roads and buildings) by destabilizing foundations.

Such destabilization of foundations could alone increase the cost of maintaining needed onshore infrastructure by tens to hundreds of billions of dollars in the decades to come for many of the Arctic countries – Russia, Canada and the United States (Alaska).

In addition to operational challenges in the Arctic, significant logistical, technological and infrastructural problems remain to be resolved both to improve accessibility to natural resources and make extraction and transport of hydrocarbons and minerals a safer operation. Extraction of hydrocarbons in offshore areas of the Arctic Ocean with seasonal sea-ice coverage will require ice-class drill ships, icebreakers and new technology for wells and ice management that increase costs to the point where such areas are currently not viable for development. New technologies and proper infrastructure for safety, logistics and export could change this situation. Balancing commercial activity in the region with environmental protection will remain a significant challenge during the years to come.

Similarly, several deficiencies in the current Arctic marine transport infrastructure have been identified that need to be overcome if the Arctic Ocean is to become widely used in the future as a transportation corridor and trade route between markets in Europe or North America and the Far East.

These include improvements to all the main components of a proper

Arctic marine transportation system, including: a) *physical infrastructure* such as adequate ports and terminals with deep-draft access; cargo handling and passenger/crew facilities; and refuge provided for ships, b) *information infrastructure* such as navigational charts with updated hydrographic and shoreline mapping data; aids to navigation and real-time navigation information; marine weather and sea ice forecasts; proper communication systems; and vessel traffic monitoring and reporting systems, c) *response services* such as services of icebreakers for icebreaking and for vessel escort; search and rescue and emergency response; oil spill prevention, preparedness and response; and available response technologies to clean up oil and other hazardous wastes spilled at sea, and d) *Arctic vessels*, namely a fleet of ice-strengthened cargo ships and specialized vessels operating in the harsh Arctic environment, possibly on a year-round basis.

Hydrocarbon and mining industries and support facilities need to operate on a year-round basis in the Arctic, onshore and offshore. The main shipping activity and transit traffic in Arctic waters now takes place during the summer and early fall (July to November). However, we should also consider the possibility in the near future of year-round shipping in Arctic waters.

The task at hand is to develop infrastructure capable of meeting the safety, security and environmental protection needs of present and future Arctic stakeholders and activities. Our logistics solutions should take advantage of the Arctic resource potential and Arctic shipping opportunities, but at the same time provide the needed safety and reliability of operations and adequate pollution prevention to safeguard the fragile Arctic environment.

FIRST STEP IN ADDRESSING LOGISTICAL CHALLENGES: ASSESSMENT STUDY

A detailed assessment of the existing logistics and transportation infrastructure as well as hydrocarbon and mining infrastructure in the Arctic needs to be done. This includes operational conditions and technical challenges in different parts of the Arctic, existing transport and logistics systems, and currently available support facilities and services of Arctic ports, terminals, and airfields. We need to know what is currently there and the conditions of these facilities. This information is needed to identify the

state of affairs and is a necessary baseline for designing a new, improved transport and logistics system for the Arctic based on predicted future activities.

Two important prior assessments provided a clear picture and overview of our current deficiencies when it comes to Arctic marine transport infrastructure: the Arctic Council's Arctic Marine Shipping Assessment of 2009 and the Canadian Arctic Shipping Assessment of 2007 done for Transport Canada.

A new report by the U.S. Committee on The Marine Transportation System provides a detailed evaluation of the current state of the U.S. Arctic (Alaska) marine infrastructure and describes in detail the five main components and 16 infrastructure elements of a new preferred Arctic Marine Transportation System. For each of the infrastructure elements (e.g., communication, shoreline mapping, places of refuge for ships, etc.) information is provided on the a) status, challenges and current activities, b) case studies to highlight importance, c) federal actions needed and cooperation with non-federal partners, and d) milestones and timeframes for action.

Another important recent effort is the Arctic Council's Arctic Maritime and Aviation Transportation Infrastructure Initiative (AMATII). AMATII is meant to help decision makers evaluate northern infrastructure – ports, airports and response capabilities – by inventorying maritime and aviation assets in the Arctic. What infrastructure is in place and what is lacking? The effort has as deliverables an Arctic Maritime and Aviation Infrastructure Database and an interactive web-based map of current Arctic infrastructure.

SECOND STEP IN ADDRESSING LOGISTICAL CHALLENGES: MODELING AND VISUALIZATION STUDY

Based on the above studies we already know that we currently lack both adequate marine transportation and resource exploitation infrastructure in the Arctic. But more importantly, the question now becomes: what kind of infrastructure would we like to see put in place in the Arctic in the near future, for example by 2030, to satisfy our safety and environmental requirements?

The initial assessment study described above now needs to be followed

by detailed circumpolar Arctic modeling of the needed infrastructure for reliable and safe cargo transport and proposed natural resource extraction along with related support facilities to carry out emergency response and search and rescue activities.

Results should be displayed as interactive GIS maps with effective visualization components, animations and as a series of videos showing the proposed structural and design features of the required physical infrastructure, communication and navigational systems, and response services.

Such detailed graphical visualizations of the whole shipping and natural resource infrastructure system are needed to give all stakeholders a clearer picture of how various components of the logistics chain are tied together and how the whole system should operate and function. Model simulations should be based on various development scenarios and feasibility and sensitivity analyses for different cargo types being shipped, volumes and trade flows, types and sizes of vessels being used, transshipment, seasonal or year-round operations, and other factors.

Full-scale, year-round transit shipping on the Northern Sea Route (NSR), to take a concrete example, requires different physical infrastructure and support services than the current seasonal operation during the five months of summer and early fall, which is taking place in largely ice-free waters. If an Arctic route is only feasible during the current navigation season, will it be economically viable on a large scale to use Arctic ice-class ships in the Baltic during the rest of the year, as currently practiced by the Danish shipping company Nordic Bulk Carriers?

This modeling of a new marine transportation and logistics infrastructure system should be a joint exercise between the industry and the research community (sciences/engineering) based on the safest, the most sensible, cost-effective and environmentally sound solutions – and be circumpolar in nature.

THIRD STEP IN ADDRESSING LOGISTICAL CHALLENGES: COSTS AND FINANCING STUDY

If an agreement is reached on a new marine transportation and logistics system for the whole Arctic, the next step is estimating the costs of the various infrastructure components of the new system and establishing

international cooperation and partnerships for putting the required infrastructure in place.

The build-up of new infrastructure will take many years and will be costly. Is there a way to finance long-term, capital-intensive infrastructure? Some kind of funding mechanism needs to be put in place. Maybe, a transnational “Arctic Development Bank” or “Arctic Bank” along the lines of the European Bank for Reconstruction and Development (EBRD), Nordic Investment Bank (NIB) and others. But a mechanism is needed that can finance projects that cross borders within the Arctic. This could open up the possibility of attracting long-term financing such as the sovereign wealth funds (e.g., those in Norway, Europe and Alaska).

All eight Arctic nations and international shipping and natural resource companies need to be involved, as well as other nations and industries that see benefit in better access to Arctic resources and shorter trade routes between the markets of the Eurasian Arctic, north and west Europe, the east coast of North America, and Asia (China, Japan, and South Korea). Without cost-sharing, the up-front capital costs of establishing proper infrastructure are prohibitive. Joint funding among interested parties and governments should be a viable solution. Infrastructure maintenance could also be partially funded through user fees.

With energy and mineral exploration currently driving increased marine transportation activities in the Arctic, we need to explore greater use of public-private partnerships (PPPs) with energy and mining companies to finance some parts of the needed infrastructure and/or leverage the infrastructure that directly supports these companies’ needs. Also, to make sure that when infrastructure is developed as part of resource extraction projects, all aspects of the new Arctic logistics and transportation system must be considered. Creative approaches to meeting the infrastructure requirements of the private sector will stretch scarce government financial resources and benefit all users of the Arctic logistics and transportation system.

What are some of the key issues to consider for Arctic routes to develop into predictable and commercially viable trade routes that attract large volumes on a recurring basis between markets in Europe, North America and the Far East? The main determinants will always be the availability of cargo, transport safety and reliability, and competitive cost levels compared to other more southerly routes (Suez, Cape and Panama). Some of these factors are discussed below with particular reference to future development of the NSR.

SIGNIFICANCE OF SEA-ICE REDUCTION FOR FUTURE ARCTIC NAVIGATION

The summer ice extent has declined by 40% since satellite observation began in 1979, and over the same period sea ice has thinned considerably, experiencing a decline in volume of 70%. The last six years, 2007-2012, have produced the six lowest sea ice minima since 1979. The 2012 September sea ice minimum was 49% below the average of 1979-2000 and 18% below the previous minimum in 2007. Over only seven years, 2005-2012, multiyear ice experienced a reduction of 50%.

Studies differ widely in their predictions of when summer sea ice (and remaining multiyear ice) will melt completely in the Arctic Ocean – perhaps before the mid-century or possibly before 2030. The sea ice is likely to collect and persist longest along the northern flanks of the Canadian Archipelago and Greenland, while the central and eastern part of the Arctic will see the most significant decline of ice, further promoting shipping on the NSR and along a possible new Transpolar Passage. Some year-to-year variability of sea ice in some coastal seas and straits will likely continue to remain a challenge, at least in the beginning and end of the summer navigational season.

The summer navigational season on the NSR is now five months, from July to November. For the last two years, in late August and the whole of September and October, the NSR has been nearly or completely free of sea ice, so transiting ships such as the 162,000 dwt Suezmax tanker “Vladimir Tikhonov” could keep the same speed as in open waters – an average of 14 knots – and transit the NSR in only eight days. In November the Laptev Sea and the East Siberian Sea are covered with new ice up to 30 cm thick that allows for safe passage of vessels supported by an icebreaker.

Diminishing sea ice and rapid melting of multiyear ice will further promote shipping activity in the Arctic. In fact, all NSR seaways are currently located in the area of one-year ice. In the Arctic, one-year ice grows up to 1.6 m in thickness. With less or no sea ice, the predictability and punctuality of NSR voyages will increase, both of which are important to global shipping operations. This will increase the attractiveness of the NSR as an optional trade route in the future, even for liner services (container shipping). Lack of schedule reliability and variable transit times have been noted as major obstacles to the development of Arctic shipping.

The Arctic Ocean will always refreeze during late autumn and sea ice

cover will be present in the winter and spring, presenting a challenge to future traffic. But this would be relatively thin seasonal ice and navigable by high ice-class carriers and icebreakers. Arktika-class Russian icebreakers can open up water passages through ice that is 2.3 m thick. This fact opens up the possibility of year-round operations on the NSR if proper support infrastructure is put in place.

ENERGY AND MINERAL RESOURCE DEVELOPMENT IN THE ARCTIC

The U.S. Geological Survey (USGS) forecast in 2008 that almost one quarter of the undiscovered, technically recoverable hydrocarbons in the world are located north of the Arctic Circle. This amounts to 90 billion barrels of oil, 1,670 trillion cubic feet of natural gas and 44 billion barrels of natural gas liquids in 25 geologically defined areas thought to have potential for petroleum. According to the USGS, the Arctic accounts for around 13% of the undiscovered oil, 30% of the undiscovered natural gas, and 20% of the undiscovered natural gas liquids in the world.

A substantial part of this hydrocarbon resource potential lies in the Eurasian Arctic – in northwest Russia and offshore in the Barents and Kara seas – at the gateway of the NSR. In addition, an abundance of iron ore and other mineral resources are located in Northern Scandinavia and on the Kola Peninsula in Russia.

Current and future development of this resource base is the main driver for increased Arctic shipping in the coming decades, bringing Arctic natural resources to markets in the Far East via the NSR. This is also the main driver for the urgent need to build up the proper logistics and marine transport infrastructure with the goal of taking full advantage of this resource potential without harmful effects to the fragile Arctic environment.

THE FREIGHT MARKET, PRICE DIFFERENCES, AND TIME SENSITIVITY OF MARKETS AND CARGO

The main factor influencing the short-term usage of the NSR as a trade route is the inherently unpredictable freight market. This is even more difficult to assess because of fluctuations within the different shipping

segments. The main factor is the economic savings achieved by using the NSR relative to traditional routes. Other important factors are price differences of products in Asian and Western markets, the delivery time sensitivity of various cargoes, and the repositioning cost of the vessels.

Overall, high commodity prices and in particular high demand and prices in the Far East are the current drivers of cargo transport along the NSR eastward. Transport of Arctic hydrocarbons and mineral ores from the resource-rich Barents region and Northwest Russia to Asian markets along the much shorter NSR is considered an alternative shipping route with potential savings too large to ignore. Today, as in the near future, we will primarily see dry bulk carriers and tankers transiting the NSR carrying Arctic resource materials to destinations outside the Arctic.

But a prerequisite for increased growth of transit shipping on the NSR is the availability of cargo transport in both east and west directions. Therefore, for further development, a new cargo base needs to be identified for shipment westward along the NSR. This will enable more effective use of Arctic vessels by reducing or even eliminating the costs of in-ballast transits and will thereby significantly increase the overall cost-effectiveness of each vessel's operation.

Global shipping operations are dependent on three key factors: predictability, punctuality and economy of scale, all of which are currently limited in Arctic shipping.

Container ships operate on regular schedules and follow set routes, calling at a number of ports to load and unload cargo. Profitability can only be achieved with large-scale shipping based on stable and predictable year-round operations. The ability to schedule voyages a long time in advance and to guarantee uninterrupted services is considered key for container ship operators.

Full-scale container shipping on the NSR as part of world trade is therefore problematic, as the above conditions cannot be easily met even during the current navigational season. Container shipping occurs on a just-in-time-schedule in order to reduce costs associated with warehousing and storage. During the summer navigational season on the NSR such accurate time scheduling could become a reality in the years to come. Though the NSR will in the future become increasingly ice-free during this season, still, large-scale container transport between the Far East and Europe requires year-round operation. For the NSR this means unpredictable navigational conditions due to the presence of seasonal sea ice covering the whole Arctic

Ocean during more than half of the year in winter and spring.

Dry bulk carriers and tankers, on the other hand, follow less predictable schedules and their routes depend more on changing supply and demand of less time-sensitive items. Bulk metal ores and concentrates can be stockpiled at the mine or destination port, and oil in large storage tanks. Such raw materials could then be shipped along the NSR if spot charters could be arranged on an opportunistic basis.

TIME AND COST SAVINGS BY USING THE NSR VS. THE SUEZ ROUTE

Shipping of ores and hydrocarbons from Murmansk through the NSR shaves 19 days off transport times to Kobe (Japan), 18.5 days to Busan (South Korea), and 16 days to Ningbo (China) compared to the Suez route, providing the average sailing speed is the same on both routes. By using the shorter NSR between Northern Europe and Asia one saves about 40% of travel time and subsequent fuel and freight shipping costs. The reduced number of days at sea allows a ship to make more return trips, resulting in increased revenue and potentially greater profits.

Cost savings can be achieved by simply burning less fuel because of a reduced number of days at sea, or through more energy-efficient slow steaming, or a combination of both. A vessel on slow steaming between China and Kirkenes/Murmansk can reduce its speed by 40% and still arrive at the same time as a ship sailing at full speed traveling the Suez route. Such slow steaming can double a vessel's energy efficiency performance and result in a significant reduction of greenhouse gas emissions. This could become important if future emissions control measures were to include global maritime transport. Reduction of emissions could thus also result in significant cost savings.

Shorter sailing distances allow for considerable fuel cost savings. As an example, a Panamax bulk carrier (about 75,000 dwt) sailing from Kirkenes in north Norway to Shanghai in China burns about 30 metric tons of heavy fuel oil per day at a cost of USD \$650/ton. The travel time saved on the NSR compared to Suez one way is 21 days, hence 42 days saved on a round trip, or 1,260 metric tons of burned oil, which is a savings of about USD \$820,000. Future price increases in bunker fuel will make the NSR even more competitive compared to the Suez.

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. For an LNG tanker with a time-charter rate of USD \$120,000 per day going from Statoil's LNG Melkøya Plant near Hammerfest in north Norway to Yokohama in Japan and back the same way in ballast, savings in time-charter alone can add up to USD \$5 million. Total savings on a round trip can reach USD \$6.8 million compared to the Suez. Russia's Yamal LNG is additional eight days (roundtrip) better positioned within the NSR than the Suez route, representing even more cost savings.

Other cost elements to consider are insurance and the NSR's transit tariffs vs. Suez Canal fees. Marine insurance costs on the NSR are currently higher than on the Suez route but are by no means prohibitive. These costs are expected to go down in line with increased traffic and transport volumes on the NSR, if no major accidents occur. Russian authorities are actively investigating ways to reduce perceived risks to shipping. Future insurance fees also need to consider the changing sea ice conditions, route optimization and more advanced sea ice reconnaissance. In general, as the proper marine infrastructure is put in place on the NSR, insurance costs will subsequently go down. At this time, there seems to be no solution to the piracy threat on the Suez route, leading to increased costs of insurance and protection, and increased risk of non-delivery of cargo.

The official NSR tariffs from June 7, 2011, are much higher than the listed Suez Canal fees, but it is stated clearly that these are maximum rates subject to negotiations between FUSC Atomflot in Murmansk (now the new NSR Administration in Moscow) and the ship owner/operator. At least some of these past negotiations led to agreed rates that were equal to the Suez Canal fees or approximately USD \$5 per ton.

The new Russian federal law on navigation on the NSR being implemented for the first time during the 2013 navigational season states that the tariff rates on the NSR will depend on the tonnage of the vessel, ice-class of the vessel, distance of needed icebreaker guidance, and the time period of navigation. Previously, discounts were given based on the total volume being transported within a season (in excess of 200,000 tons) and for in-ballast return legs connected to loaded legs. Clearly, for the NSR to be competitive to the Suez route, the NSR tariffs need to be commercially reasonable.

REDUCED GREENHOUSE GAS EMISSIONS ON THE NSR

Shorter transit routes in the Arctic imply lower stack emissions into the lower atmosphere on a global scale. For the case presented above for a Panamax bulk carrier transiting the NSR from Kirkenes to Shanghai and burning 1,260 metric tons less heavy fuel oil compared to the Suez, savings in CO₂ emissions for a round trip are close to 4,000 tons. Additional savings in NO_x and SO_x emissions are 130 tons and 90 tons, respectively. As stated in the AMSA study, the presence of sea ice in the Arctic may require higher propulsion levels and ultimately similar or greater emissions during voyages compared with southerly routes. But this would only come into play during the winter and spring seasons if the NSR opened up for transit traffic on a year-round basis.

AVAILABILITY OF ICE-CLASS SHIPS IN DIFFERENT SEGMENTS AND SIZES

The numbers of vessels with an adequate ice class (1A or Arc 4) represent a limitation on the utilization of the NSR during the short navigational season. The availability of such vessels varies greatly between different segments and sizes.

The new Rules of Navigation in the NSR Water Area approved by the Ministry of Transport of the Russian Federation on January 17, 2013 allow vessels with lower ice classes (Ice1, Ice2, and Ice3) and even vessels without ice reinforcement to operate along the NSR in the period from July to October if ice conditions are favorable according to official information from Roshydromet, and without icebreaker assistance (and tariff payments) if sailing takes place in essentially open waters. The new navigational rules will further promote the use of the NSR and open up the possibility for less ice-strengthened vessels to use the route when sea ice conditions are favorable.

Still, there is a serious lack of ice-class vessels (Arc 4) in the dry bulk sector. Today only several ice-class Handymax and Panamax vessels can be involved in cargo transport on the NSR, while larger Capesize vessels are not available at all. This is the reason dry bulk transportation is still limited on the NSR, despite significant cost savings due to the shorter travel distance, time and reduced fuel consumption. This makes the NSR

vulnerable to competition from much larger dry bulk vessels going via the Suez or Cape (economy of scale). Because of the depressed market for Capesize bulk vessels, it has been cheaper to transport iron ore from Kirkenes to China via the Cape instead of using Panamax vessels via the much shorter NSR.

Few LNG tankers with proper ice class have been delivered, but some are on order. Recent high demand in the Far East for LNG and positive prospects for increased natural gas development in the Russian Arctic (e.g., Yamal) are the drivers.

There seems to be a sufficient number of oil tankers with proper ice class to service oil production in the Russian Arctic today. Tankers that operate in the Baltic during the winter and early spring could be used on the NSR during summer-autumn navigation.

Also available are specialized ice-class vessels transporting project cargoes. But for these kinds of vessels, which call on Arctic ports, issues like draft and crane capacity are equally important. Oversized project cargoes and modules represent high values and are often critical to project schedules and could in the future be transported by high ice-class barges.

From the above it is clear that large-scale global investment is needed for the construction of a fleet of large, powerful ice-class cargo ships. The question is whether these ships will be icebreaking carriers in their own right and capable of independent ice operations or will require icebreaker support.

THE IMPORTANCE OF ARCTIC ICEBREAKERS

Icebreakers are essential in the Arctic today. Russian icebreakers servicing the NSR not only provide ice pilotage and icebreaking services for vessels but also act as important floating support units or infrastructure to ensure safety of navigation and provide various support to vessel operations as needed. This is important because of limited land-based infrastructure. These services include providing emergency and rescue services if needed, towing of vessels through ice-covered or ice-free waters and salvage support. Subsequently, the risk to the vessel and the corresponding financial risk to owners and insurers are substantially reduced.

With anticipated increased ship traffic on the NSR, these icebreaker services become even more critical. The Russian icebreaking fleet now

consists of five powerful nuclear-powered vessels (in addition to a number of diesel-electric powered ones) which will be gradually decommissioned over the coming 20 years. The renewal process has already started; the construction of the first of three planned nuclear icebreakers of the LK-60 type started in the beginning of 2013 to be delivered at the end of 2017. This icebreaker will be a dual-draft type with the ability to work at a variable draught from 8.5 to 10.5 m, which will permit piloting vessels along the whole NSR, including the estuaries of the Ob and Yenisei Rivers. This will be the world's most powerful icebreaker, with propulsive power of 60 MW, able to break solid sea ice with a thickness of 2.8 m at a speed of 2 knots. The width of the icebreaker will be 34 m, which will allow large Aframax vessels to safely follow the icebreaker through the opened water passage.

The three planned LK-60 nuclear icebreakers are an important investment in future infrastructure development on the NSR, as they provide much-needed navigational support for intra-Arctic winter navigation, including possible commercial destination Arctic and trans-Arctic shipping in the winter. In other words, such powerful icebreakers could collectively keep the NSR open to commercial shipping on a year-round basis, provided other needed infrastructure is in place, and support convoys similar to those in the Baltic Sea during late winter and early spring.

The Russian icebreaking fleet is by far the largest and most powerful. In addition to the three planned LK-60 icebreakers, Russia plans to build new diesel-powered icebreakers, including the largest of them all, a 25 MW diesel icebreaker at the Baltiisky Yard in St. Petersburg for delivery at the end of 2015, designed for operations in Arctic waters. But as AMSA concludes, the world's icebreaker fleets are aging and will require significant investment during the coming years to maintain their effectiveness and capabilities. The average age of these icebreakers is now about 30 years.

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.

In recent years, however, Russian Arctic ports in the Barents Sea area, including the deep-water port of Murmansk, have expanded significantly and are providing increased services due to increased ore, coal and oil production and transport. Some other ports in satisfactory condition are located in the Kara Sea, including the port of Dudinka on the Yenisei River, but ports further east – on the shores of the Laptev, the East Siberian, Chukchi, and Bering seas – are in very poor condition and only support the basic needs of local settlements.

Even if Russian Arctic ports did provide better services and facilities, draft limitations make these ports and harbors inaccessible for larger cargo ships sailing on the NSR. These ships cannot sail into these ports for services, to load or unload cargo, or in case of trouble as they would run aground because the harbors are too shallow. This fact should be a reminder that future support facilities for cargo ships and the extraction industries need to include floating units, far removed from the shallow Arctic coastline. Loose infrastructure and mobile assets (vessels that move within the Arctic) need to be considered. Such floating support units give added flexibility since they can be relocated if needed. A floating LNG plant was even considered as one option for gas from Yamal to provide tankers with deep-water access to the plant.

IMPORTANCE OF TRANSSHIPMENT HUBS FOR THE NSR

A future increase in destination Arctic shipping and transit shipping on a year-round basis will require the establishment of transshipment hubs on either side of the NSR in order to fully utilize specialized Arctic vessels in the most economically efficient way, provide storage, and serve industrial purposes.

Shipping activity during the Arctic winter and spring will require a fleet of high ice-class cargo ships and support vessels that are able, with assistance from powerful icebreakers, to plough through winter seasonal ice in large convoys led by icebreakers at an acceptable speed. Because their design features are used to break through thick winter seasonal ice, these cargo ships or “Arctic shuttles” should not sail for long distances in ice-free waters and should deliver their cargo between ice-free transshipment hubs located on the west and east gateways to the NSR. Then, feeder ships that are notice-strengthened can take the cargo from the transshipment

hubs and deliver it to the final destination. The same feeder ships will also deliver cargo to the hubs for transport along the NSR by the Arctic shuttles between markets in Europe and the Far East.

These specialized Arctic shuttles would be fully and solely employed on Arctic voyages. As pointed out in the AMSA study, the addition of transshipment hubs in the northern latitudes could add a new dimension to global trade routes and might add options for select cargoes to be carried from the Pacific to European ports.

One hub could be located in ice-free waters in the Barents Sea – perhaps in the Murmansk-Kirkenes area; the other would need to be located in ice-free waters past the Bering Strait in the North Pacific Ocean, perhaps in the Aleutian Islands.

The location of a Murmansk-Kirkenes hub is quite strategic, as this area is nine days sailing from both the North Pacific (Bering Strait) and the Mediterranean (Gibraltar), and close to major oil and gas deposits in the Barents Sea, as well as to ore mines in northern Sweden and Finland. A suitable location for the eastern hub in the U.S. Aleutian Islands could be Dutch Harbor or Adak. A location favored by the Russians is the port of Petropavlovsk on the coast of Kamchatka.

NAVIGATION AND COMMUNICATION

Improved Arctic charting and greatly enhanced Arctic marine observations are vital to current and future Arctic marine operations. Only an estimated 6-7% of the Arctic marine environment is charted to international navigation standards. This means that the Arctic needs extensive hydrographic surveying, in particular the coastal areas. Also needed is better real-time information concerning the operational environment. This includes ice charts, satellite images of ice-infested waters, text messages describing ice conditions, and accurate marine weather information such as forecasts for sea ice distribution, wave height, wind direction and speed, visibility, temperature and superstructure icing. There are also communication difficulties in the high Arctic. Subsequently, improved voice and transmission coverage is needed.

Though conditions are better along the NSR than elsewhere in the Arctic, major improvements are still needed in support of navigation as well as better communication in light of increasing destinational and trans-

Arctic traffic on the NSR.

As mentioned earlier, Russian icebreakers play a major role here. The tariffs for icebreaker guidance on the NSR guarantee the best available navigational information, knowledge and safety of passage from experienced icebreaker captains. If senior navigating officers of international vessels do not have sufficient experience steering a vessel in Arctic conditions, it becomes obligatory by Russian navigation rules to have on board Russian ice pilots. The experience of steering vessels through the NSR has shown that ice pilots (ice navigators) not only are important in providing advice to the captain of the vessel in ice maneuvering, but also in communication with the icebreaker, interpretation of navigational charts and manuals (most of which are in Russian), and on safe speed and distance when following the icebreaker.

The organizations that provide icebreaker services (FUSE Atomflot and Far Eastern Shipping Company Ltd) form a convoy of transiting vessels guided by one or two icebreakers. Radio communication (16-channel VHF) between the icebreaker and the ships in the convoy is established, and the ships need to act in accordance with the icebreaker's instructions and report directly to the icebreaker captain. The arrangement of vessels in the convoy is determined by the icebreaker, including the allowed speed and distance to the vessel ahead.

LIMITED SAR AND OIL SPILL RESPONSE CAPABILITIES

The current search and rescue (SAR) infrastructure in the Arctic is limited. SAR is particularly challenging in the Arctic due to the remoteness and long distances that are involved in responding to emergencies, as well as cold temperatures and sea ice conditions. There is also a lack of adequate shore side infrastructure and communications to support and sustain a SAR response of any significant magnitude. The potential number of people needed to be rescued from, for example, a cruise/passenger ship far exceeds the capacity of SAR response in the Arctic. This includes lack of sufficient food, lodging and medical facilities.

The Arctic Council's 2011 agreement on developing a joint SAR framework for the eight Arctic states is important. In it, all Arctic states commit to coordinated assistance to those in distress and to cooperate with each other in SAR operations. The Arctic states agreed upon their respective

areas of SAR responsibility and on promoting the establishment, operation and maintenance of an adequate and effective SAR capability within their areas of responsibility.

The accidental release of oil into the Arctic marine environment is the most significant threat from offshore oil exploitation and Arctic shipping. Oil spills in ice are more complicated to address than spills in open waters, and oil spilled in ice-covered waters can collect onto the ice, in open pools between ice floes, under the ice, and drift with ice flows. All available oil spill response methods must be available and considered for each situation (e.g., mechanical recovery, chemical dispersion, in-situ burning, biological degradation).

As a precaution against future threats of oil spills in Arctic waters, the Arctic Council agreed on another legally binding agreement in May 2013 on oil pollution preparedness and response. The new agreement provides for assistance between the Arctic states in response to oil pollution incidents in the Arctic that are beyond the capacity of a single state to respond to effectively. Such assistance includes provision of human resources, know-how, equipment and technology. The agreement also outlines other actions that are essential to spill response, such as maintaining national spill response systems, notifying other states of spills that may affect their marine areas, conducting monitoring activities to identify spills, and undertaking joint exercises and training. Prior to this, Norway and Russia had a bilateral oil spill response agreement for the Barents Sea and Russia and the U.S. for the Chukchi Sea.

To address the urgent need for improved SAR and oil spill response along the NSR, Russian authorities started designing new Marine Rescue Coordination Centers in 2011 that are also equipped with oil spill response equipment, with the aim that their construction would be complete by 2015. The main centers are in the ports of Murmansk and Dikson, with sub-centers in the ports of Tiksi, Pevek and Provideniya. Additional SAR units are based at the Archangelsk and Naryan-Mar airports. As before, Russian icebreakers will continue to act as “floating” SAR and oil spill response units on the NSR, accompanied in the near future by six new multifunctional rescue vessels of ice-class Arc5.

As pointed out by Tschudi, the development of economic activity in the Arctic region might be the best means to improve response capacity in general and emergency preparedness in particular. The more vessels in the area, such as ice-class offshore support vessels equipped with oil recovery

equipment and other emergency features, the sooner assistance will be rendered in case of an emergency.

THE SIGNIFICANCE OF THE IMO POLAR CODE FOR ARCTIC SHIPPING

The International Maritime Organization (IMO), in an attempt to facilitate safer, more secure, and more reliable navigation in polar regions, approved purely voluntary guidelines in 2009 for vessels operating in Arctic and Antarctic ice-covered waters. Driven by increased vessel traffic in the Arctic, a new mandatory IMO Polar Code is currently in development with a target date for completion of 2014. The code will cover both poles and be used to guide polar states in developing legislation on the safety of ships in ice and polar navigation, training of seafarers, requirements for ship construction and polar classification as well as mandatory environmental standards for shipping.

The key environmental risks the IMO Polar Code should address are: a) use of heavy fuel oil, b) black carbon and other emissions, c) ballast water, d) routing measures and speed reductions, e) particularly sensitive areas and places of refuge, f) emergency response, and g) discharge of garbage and pollutants.

When the Polar Code is finalized and approved by IMO member states, its various measures are expected to take legal effect through amendments to existing IMO instruments, such as the Safety of Life at Sea Convention (SOLAS), the international Convention for the Prevention of Pollution from Ships (MARPOL), and others.

Clearly, Arctic marine safety and environmental protection will be greatly enhanced with the adoption and full implementation of a mandatory IMO Polar Code. But defining the risks for various classes of ships in ice-covered and ice-free polar waters has been a challenging process for the IMO's committees. Inclusion of additional environmental protection measures to those already provided under various IMO instruments has also proved to be difficult.

Environmental organizations are lobbying for the Code to include sections on oil spill response plans and black carbon emissions in the Arctic. Commercial shippers have expressed worries that if regulations are imposed that are too strict or costly, such as a full-scale ban on lower-cost

heavy fuel oil (HFO) in the Arctic while more southerly routes can continue to use it, the NSR will be made uncompetitive from the start. Norway has already banned the use of HFO for the east coast of Svalbard. Shippers also ask: at what level will black carbon and other air emissions start to pose a threat to the Arctic environment? They point out that ship traffic on the NSR will always be just a small fraction of the current traffic on the Suez, Panama, and Cape routes. Will strict pollution prevention technologies be required on the NSR and even zero air emissions enforced?

With increased resource development and new shipping opportunities in the Arctic, new environmental challenges will emerge. But what are the true environmental risks in the Arctic from predicted future shipping activity, and what do we need to include in the IMO Polar Code and other instruments to manage these risks effectively? According to Tschudi, to address these new environmental challenges in the Arctic a holistic approach is needed in which environmental and safety concerns and the need for economic development are all included and integrated in a balanced way.

NEW INDUSTRIAL FRONTIER AND ARCTIC SHIPPING

During the next decade, according to a recent Lloyd's risk report, as much as USD \$100 billion of investment will take place in the Arctic, mostly in offshore oil and gas. The Russian Arctic is likely to see most of this activity – in the Barents, White, Pechora, and Kara Seas – promoting commercial shipping activity along the NSR to bring these raw materials to resource-hungry markets in the Far East.

It is also likely that increased shipping activity will take place east of the Urals, where most of the Russian onshore oil activity is located together with several mines and heavy industries. Here the large Russian rivers, which all flow north into the Arctic Ocean, act as major transport connections to the NSR, essentially unlocking the large resource potential of Siberia. Siberian rivers also offer logistical possibilities for regional and destination transportation from the NSR into the inner part of Siberia, promoting further development.

The abundance of energy and mineral/ore resources in the Eurasian Arctic within the same geographical locations – where gas meets ore – opens up the possibility of value-adding industrial processing in situ before

shipment via the NSR. Subsequently, these new sources of industrial raw materials and energy not only offer closer sources of supplies but also the opportunity to develop a new industrial frontier in the Eurasian Arctic.

DESTINATION ARCTIC TRANSPORT ON THE NSR

Destination transport will be the most relevant activity on the NSR in the short to medium term. This includes transport of resource materials between ports inside and outside of the region, such as oil, gas condensate, LNG, coal, and minerals/ores by specialized ice-class shuttle carriers such as oil tankers, LNG carriers, and dry bulkers as well as purpose-built offshore vessels and multipurpose vessels for transport of equipment. This is in addition to NSR traffic supplying Siberian communities with goods and trade during the ice-free season.

Recent examples of such new Arctic shuttles include icebreaking and multipurpose general-cargo vessels serving Norilsk Nickel's industrial activity in Siberia on a year-round basis, and Sovcomflot's 70,000 dwt double-acting ice-breaking crude oil tankers.

It has recently been estimated that the total volume of all types of cargo transported on the NSR could reach 100 million tons annually by 2020 (including transits) and perhaps reach 150 million tons by 2030.

TRANSITS ON THE NSR

The NSR shortens the distance between the North Atlantic and the North Pacific by about 40% depending on the location of loading and discharging ports. International commercial shipping on the NSR started in 2010 (though the route was officially opened in July 1991), and the number of transits and volume amounts has steadily increased since then.

There were 46 transits on the NSR during the 2012 navigational season, up from 34 in 2011 and four in 2010. The cargo volume grew from 111,000 tons in 2010 to 820,000 tons in 2011, and reached 1.26 million tons in 2012. During the 2012 season, a total of 26 tankers transited the NSR with hydrocarbons (895,000 tons) and six dry bulk carriers with iron ore and coal (360,000 tons).

In 2012, the main loading port to the west of the NSR for both cargo

types was Murmansk, in addition to Archangelsk for a few of the smaller tankers and Hammerfest in Norway for the trial run of the first loaded LNG tanker on the NSR, “Ob River,” transporting 66,342 tons of LNG to Tobata (Japan). So in reality, most of the current transits on the NSR are transporting resources within the Eurasian Arctic eastbound to markets in the Far East, and are therefore destinational in character, as described above, though the loading ports in these cases lie outside the Russian-defined boundary for the NSR – Novaja Zemlya in the west to the Bering Strait in the east.

Few transits on the NSR with cargo now take place between loading and destination ports that are both located outside the Arctic, but some examples in 2012 include the tankers “Stena Poseidon,” “Marika,” and “Palva,” all of which departed from Yosu in South Korea going to Porvoo in Finland, with 66,400, 66,550, and 66,280 tons of jet fuel, respectively. Another example of a shipment between markets in 2012 was the NSR transit of the dry bulk carrier “Nordic Odyssey” with 71,790 tons of coal, which went from Vancouver (Canada) to Hamburg (Germany).

Examples in 2013 include the tankers “Propontis” transporting 109,090 tons of diesel from Ulsan (South Korea) to Rotterdam, “Mari Ugland” with 62,115 tons of naphtha from Zeeland (Holland) to Mailiao (Taiwan), “Zaliv Amurskiy” with 96,131 tons of diesel from Onsan (South Korea) to Rotterdam, “Nordic Bothnia” with 41,573 tons of general cargo from Xingang (China) to Amsterdam, “Viktor Bakaev” with 88,024 tons of jet fuel from Yosu to Rotterdam, and “Nordic Odyssey” transporting 73,500 tons of coal from Vancouver to Pori (Finland).

During the 2013 navigational season a total of 71 transits took place with cargo volume reaching 1.35 million tons: 911,867 tons of liquid cargo (31 vessels), 276,939 tons of bulk cargo (4 vessels), 66,868 tons of LNG (one vessel, “Arctic Aurora” sailing from Hammerfest to Futtsu in Japan), and 100,223 tons of general cargo (13 vessels). Vessels in ballast or repositioning were 22 in total, including the LNG tanker Arctic Aurora departing from Vladivostok and sailing to Hammerfest.

Some sources estimate that the transit volume might reach 50 million tons by 2020. This may be a very optimistic figure, but the NSR opens up an interesting market for Arctic LNG, as Asia’s appetite for gas has increased after the Fukushima nuclear disaster in Japan in 2011, and as the prices there are significantly higher than in Europe. As mentioned earlier, each large LNG tanker sailing the NSR can save close to USD \$7 million

on a round trip compared with vessels going through the Suez. But future pipelines across Eurasia and additional pipelines to central Europe appear to be strong competitors with the oil and LNG carriers sailing eastbound along the NSR.

It is clear that in the short to medium term, the NSR will not revolutionize world trade or be serious competition for the Suez route, which has close to 18,000 ships passing through the Suez Canal each year. But Russia is actively working to capitalize on changing conditions in the Arctic and wants to transform the NSR into a commercial shipping route of global importance, capable of competing with more traditional routes in price, safety and quality.

China, the world's biggest exporter, with 90% of its trade carried by sea, is looking at gaining more economic advantages from the opening of the new Arctic trade routes between China and Europe and facilitating stronger commercial ties with Russia. China is clearly eager to diversify its supply and trade routes, save on shipping costs, and reduce its reliance on the piracy-infested Suez route. One way that China seeks to reduce the carbon intensity of its economy is by increasing the amount of gas in its energy mix, so cooperating with Russia to secure access to Arctic gas resources is a high priority.

The first NSR transit voyage by a Chinese shipping company took place during the 2013 season with Cosco's container vessel "Yong Sheng" transporting 16,740 tons of general cargo (mainly steel and machinery) from Busan to Rotterdam.

CONCLUSION

For the NSR to become an important trade route, large-scale investments are needed in a new NSR marine transportation and logistics infrastructure.

With further development of the NSR the route could become an important transport option for certain cargo types and provide new and additional capacity for a growing transportation volume. The current limited seasonal window for trans-Arctic voyages, however, will be a limitation to the NSR's development and economic viability. Future year-round operation on the NSR will therefore be a prerequisite for the route's full integration into the world's transportation system.

The global maritime industry will decide if and when the potentially

shorter Arctic routes are safe, efficient, reliable and economically viable in comparison with other routes across the world's oceans. The marine insurance industry and ship classification societies will have a significant influence in these route determinations, as will a host of other stakeholders and actors, including investors and shipbuilders.

References

- ACIA. 2005. *Arctic Climate Impact Assessment*. New York: Cambridge University Press.
- Emmerson, Charles and Glada Lahn. 2012. *Arctic Opening: Opportunity and Risk in the High North*. London: Lloyd's and Chatham House. http://www.lloyds.com/~media/Files/News%20and%20Insight/360%20Risk%20Insight/Arctic_Risk_Report_20120412.pdf
- Arctic Council. April 2009. Arctic Marine Shipping Assessment 2009 Report. Protection of the Arctic Marine Environment (PAME). Ottawa, Canada.
- Brigham, Lawson W. and Michael P. Sfraga. eds. 2009. "Considering a Roadmap Forward: The Arctic Marine Shipping Assessment." Workshop Report, October 22-24, 2009. University of Alaska Fairbanks and the University of the Arctic Institute for Applied Circumpolar Policy.
- U.S. Committee on the Marine Transportation System (CMTS). February 2013. "U.S. Arctic Marine Transportation System: Overview and Priorities for Action." Draft Document for Public Review.
- Canadian Arctic Shipping Assessment. June 2007. Mainport Group Ltd. for Transport Canada.
- AMATHI Workshop Proceedings. 2012. "Response Capacity and Sustainable Development, Arctic Marine & Aviation Transportation Infrastructure Initiative." Prepared for Arctic Council's Sustainable Development Working Group by the Institute of the North, Anchorage, Alaska, 20 December, 2012.
- Perovich, D., Meier, W., Tschudi, M., Gerland, S., and Richter-Menge, J. 2012. "Sea Ice." *Arctic Report Card* 2012. <http://www.arctic.noaa.gov/reportcard>
- Stroeve, J. C., Serreze, M.C., Holland, M.M., Kay, J.E., Malanik, J., and Barrett, A.P. 2011. "The Arctic's Rapid Shrinking Sea Ice Cover: A Research Synthesis." *Climatic Change* 110 (3): 1005-1027. DOI10.1007/s10584-011-0101-1, Springerlink.com
- National Snow and Ice Data Center. 2013. www.nsidc.org
- Gran, Rani, and Vinas, Maria-Jose. 2012. NASA Finds Thickest Parts of Arctic Ice Cap Melting Faster. NASA Goddard Space Flight Center, Greenbelt, Maryland,

- February 29, 2012. www.nasa.gov/topics/earth/features/thick-melt.html
- Humpert, Malte and Raspotnik, Andreas. 2012. "The Future of Arctic Shipping." *Port Technology International*, September 2012. http://www.porttechnology.org/images/uploads/technical_papers/The_future_of_Arctic_shipping.pdf
- Bird, K.J., Charpentier, R.R., Gautier, D.L., Houseknecht, D.W., Klett, T.R., Pitman, J.K., Moore, T.E., Schenk, C.J., Tennyson, M.E., and Wandrey, C.J. 2008. "Circum-Arctic Resource Appraisal: Estimates of Undiscovered Oil and Gas North of the Arctic Circle." USGS Fact Sheet 2008-3049.
- Avershin, V. 2013. "Russian Mining Industry in the Barents Region and Possibilities for Nordic Countries." PP Presentation given at the 9th Barents Industrial Partnership Meeting in Tromsø, Norway, May 13-14, 2013.
- Smelror, M.C. 2011. "Mining in the Arctic." PP Presentation at the Arctic Frontiers Conference in Tromsø, Norway, January 23-28, 2011.
- Tschudi, Felix H. 2012. "Developing a Profitable Shipping System Using the Northern Sea Route." *The Arctic Herald Information & Analytical Journal* 4: 70-83. <http://arctic-herald.ru/>
- Balmasov, Sergey. 2012. "Prospects of the Development of International Transit Shipping via the Northern Sea Route." *The Arctic Herald Information & Analytical Journal* 2: 44-55. <http://arctic-herald.ru/>
- Belkin, M. 2012. "Results from the 2012 Navigation Season and Future Plans." PP Presentation at the 9th Annual Arctic Shipping Forum in Helsinki, Finland, April 23-25, 2012.
- Falck, H. 2013. "Voyage Calculation - Status, Challenges and Opportunities." PP Presentation at the Northern Sea Route (NSR) Conference in St. Petersburg, Russia, April 11, 2013.
- NSR Information Office. 2013a. NSR Tariff System. http://www.arctic-lio.com/nsr_tariffsystem
- NSR Information Office. 2013b. NSR Current Legislation. http://www.arctic-lio.com/nsr_legislation
- NSR Information Office. Rules of Navigation on the Water Area of the Northern Sea Route. http://www.arctic-lio.com/docs/nsr/legislation/20130425185806en-Rules_unof.pdf
- Karlsbakk, Jonas. 2012. "Construction Starts for New Giant Icebreaker." *Barents Observer*. February 15, 2012. <http://barentsobserver.com/en/business/construction-starts-new-giant-icebreaker>
- Staalesen, Atle. 2012. "New Icebreaker for Russian Arctic." *Barents Observer*. September 18, 2012. <http://barentsobserver.com/en/arctic/new-icebreaker-russian-arctic-18-09>

- NSR Information Office. 2013d. Port Murmansk. <http://www.arctic-lio.com/murmansk>
- Kirkenes Industrial and Logistics Area (KILA). 2011. PP Presentation by Trond Dahlberg, 9 November 2011. <http://www.kystverket.no/PageFiles/8683/Presentasjoner/KILA%20-%20Trond%20%20Dahlberg.pdf>
- Norterminal - New Oil and Gas Terminal in Finnmark. <http://norterminal.no/>
- PAME. 2013. The Arctic Ocean Review Project, Final Report (Phase II 2011-2013), Kiruna May 2013. Protection of the Arctic Marine Environment (PAME) Secretariat, Akureyri, Iceland.
- NSR Information Office. 2013e. Ice Pilot Services. http://www.arctic-lio.com/nsr_icepilotage
- Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic. Signed by the Arctic ministers on May 12, 2011 at the 7th Ministerial Meeting of the Arctic Council, Nuuk, Greenland. <http://www.ifrc.org/docs/idrl/N813EN.pdf>
- Agreement on Cooperation on Marine Oil Pollution Preparedness and Response in the Arctic. 8th Ministerial Meeting of the Arctic Council, Kiruna, Sweden, May 15, 2013. <http://www.arctic-council.org/eppr/agreement-on-cooperation-on-marine-oil-pollution-preparedness-and-response-in-the-arctic/>
- NSR Information Office. Search and Rescue. http://www.arctic-lio.com/nsr_searchandrescue
- Guidelines for Ships Operating in Polar Waters. Adopted by the 26th Session of the IMO Assembly, December 2009. <http://www.imo.org/Publications/Documents/Attachments/Pages%20from%20E190E.pdf>
- Logvinovich, Eduard. 2012. Enhancing the Infrastructure of Marine Transportation System in the Russian Arctic. From Lomonosov to Nansen and Beyond. November 2011, Arkangelsk. Joint Norwegian-Russian Seminar devoted to Jubilees of Lomonosov and Nansen. Collection of Reports, Tromsø, 2012.
- NSR Information Office. Transit Statistics. http://www.arctic-lio.com/nsr_transits
- Deshayes, Pierre-Henry. 2013. "Melting Ice Pulls Norway Closer to Asia." *Agence France-Press (AFP)*, June 22. <http://www.google.com/hostednews/afp/article/ALeqM5iiVCnMhIQTXoKrTiYw42DTkBS-8A?docId=CNG.6c583ef5d013cf0b7238f85a329d1052.2b1>
- Staalesen, Atle. 2013. "First Container Ship on Northern Sea Route." *Barents Observer*, August 21. <http://barentsobserver.com/en/arctic/2013/08/first-container-ship-northern-sea-route-21-08>
- Lee, Sung Woo, Ju-mi Song, and Yeon-seo Oh. 2011. *Benefit of the Northern Sea Route to the North Pacific*. Seoul: Korea Maritime Institute.

Comments on Chapter 2: IMO perspective

Heike Deggim

INTRODUCTION

While Dr. Gunnarsson's paper addresses the challenges of a new marine transport and logistics system and the required infrastructure for the whole of the Arctic, the International Maritime Organization (IMO) only deals with one component of that system: shipping. As Dr. Gunnarsson pointed out, the IMO is currently developing a mandatory International Code of Safety for Ships Operating in Polar Regions, known for short as the Polar Code, which will provide requirements to ensure the safe operation of ships and the protection of the polar environment by addressing risks present in polar waters that are not adequately mitigated by existing IMO instruments. It should be noted that the Code addresses both polar regions, Arctic and Antarctic, and that the requirements in the Code for the two regions are not uniform, given their distinctly different geographical and governance features. This paper provides a brief update on the general progress made so far in the development of the Polar Code and offers additional comments on some of the issues raised by Dr. Gunnarsson from a shipping point of view, in particular regarding environmental protection issues, oil spill response in ice and snow conditions, and availability of hydrographic charts.

STATUS OF THE POLAR CODE'S DEVELOPMENT

Navigation in polar waters was first addressed by the IMO in 2002 with the adoption of the Guidelines for ships operating in Arctic ice-covered waters (MSC/Circ.1056 – MEPC/Circ. 399), later, following a request by the Antarctic Treaty Consultative Meeting (ATCM), revised to include Antarctic areas. The revised Guidelines were adopted by the 26th session of the IMO Assembly in December 2009 as the Guidelines for ships operating in polar waters (Polar Guidelines) (resolution A.1024 (26)).

Immediately following the adoption of these Guidelines by the assembly, the IMO's Maritime Safety Committee (MSC) considered proposals to develop them further and create a mandatory Polar Code,

covering the full range of design, construction, equipment, operational, training, search and rescue, and environmental protection issues for ships operating in polar waters. The Code aims to address the increased interest and traffic in these regions and the unique operational, environmental and search and rescue concerns specific to the areas, taking into account that the consequences of any major safety or pollution incident in polar waters are likely to cause widespread harm to these pristine environments and could in the process also seriously damage the reputation of the shipping community.

The IMO's Subcommittee on Ship Design and Equipment (DE) started its work on the development of the Code at its 53rd session (DE 53) in 2009. From the outset a goal-based approach was followed, consequently developing objectives and functional requirements for each of the chapters of the draft Code,¹ which has been structured to contain two parts: a mandatory part A, including requirements concerning structural integrity, stability, watertight and weather-tight integrity, anchoring arrangements, habitability, fire safety and protection, life-saving appliances and arrangements, navigation, communications, crewing and manning, emergency control and environmental protection together with a recommendatory part B, providing additional guidance with regard to the application of the requirements contained in Part A. The Code will contain only requirements additional to those already set out in existing IMO instruments that in any case apply globally, including for the polar regions. In between the subcommittee's meetings, the work is carried out by an exceptionally active correspondence group under the coordination of Norway.

It is expected that the draft text of the Code will be completed by the subcommittee in January 2014, and will subsequently be approved by the MSC and the Marine Environment Protection Committee (MEPC) for final adoption by the two committees, together with associated amendments to make it mandatory under applicable IMO instruments in line with the respective amendment procedures of these instruments, at the end of 2014.

The subcommittee is currently developing the Code on the premise that its requirements will apply to new passenger and cargo ships as defined in the International Convention for the Safety of Life at Sea (SOLAS) 1974, except for the chapter related to environmental protection, which will apply, as appropriate, to ship types according to the various annexes of the International Convention for the Prevention of Pollution from Ships

(MARPOL) 1973/78. Following adoption of the Code, it is planned to start work on extending its provisions to non-SOLAS ships,² such as fishing vessels.

ENVIRONMENTAL PROTECTION MEASURES IN THE POLAR CODE

While the development of the purely technical safety requirements was not controversial and mainly expanded on the existing provisions in the Polar Guidelines, the environmental protection measures to be included posed a much bigger challenge, given the fact that the environmental chapter of the Guidelines was rudimentary, generally just referring to applicable national and international rules and regulations.

The environmental chapter 15 of the draft Code will be of a much more substantial character. A large number of proposals for issues to be addressed were considered by DE 57 and the results of the discussions referred to MEPC 65 in May 2013, which took decisions as described in the following paragraphs.³

Discharge of Oil or Oily Mixtures into Arctic Waters

The discharge of oil and oily mixtures into the sea is already prohibited for the Antarctic area under regulation 15.4 of MARPOL Annex I (Regulations for the prevention of pollution by oil). DE 57 prepared two options for additional requirements to those of MARPOL Annex I concerning such discharges by ships operating in the Arctic: either allowing ships to discharge oil and oil mixtures into the sea under certain conditions or prohibiting any discharges into the sea of oil or oily mixtures from ships.

MEPC 65 considered the two options and agreed that any discharge into the sea of oil or oily mixtures from ships in the Arctic area should be prohibited. Consequently, requirements to this effect will be included in the draft Polar Code.

In this connection, the question of the lack of reception facilities in the Arctic region was raised and it was proposed that mandatory provisions for reception facilities should be developed so as to ensure and facilitate the effective implementation of the new requirements. MEPC 65 agreed that this issue needed further consideration and invited member governments

and international organizations to submit relevant proposals and comments to DE 58.⁴

Discharge of Food Waste into Arctic Waters

Keeping in mind the existing requirements for special areas in regulation 5 (disposal of garbage within special areas) of MARPOL Annex V (regulations for the prevention of pollution by garbage from ships) which prohibit (with some exceptions) the disposal into the sea of all plastics and all other garbage, DE 57 prepared two options for requirements additional to those concerning the discharge of garbage into the sea in the Arctic area: either allowing the discharge of food waste into the sea under certain conditions or prohibiting the discharge of all garbage into the sea.

MEPC 65 considered the two options and agreed to option one, i.e., allowing the discharge of food waste in the Arctic area under certain conditions. Consequently, requirements to this effect will be included in the Polar Code.

Exemption of Independently Operating Cargo Ships with Ice-Breaking Capability from the EEDI Requirements

DE 57 considered submissions⁵ providing the results of an analysis showing that recent higher ice-class cargo ships operating independently, i.e., without icebreaker assistance, in heavy ice conditions have and need considerably more installed power than will be permissible in the future under the EEDI (Energy Efficiency Design Index) regulations. The analysis further showed that even ice-strengthened ships designed to navigate with icebreaker escort in ice conditions may need some additional power in order to be able to follow icebreakers at an adequate speed. Recognizing the need to consider the possible development of correction coefficients or the possible exemption of category A ships⁶ from the EEDI requirements and taking into account the relatively small number of such ships, the subcommittee asked the MEPC for advice on the issue.

Following discussion, MEPC 65 agreed that independently operating cargo ships having ice-breaking capabilities should be exempted from the EEDI requirements and approved relevant draft amendments to chapter 4 (regulations on energy efficiency for ships) of MARPOL Annex VI (regulations for the prevention of air pollution from ships) with a view

to adoption at MEPC 66 in spring 2014. The amendments state that regulations 20 (Attained EEDI) and 21 (Required EEDI) shall not apply to cargo ships having ice-breaking capability. A pertinent definition of “cargo ship having ice-breaking capability” was included in regulation 2 (Definitions).

Use of Heavy Fuel Oil (HFO) on Ships Operating in Arctic Waters

In March 2011 the MEPC adopted a new chapter 9 (special requirements for the use or carriage of oils in the Antarctic area) of MARPOL Annex I, establishing a ban on the use and carriage of heavy grade oils in the Antarctic area.⁷ MARPOL does not contain any such requirements for the Arctic.

DE 57 received a proposal⁸ to include in the Polar Code a requirement banning the use of HFO also on ships operating in Arctic waters, referring to the ban on HFO use and carriage already in force for Antarctic waters (MARPOL Annex I, regulation 43). Noting views that the proposal contained too many policy aspects and was outside its remit, the subcommittee referred it to MEPC 65 for consideration and advice.

MEPC 65, after some discussion, endorsed the view of the majority that it is premature to regulate the use of HFO on ships operating in Arctic waters but noted the view of some IMO members that it might be desirable and possible to develop such regulations at some point in the future.

Grey Water Discharge in Arctic Waters

DE 57 also considered a proposal for the inclusion in the Code of alternative requirements for the discharge of sewage and grey water in polar areas⁹ and agreed that the introduction of requirements concerning grey water discharge should be considered first by the MEPC since grey water is currently not regulated under MARPOL.

Impact on the Arctic of Emissions of Black Carbon

MEPC 65 considered a proposal for the inclusion of requirements in the Polar Code that recognize the importance of mitigating black carbon emissions from shipping in all polar waters to the maximum extent feasible,¹⁰ having noted the view of DE 57 that the proposal went beyond

the scope of the work on emissions of black carbon from international shipping currently being carried out by the BLG Subcommittee (target completion year is 2014) but that, in any case, the outcome of that work should be awaited before considering the issue further. Consequently, MEPC 65 agreed that the DE Subcommittee should await the outcome of the BLG Subcommittee's¹¹ work on the matter.

Shipboard Incineration in Polar Regions

MEPC 65 also considered a proposal¹² to include requirements in the Code prohibiting shipboard incineration in polar regions within 12 nautical miles from the nearest land, ice shelf, land-fast ice, or area of ice concentration in excess of 10% ice coverage. However, the proposal did not receive sufficient support to be carried forward.

Temperature Testing Requirements for Ballast Water Management Systems

MEPC 65 further instructed the DE Subcommittee, when considering relevant recommendations on ballast water management (BWM) systems to be included in the recommendatory Part B of the Polar Code, to take into account the temperature testing requirements for BWM systems, as contained in the revised methodology for information gathering and conduct of work of the GESAMP¹³ -Ballast Water Working Group (BWM.2/Circ.13/Rev.1).

OIL SPILL RESPONSE IN ICE AND SNOW CONDITIONS

The specific problems of an effective response to oil spills in ice and snow conditions are well known. The matter has been under consideration at the IMO for a number of years and is being addressed by the OPRC-HNS¹⁴ Technical Group (TG), which operates under the auspices of the MEPC.

At its last meeting in May 2013, the TG considered a summary¹⁵ of a newly launched oil industry initiative on Arctic Oil Spill Response Technology, together with other initiatives being undertaken by the International Association of Oil and Gas Producers (OGP), as part of a Joint Industry Project (JIP). Having noted the considerable volume

of work undertaken by OGP through the Arctic JIP project, the group recognized that the resulting information, together with the results of the 2012 Spill Response in the Arctic Offshore document published by the American Petroleum Institute (API) also referred to by OGP, would serve as important information resources in the development of a guide on oil spill response in ice and snow conditions. In discussing how to advance this work, the group noted an offer from Norway to lead the development of the guide and to take the matter forward to the next session of the Arctic Council's Emergency Prevention, Preparedness and Response Working Group (EPPR WG) in June 2013 and agreed that the guide should initially be developed in that forum, on the basis of an initial draft of the proposed guide prepared by the United States,¹⁶ together with the OGP/ IPIECA (International Petroleum Industry Environmental Conservation Association) JIP project results and the API publication, referred to above. Once the Guide has been sufficiently developed by the EPPR WG, it will be referred back to the OPRC-HNS TG for its review and agreement and ultimately to the MEPC for approval.

AVAILABILITY OF HYDROGRAPHIC CHARTS FOR THE POLAR REGIONS

Regulation 9 (Hydrographical services) of chapter V (Safety of navigation) of the 1974 SOLAS Convention requires contracting governments (currently 162 countries covering 99.2% of world tonnage) to arrange for the collection and compilation of hydrographical data and the publication, dissemination and updating of all nautical information necessary for safe navigation.

However, according to the International Hydrographic Organization (IHO),¹⁷ systematic and complete hydrographic surveys have not been carried out in many polar areas due to their extensive, remote, and inhospitable nature. While the presence of ice throughout much of the year limits the ability to conduct hydrographic surveys, growing un-surveyed areas may be becoming available for navigation due to the melting of glaciers and sea ice. The IHO estimates that 95% of the Antarctic is un-surveyed and estimates that the situation is similar in the Arctic. The chart coverage of polar regions at an appropriate scale is generally inadequate for coastal navigation. Where charts do exist, they have limited usefulness due

to the lack of any reliable depth or hazard information.

The IHO has been leading an effort to prioritize, encourage and monitor the conduct of hydrographic surveys in the polar regions through its Hydrographic Commission on Antarctica (HCA) and through the Arctic Regional Hydrographic Commission (ARHC). However, it will take many years for the situation to improve, as national priorities generally focus on charting deficiencies at lower latitudes.

The grounding and even loss of ships in uncharted polar waters is not uncommon. To make the situation worse, national hydrographic authorities active in both polar regions are reporting that government-sponsored surveying activity is actually decreasing due to financial pressures and competing priorities in territorial waters. Meanwhile, the level of maritime activity in the polar regions continues to increase significantly. For things to improve dramatically, a major change in the priorities being set by governments and stakeholders for gathering hydrographic data around the world and particularly in the polar regions is necessary.

The IMO's Maritime Safety Committee, at its 92nd session (June 2013), stressed the utmost importance of adequate charting, not only for the polar regions, but also for all other areas. Recognizing that a collective effort is necessary to improve the situation, the committee encouraged IMO member states to collect relevant information, especially for remote areas, in support of the IHO activities in this regard and also instructed its Subcommittee on Navigation (NAV) to consider the matter and advise the committee on a suitable course of action to address the situation.

Notes

1. For the most recent version of the draft Code refer to IMO document DE 57/ WP.6/Add.1.
2. SOLAS 1974 applies to ships of 500 gross tonnage and above engaged in international voyages. Fishing vessels are explicitly excluded from the requirements of the Convention (except for chapter V requirements).
3. A more detailed description of the decisions taken at MEPC 65 is contained in the report of that meeting (IMO document MEPC 65/22).
4. Following the restructuring of the IMO subcommittees in 2013, this will be the first session of the new Subcommittee on Ship Design and Construction (SDC 1), scheduled to take place in January 2014.

5. IMO documents DE 57/11/8 (Finland and Sweden) and DE 57/11/16 (Canada).
6. Current definition in the draft Polar Code: “Category A ship means a ship capable to operate at least in medium first-year ice which may include old ice inclusions in accordance with an ice class at least equivalent to those acceptable to the Organization.”
7. MARPOL defines in Annexes I (Prevention of pollution by oil) and V (Prevention of pollution by garbage from ships) certain sea areas as “special areas” in which the adoption of special mandatory methods for the prevention of sea pollution is required. Under the Convention, these special areas are provided with a higher level of protection than other areas of the sea. The Antarctic area has been designated a special area under MARPOL Annexes I and V.
8. IMO document DE 57/11/11 (FOEI, CSC, IFAW, WWF and Pacific Environment).
9. IMO document DE 57/11/14 (FOEI, WWF and Pacific Environment).
10. IMO document DE 57/11/20 (CSC, FOEI, WWF and Pacific Environment).
11. Following the restructuring of the IMO Subcommittees in 2013, the BLG Subcommittee has now been replaced by the Subcommittee on Pollution Prevention and Response (PPR).
12. IMO document MEPC 65/11/5 (FOEI, CSC, Pacific Environment and WWF).
13. IMO/FAO/UNESCO-IOC/WMO/IAEA/UN/UNEP/UNIDO Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection.
14. Preparedness, Response and Cooperation to Pollution Incidents by Hazardous and Noxious Substances.
15. IMO document OPRC-HNS/TG 15/3/1 (OGP).
16. IMO document MEPC 57/6 (United States).
17. IMO document DE 57/11/4 (IHO).

Comments on Chapter 2: Russian perspective

Arild Moe

As described in the introduction to this session, as well in the other comments, there is considerable international interest in using the Arctic waterway connecting the Atlantic with the Pacific – the Northeast Passage. Sometimes, the underlying assumption seems to be that this is an international waterway where it is up to the international community to define the terms of its use. However, this perspective is far from the Russian position.

In Russia, the prevailing understanding is that the waterways north of Russia are a part of the national transport infrastructure holding the country together. Indeed, if one looks at the map, it clearly shows that the route between the northeast and northwest of Russia is much shorter than connections over land. Moreover, this sea route has been developed over decades by the Russian and Soviet states.

Traditionally Russia's legal argument for control and management of the sea route rested on its de facto control over the area and its historical role in developing shipping lanes. But with the USSR's signing of the UN Convention on the Law of the Sea (UNCLOS), the argumentation changed, bringing Soviet and later Russian claims more in line with international law.

As a general rule, UNCLOS mandates free navigation within a coastal state's 200 nm exclusive economic zone. There is, however, an important exception, the so-called "ice paragraph" Article 234. This paragraph stipulates that "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 irreversible disturbance of the ecological balance." This paragraph is crucial in Russia's argument today for management and control of traffic through the sea route.

Nevertheless, a certain ambiguity can be detected in Russian declarations. The 2012 "Law on the Northern Sea Route (NSR)" (in reality a "change" law detailing alterations in several relevant laws) says that "Navigation in the water area of the NSR, a historically formed

communication lane of the Russian Federation, is conducted in accordance with generally accepted principles and norms of international law, international agreements of the Russian Federation, the present Federal law, other federal laws, and other normative legal acts issued in accordance with them.” Although convoluted, this clearly refers to UNCLOS and Article 234. But it also retains a reference to the specific historical circumstances. Clearly, there is some uneasiness in Russia over the prospects of diminishing ice, which at some point would make Article 234 irrelevant. If such a situation occurs, I would expect that the emphasis on the historical formation of the NSR would become stronger again.

Even if *internationalization* of the route itself has never been an issue, much has happened with regard to international use of the sea route. With the easing of international tensions in the late 1980s, the USSR changed its policy in the Arctic and declared that it should be open for international cooperation and trade. The NSR was officially opened for international shipping on January 1, 1991. Russia has since encouraged international use of the sea route – unsuccessfully in the 1990s, more successfully in the last four years.

Transit traffic on the NSR was for a long time held back by exorbitant transit, or icebreaker, escort fees. The fees, which were last fixed in a “price list” from 2005, were meant to secure enough revenue to finance the icebreaker fleet. The problem was that few were willing to pay the fees, and the financial challenge only grew worse.

The reason for the increased interest in transit that has been observed in recent years has much to do with changing ice conditions. But clearly, improvement in conditions offered by Russia played a big part. Special deals that had been offered in 2009 and 2010 became the norm when one word was changed in the price list in 2011. What had been compulsory rates now became maximum rates; the fees had become officially negotiable.

Also, the practical administrative handling changed: it was simplified and became more transparent. Whereas shipping companies previously had to arrange transit a long time in advance, starting in 2012 a 15-day minimum notice system was introduced. The conditions were further elaborated in the new “Rules for Navigation on the Northern Sea Route” adopted in January 2013. Applications can now be sent electronically, containing standard information about the ship and cargo and documentation of insurance. The applications are processed by the

newly established Northern Sea Route Administration. The administration determines whether an icebreaker escort is required, based on an assessment of the ice situation in combination with the ice class of the relevant vessel.

The Law on the NSR from 2012, which is the legal basis for the new regulations, also introduces a new principle for the determination of fees. The fees should no longer be a general payment for going through the sea route, but payment for services rendered. This was seen as an important step forward by shipping companies that do not expect to be dependent on Russian icebreakers.

Uncertainties remain, however, over how the principles will be implemented. Icebreaker services are treated as a natural monopoly, and the icebreaking companies cannot charge higher rates. The maximum rate is fixed by the Federal Tariff Service, but the actual rate is negotiated with one of the Russian icebreaker companies, Atomflot and five others operating long-distance diesel icebreakers or port icebreakers, which together are given a monopoly position in icebreaker escort on the NSR.

The most complicated question is what should be included in the “services rendered.” It can be argued that services rendered to vessels navigating the sea route consist not only of an actual icebreaker escort. Navigational assistance, for instance, could be termed as a service. But most importantly, the presence of icebreaker back-up capacity is a vital element in safe NSR shipping. Icebreakers amount to floating rescue stations in areas with no other relevant infrastructure. And the cost of maintaining nuclear icebreakers in a back-up mode is almost the same as running them. If the back-up and rescue operations are taken into account as services, the difference in fees between vessels enjoying icebreaker escort and those sailing independently is not so great. For the time being, it seems that a narrow definition of services is applied (i.e., only icebreaker escort), but the new tariff system is not settled, and strong voices argue for reintroduction of a general transit fee for all ships using the sea route.

The underlying problem is whether the income collected from fees will be substantial enough to cover the running costs of infrastructure and icebreakers along with some investments. It has been claimed that the fees negotiated over the last few years, and which have been competitive enough to attract vessels, have been so low that they cover no more than direct operational costs. But if competitive rates are not sufficient to cover costs, how long can this continue? Will competitive rates attract so much traffic that revenues reach a decent level, or can and will the Russian government

step in with increased subsidies?

The number of commercial transits with cargo, with destinations or ports of departure outside Russia, (19 in 2012) is still very limited. (The total number of 46 voyages also includes ballasts, repositioning and transits between western and eastern Russia.) It is difficult to draw clear conclusions regarding interest in NSR transit based on these numbers alone – how much is a reflection of a long-term trend toward increased usage of this Arctic transport corridor and willingness to invest and how much is about companies availing themselves of short-term opportunities in the freight markets? Obviously, companies who see the NSR as an important option in the years ahead will be concerned about how conditions will develop over time, whereas actors in the second group just relate to existing conditions at any point in time. Thus, it is important to look for companies and projects that have a long-term stake in the NSR.

The Yamal LNG project is seen as crucial for the further development of the NSR since it depends on extensive use of the NSR year round. The plan is to build an LNG factory on the eastern side of the Yamal Peninsula, construct the port of Sabetta and ship out the product via the NSR, eastward in the summer and westward in the winter. This project was owned 80% by the independent Russian gas company Novatek and 20% by Total. In September 2013, CNPC of China bought a 20% stake in the project from Novatek coupled with contracts for gas deliveries.

Daewoo of South Korea won an option to build 16 ice-strengthened carriers in 2013. The LNG carriers ordered are designed to cut through 1.5 meters of ice with a continuous speed of 5 knots. They also can go through thicker ice, with less speed. Yamal LNG argues that this will make it possible to operate without the escort of nuclear icebreakers. This position contrasts with statements from Atomflot, which maintains that escorting LNG carriers from Yamal will form a stable demand for icebreaker services and thus produce revenues in the years ahead.

A final investment decision for the project has yet to be made (as of September 2013). The decision – positive or negative – will have large implications. But in any case, it is reasonable to expect that the debate regarding how much icebreaker capacity will be needed along the sea route will heat up in the years ahead. Could diesel-powered icebreakers stationed in the most critical passages do more of the job, and will the melting of ice altogether make icebreaking less of a constraint? These discussions are complicated by a widespread scientific disagreement in Russia on the pace,

and even the direction, of climate change.

Meanwhile, the official Russian position is that there will be a continued need for nuclear icebreakers. The fleet is aging, however. In 2013, there is a total of six, but only four are in operating condition. One new nuclear icebreaker has been completed since soviet times. According to the latest assessments from Atomflot, five of the icebreakers will have reached the end of their service life by 2022, but two will, with renewal of their nuclear fuel, be able to operate for some additional years. Only one will be operational after 2026. The diesel icebreakers are also ageing and in need of replacement. Thus, the overall picture is that Russia is in need of rapid renewal of its icebreaker fleet if it wants to continue to provide the present level of icebreaker services.

Plans for construction of new nuclear-powered icebreakers have been announced several times and a design worked out for the strongest icebreaker ever seen to secure year-round traffic on the NSR. A shipyard in St. Petersburg finally started construction in 2013. Skepticism about the cost estimate of 37 billion rubles (approximately USD \$1.2 billion) has been voiced. The Russian government has declared that it will build and fully finance two more such giants. If all three are delivered on time in 2017, 2019, and 2020, and nothing unexpected happens with the old icebreakers, Russia will avoid the “ice pause” often feared in critical Russian comments. But the time set aside for construction looks very optimistic.

In its policy regarding the NSR, Russia faces paradoxes and trade-offs. Whereas less ice is a major factor in increased use of the sea route, making navigation possible without icebreaker support in longer seasons, uncertainty about the level of icebreaker support needed, is a constraint on long-term plans for use of the route. Whereas Russia maintains its exclusive right to administer traffic on the NSR, it relies on international shipping to help finance maintenance of the route.

As this commentary suggests, much has been improved in the last few years, but the basic financial challenges have not been solved. Russian planners hope that steadily increasing traffic, both transit and commercial destination traffic, will provide a sufficient level of income to sustain and improve infrastructure. The reforms and flexibility seen in recent years indicate a willingness to adapt to the needs of users, which is a prerequisite for a further increase in the attractiveness of the route. Nevertheless, substantial financing from the Russian state also will be needed, and the NSR will have to compete with other priorities for funding.

Comments on Chapter 2: NSR operational perspectives

Lawson W. Brigham

Björn Gunnarsson's paper clearly outlines the opportunities and challenges involved in developing the Northern Sea Route (NSR). He makes clear that the primary driver of Russia's NSR initiative is Arctic natural resource development. Development of the Russian Arctic offshore and onshore natural resources is a key component of Russia's economic strategy. Linkages of these resources to global markets, particularly those in the Pacific, are facilitated by the NSR, a challenging waterway across the top of the Russian mainland. Importantly, political support for expanding the NSR as a national waterway has come from President Putin and the highest levels of the Russian government. But how the NSR competes with, or is supplementary to, land bridges as transport corridors across Eurasia is not clear. Transport alternatives to the NSR across Eurasia have not been fully exploited and the possibilities of intermodal options have not yet been adequately explored. However, the strategic driver of Arctic navigation being natural resources development remains paramount. This driver is wholly consistent with the findings of the Arctic Council's *Arctic Marine Shipping Assessment* (AMSA) released in 2009, a study in which Russia was a full contributor and partner.

It is this author's opinion that the NSR (and overall Arctic navigation) will not revolutionize global maritime trade routes. The NSR is seasonal and the sea ice conditions are highly variable, so that achievement of year-round, regular service for its entire length would be difficult. However, marine operations on the western end of the NSR (which has been a year-round operation to the port of Dudinka on the Yenisei River since the 1978-79 navigation seasons) will continue and may witness increasing numbers of westbound voyages of LNG carriers from the Yamal Peninsula throughout the winter period.

Therefore, the NSR cannot be considered a viable replacement for the Suez Canal as a global trade route. *The Moscow Times* (4 June 2013) in an article about the future of the NSR quoted a senior Rosatomflot official who stated that 'the NSR is not a rival to the Suez Canal, but it's a good seasonal complement.' This statement encapsulates what many in the maritime industry believe is the promise of the NSR - linking Arctic natural

resources to global markets, but with significant liabilities related to the viability of regular, trans-Arctic container traffic.

The majority of the ships observed today navigating the length of the NSR in summer are ice-capable tankers, bulk carriers (with Arctic minerals such as iron ore, nickel and zinc), and LNG carriers. These high value bulk cargoes pose significant environmental risks to the Arctic marine environment if accidentally released. This current operational picture places urgency on near-term implementation of safety and environmental protection schemes such as the International Maritime Organization's (IMO) mandatory Polar Code. The passage of these large tank vessels and bulk carriers through the Bering Strait region also poses a number of critical challenges, including navigating through waters of coastal indigenous marine use, sensitive marine wildlife areas (with large numbers of marine birds and mammals), and a world class fishery located in the Bering Sea. Navigation across the length of the NSR must be viewed in the context that the Bering Strait region at the eastern end of the Route is one of the most ecologically sensitive marine areas on the planet.

One of the key issues when evaluating future NSR use is determining what the 'navigation season' will be for trans-Arctic voyages. It may be technically possible to move ships in winter convoys led by nuclear icebreakers along the eastern sections of the NSR. But do the slow speeds and higher risks undermine the economic viability of the Route? The answer is probably yes. A six-month navigation season along the length of the NSR may be attainable with significant icebreaker support, and this goal appears more realistic and economically viable. More experimental voyages in early spring and late autumn, likely conducted with commercial ships in icebreaker convoy, are needed to highlight the operational challenges of moving large bulk carriers and tankers through long stretches of the NSR that may be completely ice-covered. In these ice conditions, polar class ships will always be mandatory, and the higher the polar class needed to operate during longer navigation seasons, the more expensive these ships will be. Shipping economics in the Arctic can be altered (perhaps unfavorably) if high ice class ships are required to extend the navigation seasons. One of the challenges for shippers will be the full utilization of these high ice class ships when operating in open water and not during a short, ice navigation season along the NSR.

Gunarsson's paper suggests the use of the NSR for container ship traffic. While there is potential for select trans-Arctic operations, the NSR

presents serious challenges to establishing 'regular' (time sensitive) container traffic. First, any service would be seasonal if using a full trans-Arctic route between Atlantic and Pacific; the Russian regulators would not open the eastern reaches of the NSR for year-round commercial traffic. Second, there are few ports along the NSR where cargoes might be transferred. Further expansion and development of the Russian Arctic could change this situation as goods and services may be purchased from foreign sources throughout the region. New, niche and seasonal opportunities for container ship routing may be possible for Korean, Japanese and Chinese shippers. During a three-month season these shippers might exploit the NSR carrying select cargoes to Europe and to Russian Arctic ports. The challenge will be having sufficient containerized cargoes for return voyages. Multipurpose carriers may be the most effective vessel types to exploit potential markets and provide marine support to the Russian Arctic in limited navigation seasons.

Maritime infrastructure requirements and investment needs are major themes in Gunnarsson's paper. Nearly the entire Arctic lacks fundamental maritime infrastructure. Only the Norwegian coast and Russian northwest coast have adequate infrastructure including ports to support current levels of traffic. Several critical elements of infrastructure that are missing in most of the maritime Arctic include: ports; hydrography and charting; response capacity (for search and rescue, and environmental response); environmental observing systems (for monitoring climate changes and to provide real-time information on weather and sea ice for ship operations); places of refuge; communications; salvage, and polar icebreaking capacity. For the Russian Arctic and NSR, polar icebreakers are deemed essential for convoy escort, especially during extended navigation seasons. New diesel-electric icebreakers are being built in St. Petersburg to replace several of the 1970s/1980s icebreakers built in Finland by the former Wärtsilä shipyards. Construction of nuclear icebreakers is also underway in Russia to replace the earlier ships of the *Arktika* class. In addition, Russia is building a series of response (search and rescue) stations along the length of the NSR and hydrographic surveys continue so that up-to-date charts are available for select NSR routes.

One operational note for the NSR will be the sailing of ice class ships without icebreaker support or convoy. There may be an increase in such voyages as the regulators respond to the improving ice conditions along sections of the NSR. Several Norilsk class icebreaking carriers have

been allowed to make full voyages without any icebreaker escort during summer voyages to China (carrying cargoes of nickel plates produced at Norilsk). These experimental voyages have shown that these carriers are fully capable of operating the length of the NSR without being escorted in convoy. The future of this mode of commercial ship operations has not been fully evaluated and planned.

The speed of infrastructure improvements and the implementation of additional protection and safety measures developed under IMO auspices will surely influence the use of the NSR. Foreign carriers operating under the mandatory Polar Code will have confidence that international standards are being used to evaluate ship applications for use of the NSR. Increasing investments in coastal marine infrastructure along the Russian Arctic will provide new levels of safety and increase the operational efficiency of the NSR as noted in Gunarrson's paper.

Comments on Chapter 2: Conservation perspective

Martin Robards

In “The Future of Arctic Marine Operations and Shipping Logistics,” Dr. Bjørn Gunnarsson focuses on how environmental (i.e., loss of summer sea ice), physical, and economic conditions, as well as infrastructure, are affecting the development of Arctic shipping. In addition, he provides background for the conservation issues that need to be considered and addressed to responsibly manage and steward our natural resources in the face of increased Arctic shipping.

The following quotes highlight some of the considerations Gunnarsson raises related to environmental protection in an era of increased shipping traffic:

“Balancing commercial activity in the region with environmental protection will for sure remain a significant challenge for the years to come.”

“Our logistics solutions should take advantage of the Arctic resource potential and Arctic shipping opportunities, but at the same time provide the needed safety and reliability of operations and adequate pollution prevention to safeguard the fragile Arctic environment.”

“Accidental release of oil into the Arctic marine environment is the most significant threat from offshore oil exploitation and Arctic shipping.”

Gunnarsson highlights the value of the Polar Code as a means to mitigate some conservation risks through vessel design and operational practices. He also emphasizes the need for other broad efforts to improve navigation, communication, and oil spill response capabilities. In this commentary, I provide more detail about the environment we are trying to conserve, the conservation risks we are concerned about, and the tools we are/should be considering. I also touch on additional considerations and questions that we must grapple with related to wildlife conservation, subsistence communities, and environmental protection more generally.

This commentary uses the Bering Strait as a case study for issues across the Arctic, but also as an area of profound importance and risk that highlights the need for resolving how to accomplish locally specific measures. Elsewhere in the world, we can find areas of substantially greater concentrations of shipping traffic. However, the Bering Strait has dramatic

seasonal concentrations of wildlife, and its wildlife are of profound importance to the food security of indigenous human communities. A primary message of this commentary is that direct and indirect impacts of shipping on the conservation of wildlife and their habitats are inextricably linked with the health, safety, and cultural continuity of numerous Arctic communities.

WHAT IS THE ENVIRONMENT WE ARE TRYING TO CONSERVE?¹

The Bering Strait is an 85-kilometer-wide passage that connects the North Pacific Ocean and Bering Sea to the Chukchi Sea and Arctic Ocean. The Anadyr Strait is a 70-kilometer-wide passage separating St. Lawrence Island in Alaska (United States) from Chukotka (Russian Federation). Together, these two straits are globally significant for their marine, avian, and coastal biodiversity.

The International Union for the Conservation of Nature (IUCN) has designated 13 ecologically and biologically sensitive areas in the Arctic, including three in the area that encompasses the Bering and Anadyr straits.² Almost the entire global populations of some species, such as the Pacific bowhead whale (about 15,000 animals) and Pacific walrus (more than 150,000 animals) pass through the Bering Strait twice each year over a period of about a month. For other species, such as spectacled eiders, incredible seasonal concentrations may also be found, with large segments of the overall population in one place at one time.

This region is home to a wide array of indigenous subsistence communities dependent upon marine life for their nutritional and cultural survival. For the Bering Strait region as a whole, including the Seward and Chukchi Peninsulas, about 20,000 people directly rely on marine resources as their primary subsistence foods. For some communities, such as those on St. Lawrence Island, these marine resources represent over 95% of all subsistence foods.

Profound reductions and changing patterns of sea-ice cover in recent years as a result of climate change are affecting wildlife distributions and subsistence hunters' ability to hunt. The combination of changing sea ice, strong currents, large seasonal wildlife aggregations, the large number of subsistence communities on the Alaskan and Chukotkan coasts, and a

political boundary makes the Bering and Anadyr straits challenging areas for mitigating the cumulative conservation and food security risks arising from new industrial developments, including shipping.

WHAT ARE THE ENVIRONMENTAL RISKS WE ARE TRYING TO MITIGATE?

Vessel traffic through the Bering and Anadyr straits is expected to significantly increase over the next decade and beyond as the Arctic warms, industrial activities expand, and the Northern Sea Route (NSR) and Northwest Passage become more active transcontinental shipping routes. Already cargo on the NSR has increased by an order of magnitude since 2010, with 1.3 million tonnes of cargo transported by 47 vessels in 2012, up from only two vessels in 2007. While this is a tiny figure compared to the 740 million tonnes of cargo transported through the Suez Canal each year, the rapid rate of increase in vessel numbers on the NSR; expansion of the NSR's sailing season to approximately six months in 2012; general up-tick in port usage by local (including village resupply) and industry (e.g., mining) support vessels, and establishment of new vessel lines such as by FESCO and SASCO, which now sail from Everett, Washington (near Seattle) to Pevek in Chukotka, and China's Cosco Shipping Company, which plies the NSR, all indicate that vessel traffic will continue to grow. It is clear that we have transitioned from what was previously called *experimental* shipping activities³ to a more routine use of the NSR.

We expect that in the absence of mitigation measures to reduce impacts, the increased vessel traffic will result in a variety of threats to conservation and food security, including:

- Increased risk of vessel accidents (including release of petroleum products)
- An upsurge in legal discharges and emissions (e.g., black carbon)
- Measurable indirect and direct impacts to wildlife and subsistence (e.g., displacement or collisions with whales, and swamping of subsistence vessels)

WHAT ARE THE PRIORITY MITIGATION MEASURES?

Risks of Vessel Accidents

While the voluntary guidelines established in 2002 by the International Maritime Organization (IMO) for ships operating in Arctic ice-covered waters provide a start to ensuring the safety of the Arctic marine environment, environmental protection will be greatly enhanced with the adoption and full implementation of a mandatory IMO Polar Code. Gunnarsson suggests that at a minimum, the mandatory IMO Polar Code should address: a) use of heavy fuel oil, b) black carbon and other emissions, c) ballast water, d) routing measures and speed restrictions, e) Particularly Sensitive Sea Areas, f) places of refuge, g) emergency response, and h) discharge of garbage and pollutants. However, some of these issues, despite their potential value to conservation, will need to be addressed outside of the Polar Code (e.g., speed restrictions to minimize strikes of large cetaceans in areas where they are aggregated).

The IMO's work to develop a mandatory Polar Code started in 2010. In 2012, work on the environmental chapter was set aside to focus on vessel and mariner safety issues and concerns. The IMO Ship Design and Equipment Subcommittee adopted a draft environmental chapter in April 2013, but concerns remain that black carbon emissions and the use and transport of heavy fuel oil by ships operating in the Arctic (despite being outlawed by the Antarctic Treaty in 2005 and by MARPOL Annex I in 2010) are not being addressed adequately. The scope of the IMO Polar Code efforts is currently much more limited than the scope suggested by Gunnarsson, an issue that will need to be resolved in the final Polar Code or elsewhere at the IMO if conservation concerns are to be alleviated.

Given the risk of accidents and associated oil spills in the Arctic, all eight Arctic states have agreed within the Arctic Council to cooperate on search and rescue and oil-spill response. However, necessary technology and infrastructure are currently limited or absent in many areas across the Arctic. The proximity of land to shipping routes, particularly in narrow passes and along the north Chukotka coast, also precludes the timely mobilization of equipment from response hubs to the Bering Strait, emphasizing the need for efforts to both minimize the risk of accidents, and innovative strategies for rapid accident response over the huge area of the Arctic.

In Alaska's Arctic region, oil spill response capacity is primarily linked to the oil and gas industry, which has invested heavily in response and conflict mitigation measures to reduce impacts to the environment and subsistence practices. However, for many of the areas experiencing increases in Arctic maritime traffic, this is not the case, leaving a void between the "responsible party" and the environment at risk. Better connections need to be made between shippers, shipping insurers, and local response organizations to ensure that both safety measures and effective response options are in place when needed. Oiled wildlife (seals and seabirds) from an unknown source in the vicinity of St. Lawrence Island (Alaska) in 2012 emphasized that discharges are already taking place either from sunk or active vessels.

Improved communication systems are being developed to allow the position of large vessels and subsistence vessels to be known to each other, either verbally or through Automatic Identification Systems (AIS). This developing infrastructure has potential for informing captains of large vessels when marine mammals or subsistence vessels are active in an area (as is done on the east coast of North America for Atlantic right whales), reducing the chances of collisions or swamping of subsistence boats. Furthermore, local communities, NGOs, and government agencies are increasingly documenting areas of conservation concern on nautical charts that can inform vessel captains of areas where there is a need for special care (e.g., through voluntary speed restrictions), or that should be avoided entirely (as an Area to be Avoided).

Legal Discharges and Emissions

The IMO has made progress on a number of key safety issues and seems ready to agree to strengthen safeguards on the discharge of sewage and oil in polar waters. However, black carbon emissions, which are the second most important agent of climate change, remain controversial, and routine emissions are currently unregulated. Ballast water has also been identified as a potential issue with respect to invasive species.

Indirect and Direct Impacts on Wildlife and Subsistence

Aggregations of whales in shipping lanes in Alaska and elsewhere have resulted in persistent ship strikes and the death of whales. In the Bering

Strait region, whale strikes by ships could impact whale conservation, food security, and potentially activate responses within political systems, such as the International Whaling Commission, through which subsistence quotas are decided, or the American Marine Mammal Protection Act. Without policies that proactively address the risks associated with large vessels transiting hotspots for marine mammals or areas that support indigenous subsistence practices, negative impacts on marine mammal populations and indigenous food security can be expected.

While direct collisions with subsistence vessels are unlikely, impacts to hunters while involved in hunting, towing of whales, or in/on broken ice as a result of vessel wakes are possible.

Other wildlife aggregations are also vulnerable to the impacts of shipping, although this may be most significant when ice is present, such as the eider duck concentrations in polynyas, walrus concentrations during spring breeding, and pupping of seals, particularly ringed seals.

Tools to mitigate impacts to marine mammals and subsistence hunters include:

- Reduced vessel speed (<10 knots) in areas of whale aggregations to minimize the risk of whale strikes.
- Permanent or seasonal sanctuaries (Areas to be Avoided) to provide safe havens for animals where they concentrate.
- Vessel lanes to provide predictability on location of large transiting vessels.

In some cases, there are opportunities for win-win solutions. For example, a large proportion of vessels transiting past St. Lawrence Island to the south of the Bering Strait do so on the island's west side (in Anadyr Strait). Despite it being longer for vessels sailing to the United States' west coast, this route is often preferred due to poor hydrographic charting east of the island. For conservation of large cetaceans, it would be better for vessels to travel where possible to the east of the island, and this could be resolved with additional funds allocated to developing better hydrographic charts, an issue common across the Arctic.

Priority Mitigation Activities

Based on what is discussed above, the following five measures are priorities

for protecting the conservation of wildlife and food security:

- Limit/preclude use and carriage of heavy fuel oils in the Arctic through the Polar Code or other international policy tools.
- Limit/preclude black carbon emissions in the Arctic through the Polar Code or other international policy tools.
- Reduce vessel speeds in areas of large cetacean aggregations (e.g., Bering Strait) through the implementation of reporting and speed measures (voluntary or mandatory).
- Divert vessel traffic away from areas of established wildlife conservation or subsistence risk through establishment of Areas to be Avoided.
- Provide and maintain viable spill response capacity in the Arctic through development and support of the necessary institutions that can address the unique challenges posed by Arctic shipping.

CHALLENGES FOR ACCOMPLISHING CONSERVATION OBJECTIVES

Historically, changes in maritime policy are the result of a response to a crisis. International laws such as the International Convention for the Safety of Life at Sea (SOLAS) and the International Convention for the Prevention of Pollution from Ships (MARPOL) came about through catastrophic events – the “Titanic” and “Torrey Canyon” disasters, respectively. Currently, the IMO, which balances the principle of “freedom of the seas” with the need to regulate for the safety of people, vessels, and the environment, needs to approve any regulations related to passage through international straits. To accomplish this, the IMO first requires the relevant coastal states (in this case, the Russian Federation and U.S.) to agree on protective measures to address specific environmental needs before the IMO will consider regulation of all international traffic.

Ideally, sound maritime polices can be put into place that avert disasters from happening in the first place. However, as a global community, it will be our continued responsibility to grapple with tough issues and develop durable solutions that balance commerce with ecological, subsistence, and cultural values. Going forward, the following questions must be addressed:

- Given changes in climate, industrial development, and shipping demands, how do we implement policy changes that proactively address the increasing risks to wildlife and indigenous communities while respecting the international desire (and rights) to move more vessels through the Arctic?
- How can national, bilateral, and international institutions work together, perhaps using experience from analogous situations elsewhere, to proactively respond to localized environmental threats before a disaster occurs?
- Can voluntary measures adequately address the threats at hand, or are mandatory policies required to adequately protect ecological, subsistence, and cultural resources?

Notes

1. Based on: Robards, M.D. 2013. Resilience of international policies to changing social-ecological systems: Arctic shipping in the Bering Strait. pp. 99-104 in Arctic Resilience Interim Report 2013. Stockholm Institute and Stockholm Resilience Center, Stockholm. Arctic Council. Stockholm, Sweden.
2. Going forward, the term Bering Strait will be inclusive of both the Bering and Anadyr straits.
3. Brigham, L. W. 2010. The Fast-Changing Maritime Arctic. Proceedings of the U.S. Naval Institute, 136(5), May. pp. 54–59. <http://www.usni.org/magazines/proceedings/2010-05/fast-changing-maritime-arctic>.

Comments on Chapter 2: Community perspective

Denise Michels

Thank you for allowing me to provide comments on Dr. Bjørn Gunnarsson's paper entitled "The Future of Arctic Marine Operations and Shipping Logistics." I will focus on Arctic marine operations and shipping logistics at the community level, providing an update on shipping activities and recommendations. Dr. Gunnarsson's paper focuses on the Northern Sea Route (NSR) and international relations. What happens here matters to us every day. The majority of Alaska Natives in rural Alaska who live in coastal communities depend on subsistence practices. We need more local control/governance to foster public-private partnerships to finance and build Arctic infrastructure when the budgets of the State of Alaska and the Federal government are tight. Alaska Natives have been the custodians of the Arctic for thousands of years and will be for years to come. The Russian federal government charges for icebreaker-escorted passage within the Russian EEZ, while vessels traversing the Northwest Passage and the Bering Strait are not required to pay fees or comply with the United States' EPA and OPA90 regulations. Alaska Natives bear the most risk but receive no benefits, that is, Outer Continental Shelf (OCS) revenue sharing.

THE BIG PICTURE

The Arctic is the next economic hot spot, with increases in energy and mineral development activities and an increase in tourism. The USGS estimates that there are 90 billion barrels of oil in the Arctic, which at USD \$100 a gallon is worth USD \$9 trillion. This will make the U.S. energy independent and provide profits for energy companies. The Bureau of Ocean Energy Management (BOME) has plans for additional outer continental shelf (OCS) lease sales in 2017 in their five-year strategy.

These activities in the Arctic are a national security issue, with other countries conducting research on minerals beyond the Exclusive Economic Zone of the US. In 2009, AMSA reported that there were more than 5,000 vessels in Arctic waters. The latest estimate is up to 6,000. For both the NSR and Northwest Passage, the only way in and out of the Arctic on the Pacific

Ocean side is through the chokepoint at the Bering Strait between the Diomed Islands. All vessels and migrating marine mammals go through this 51-mile strait. While the U.S. has not ratified UNCLOS, 164 countries have done so and have a stable regulatory regime along with regulations in place for a stable system for private exploration and production. The lower 48 states receive OCS revenue sharing. But exploration and development have been happening in U.S./Alaskan waters since the 1970s, and Alaska does not receive OCS revenue sharing. The closest US Coast Guard base is in Kodiak, Alaska, over 800 miles away from the Bering Strait region. It takes more than a day of ocean travel by cutter, two hours of flight time by C-130, and five hours by HM-65 helicopter to access the region.

Alaska is a resource-rich state, with coal deposits on the North Slope, the world's largest zinc mine in the Northwest Arctic Borough, and gold and rare earth minerals in the Nome Census Area (the Bering Strait/Norton Sound), along with opportunities to develop alternative energy. Rural Alaska lacks the infrastructure needed for responsible development. Ports, harbors, barge landings, roads (the Foothills West Transportation Access Project is underway to build a road to Umiat), runways, water and sewer pipes, housing, fiber-optic lines, and cheap energy are needed in rural Alaska for any Arctic exploration and development to happen.

Marine transportation companies have successfully operated in the Arctic, shipping goods during the shipping season. They are used to working in harsh ocean conditions that include rough waters and bad weather (no visibility), and have knowledge of the area their areas of operation. For example, most villages do not have fuel headers, so a hose is run to shore to deliver fuel. Most villages do not have barge landings and smaller landing craft are used to get close to shore to deliver goods.

The northern Bering Sea, the Norton and Kotzebue sounds, the Chukchi and Beaufort seas and ocean waters along the Kuskokwim and Yukon deltas are very busy, with much ocean vessel traffic.

Fish are migrating farther north. The regional Community Development Quota (CDQ) fishing fleet, numbering 20 or more operate from 20 to 40 miles out in the ocean.

There are 3-10 skiffs for subsistence activities operating from the surrounding villages in the Norton and Kotzebue sounds, the Bering, Chukchi, and Beaufort seas and the Arctic Ocean.

Adventure tourism has increased, with kiteboarders, jet skiers, swimmers, kayakers, and winter ice driving expeditions making attempts to

cross the international border between the Diomede Islands and mainland Russia and Wales, Alaska.

There have been a few near-misses: a fuel barge broke loose in high seas two summers ago. The fuel company was prepared and dispatched a second barge to bring the first barge under control. Gambell lost a whaling crew in rough waters. One of two small skiffs boating from Wales to Diomede was lost in rough waters. The weather in the Arctic is unpredictable. For safer navigation, more weather stations and ice data are required, along with reliable communications (fiber-optic, etc.).

Comparing the lower 48's western coastline to ours, there are numerous bases and stations between Washington and California. We believe the same coverage is needed for Western Alaska's coastline from Kodiak to Barrow and beyond. If we do not include hub communities, there is a huge gap in adequate response time. Nome is a prime location to allow the USCG to respond to emergencies more quickly and to monitor environmental concerns.

With climate change, the shipping season is becoming longer; the Bering Strait in the Norton Sound freezes in late December/early January. The shipping season is predicted to be six months for the NSR, with more use of the Northwest Passage. Even though the passage is shallower than the NSR, there will be more ships passing through the Bering Strait with no regulatory regime in place. The tribes and cities in the Bering Strait region support the USCG's Port Access Route Study with a 4-nautical-mile, two-way traffic lane, speed recommendations, and areas to be avoided. This route needs to be approved by the international community via the IMO. We understand this process may take several years. We recommend voluntary measures be put in place in the meantime, with vessels traveling at a slower speeds and using the proposed shipping lanes.

The Alaska Marine Exchange's data for marine traffic transiting through the Bering Strait showed that there were 262 transits in 2009, 242 in 2010, 239 in 2011, and 316 in 2012. The Barents Observer reported that 46 vessels traversed the NSR in 2012, up from 34 in 2011 and only four in 2010. Canada also saw an increase in transits through the Northwest Passage.

If accidents happen, they will likely occur in the Bering Strait, with its limited visibility, unpredictable weather and lack of infrastructure in place to allow assets staged for SAR, environmental response, and national security enforcement.

The Port of Nome has recorded increased ocean vessel traffic, as documented in port statistical data. In 1990, there were a mere 34 dockings. By 2012, this had increased ten-fold with 436 port calls. Vessels continue to wait in a queue to dock at the port: in 2012, there were 61 (in 2011, 30, in 2010, 49, and in 2009, 53). Destinal traffic includes fuel, bulk cargo, gravel and equipment barges, cruise ships, government ships, and research and exploration vessels. Since 2008, an average of 10 private sailboats and yachts have stopped in Nome after successful transits through the Northwest Passage each year. Adventure cruise ships that transit through the Northwest Passage use Nome as a port of call. In 2009 and 2012, the cruise ship “World” stopped in Nome.

ALASKA DEEP-DRAFT ARCTIC PORT STUDY FOR NOME AND PORT CLARENCE

The Department of the Interior USGS Preliminary Report on the Cape Nome Gold Region in 1900 identified the need for harbor facilities for ocean vessels. It called for necessary public improvements, including constructing a deep-water pier. It also recommended that a lifesaving station be established. Today we are talking about this again, the same issues 112 years later.

In 1980, the Minerals Management Service (MMS) opened up gas lease sales in the Norton Sound. In 1981, a Port Master Plan Phase I identified the need to construct a 3,500 ft-long causeway to support medium-draft ocean vessels to -35 ft MLLW for OCS activities. In 1985, the causeway was constructed to 2,712 ft with a -22 ft depth.

The U.S. Army Corps of Engineers completed the Nome Harbor Improvements Project in 2006 by adding a 3,025 ft breakwater east of the existing causeway and a 270 ft spur on the end of the causeway. This improvement allows vessel operations in a protected marine environment.

The 2013 City of Nome’s Port and Harbor Master Plan expands services based on projections of increased vessel traffic with the opening of the Arctic.

The Corps of Engineers and the Department of Transportation identified Nome and Port Clarence as the site for an Arctic Deep-Draft Port System. The Bering Straits Native Corporation is working on acquiring site control from the Federal government where the former USCG station at

Port Clarence is located and is partnering with Crowley to develop the site. Port Clarence has been used as a natural place of refuge for more than 100 years.

U.S. Coast Guard and National Oceanic and Atmospheric Administration vessels continue to use the Port of Nome to conduct crew changes and resupply their vessels with fuel, water and fresh produce. Nome is a medium-draft port, so vessels with drafts over 22 ft have to anchor offshore and use small craft and helicopters to shuttle goods and personnel. The City of Nome has a concept design to extend the causeway to be able to accommodate large vessels.

A gold rush is on, with the price of gold averaging USD \$1,200 an ounce and the airing of the shows “Bering Sea Gold” and “Under the Ice, Bering Sea Gold” on the Discovery Channel. Nome is in a unique position in the State of Alaska relative to offshore lease sales in state waters for suction gold dredging. In 2011, Department of Natural Resources lease sales netted the state more than USD \$9 million. This was in an area where in 1996 there were only three dredges operating offshore. For the 2012 mining season, there were 80 dredges with 30 support vessels and three mining research vessels specifically for gold mining. The interest in this opportunity is growing rapidly, and we are seeing a massive influx of these dredging vessels. In 2013, DNR approved 204 permits. There continues to be a need for USCG and Department of Environmental Conservation personnel in Nome for boating safety and environmental enforcement.

The City of Nome’s efforts to establish an Arctic deep-draft port will allow safer resource development and provide the public with a sense of comfort that resources and assets are close by if needed for environmental response, national security, and search and rescue. Together, all these data show the need to extend the causeway to -35 ft MLLW.

Other regional hubs have plans to develop ports for resource and economic development. Kotzebue has identified a port at Cape Blossom and Arctic Slope Regional Corporation has identified Cape Thompson as a port for the North Slope area, along with Barrow.

If the U.S. wants to be part of the show and not sit on the sidelines, the Senate needs to ratify UNCLOS. One idea is to use the revenue from future lease sales to develop infrastructure in the Arctic to provide for national security, environmental response and search and rescue activities and to move toward energy independence. Waivers to the Jones Act should be considered to allow for the construction of much-needed icebreakers

in a timely manner. We encourage the State of Alaska to work with tribes that have government-to-government status with the Federal government. We recommend that the international community look at utilizing local traditional knowledge for all aspects of developing Arctic infrastructure. Most importantly, Alaska Natives need to be consulted and be at the table when any rules, regulations or laws are being considered. The Marine Mammal Protection Act allows Alaska Natives to hunt marine mammals for subsistence purposes. We depend on these mammals to sustain our way of life.

We continue to encourage the State Department to work with Russia and to improve international relations. We are related to the Chukchi Eskimos and have a long tradition of cultural exchanges before the Iron Curtain sealed the border. The Arctic Council continues to be an important forum for Alaska, with the U.S. taking the chairmanship in 2015. We recommend that all meetings of the council during the US chairmanship be held in Alaska and that there be a U.S. Arctic Ambassador who is from Alaska and lives in Alaska.

We support the AMSA 2009 Report Recommendations and the Northern Waters Task Force Recommendations and continue to work with the Alaska Arctic Policy Commission on Alaska's Arctic Strategy. We will continue to track global events that affect the maritime Arctic, such as climate change, expanding resource exploration, increasing scientific research, changes in biodiversity, non-Arctic nations entering into the Arctic, eco-tourism, and species movements northward. Scientists predict that the Northwest Passage will be open in the future.

The City of Nome and Kawerak, Inc. will continue engage in Arctic issues at all levels of government with the minimal funds we have to advocate on our behalf and to voice concerns to regulatory bodies.

Comments on Chapter 2: Chinese perspective

Xu Hua

I appreciate the invitation to make a comment on Dr. Gunnarsson's paper. His work provides a wide and comprehensive vision on Arctic shipping that considers many factors and sets forth a three-step plan for profitable Arctic shipping in the future. I think these factors fall into three groups:

- i) Biophysical factors, such as sea-ice conditions, and Arctic energy and mineral resources.
- ii) Freight market factors, such as economic properties of cargo, freight rates, costs occurring in operation, and competition from optional routes.
- iii) Infrastructure factors, such as ice-class ships, icebreakers, Arctic ports and transshipment hubs, navigation and communication facilities, and SAR and oil spill response systems.

These three groups of factors interact in a complicated way. For example, the seasonal variations in Arctic sea-ice extent and concentration determine the feasible Arctic shipping lanes, but factors such as icebreaking fees, insurance cost, and transport demand determine the economic lanes. Based on an analysis of the interactions between these factors, we can take three steps toward future Arctic shipping as the author suggests: assessment, modeling, and financing.

As a commentator on Dr. Gunnarsson's paper, I will first integrate the factors and the relations among them into a framework. Second, I will attempt to establish an assessment model for Arctic shipping, combining it with my earlier work. Third, I will identify some available transport routes between Eastern Asia and Northwest Europe other than the Northern Sea Route (NSR) and make comparisons.

FRAMEWORK

I have divided the total cost occurring in shipping into two parts: the shipping cost, which is the prior business cargo carriers' concern, and the cargo cost, which is the focus for shippers. An assessment of Arctic shipping is, to a large extent, a matter of comparing the total cost between the Arctic shipping routes and traditional shipping routes. Dr. Gunnarsson

has presented many relevant factors for the total cost and indicated the relations among them. In this paper I will visualize his work as an explicit framework (see Figure I-1).

As shown in Figure I-1, the shipping cost is divided into: the fuel cost, which is determined by the length of shipping routes, the ship speed, and the bunker price; the operating cost, which includes Protection and Indemnity insurance (P&I), the manning cost, the icebreaking fees, etc., and the capital cost, which is roughly equal to the value depreciation of the ships in service. The cargo cost is divided into: the inventory cost, which is related to the cost occurring during the storage of the cargo; and the time cost, which is the opportunity cost relative to time.

Sea-ice conditions, reflecting seasonal variations in geographic distribution of different thicknesses and concentrations of Arctic sea ice, have an effect on the length of Arctic shipping routes. The position and infrastructure of ports or transshipment hubs also have an effect on the length of Arctic shipping routes. A port with limited infrastructure conditions accommodating lesser ships may become a feeder port, and this can influence the route structure.

Combined with IMO regulations, the length of Arctic shipping routes is the most critical determinant in the framework. In the IMO’s Guidelines for Vessels Operating in Arctic and Antarctic Ice-covered Waters of 2009, the classification of navigable coverage of Polar Class ships and equivalencies

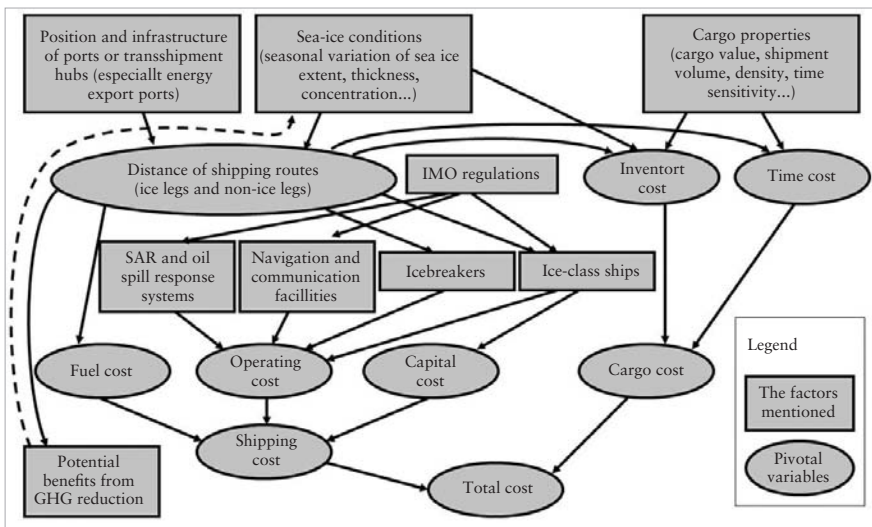


Figure I-1 Integrated frame for Arctic shipping assessment

with other classifications are indicated. An ice-class ship sailing an Arctic shipping route should comply with the coverage of Polar Class from this guideline. If the sea-ice condition is too heavy for an ice-class ship to pass, assistance from icebreakers is needed. Needless to say, the length of Arctic shipping routes also influences the fuel costs from the carrier side, and the inventory and time costs from the shipper side. The reduction of greenhouse gas emissions may result in pecuniary benefits in the future, which can be absorbed into the Clean Development Mechanism (CDM). This reduction may deter or alleviate global warming in the long run, and therefore influence the sea-ice condition. But the extent of this effect has not been clarified yet.

The IMO regulates the standards for navigation and communication facilities, SAR and oil spill response systems, etc. in order to secure navigation safety and protect the maritime environment. These factors will reduce the risk and P&I cost of Arctic shipping, while ships with different ice classes will vary in P&I cost. Assistance from icebreakers will result in icebreaking fees. All of the above factors will influence the operating cost. Moreover, ships with higher ice classes tend to be more expensive to build, leading to higher capital costs.

The properties of cargo are critical for the inventory and time costs. Valuable cargoes require faster and more punctual transportation to avoid high inventory and time costs, so they are usually transported in small shipments. The inventory and time costs, in turn, make up the cargo cost.

MODEL

Using this framework, I have developed a model to make it more maneuverable. The shipping cost and cargo cost for a voyage consist of three and two components, respectively:

$$CS_i = CF_i + CO_i + CK_i, CC_i = CT_i + CI_i$$

where the subscript i indicates the voyage number; CS_i is the shipping cost; CF_i is the fuel cost; CO_i is the operating cost; CK_i is the capital cost; CC_i is the cargo cost; CT_i is the time cost; CI_i is the inventory cost. The sea-ice condition on a shipping route varies from season to season, so different voyages may have particular sea-ice conditions.

The annual shipping cost CS and the annual cargo cost CC are the sum of voyage values:

$$CS = \sum_i CS_i, \quad CC = \sum_i CC_i$$

Each component can be explored in detail as:

$$CF_i = PF \cdot \sum_i \frac{D_{ij}}{SP_{ij}} F_{ij}(SP_{ij}, TH_{ij}, CONC_{ij}, Z_i)$$

$$CO_i = CIB_i + CPAI_i + CMAN_i \\ = \sum_i PIB_{ij}(TH_{ij}, CONC_{ij}) \cdot D_{ij} + (ACP AI_i(PC_i, Z_i) + ACMAN_i(PC_i, Z_i)) \frac{T_i}{365}$$

$$CK_i = \delta \cdot PIC_i(PC_i, Z_i) \cdot \frac{T_i}{365}$$

$$CT_i = r \cdot CV \cdot V_i \cdot T_i$$

$$CI_i = \frac{1}{2} PI \cdot V_i \cdot T_i$$

where the subscript j indicates the sea-ice condition (the combination of the thickness and concentration of sea ice); PF is the bunker price; D_{ij} and SP_{ij} are the distance and the ship speed when passing through waters with sea-ice condition j on voyage i ; F_{ij} is the fuel consumption rate, which is a function of the ship speed, the thickness of sea ice, TH_{ij} , and the concentration of sea ice, $CONC_{ij}$; CIB_i , $CPAI_i$, $CMAN_i$ are the icebreaking fees, the P&I cost, and the manning costs, respectively; PIB_{ij} is the tariff of the icebreaking service, which is assumed to be a function of the sea-ice condition; $ACP AI_i$, and $ACMAN_i$ are the annual P&I and manning costs respectively, which are both related to the grade of Polar Class applicable for the ship used in voyage i , PC_i ; Z_i is the ship size in voyage i ; T_i is the transit time of voyage i ; δ is the depreciation rate of a ship; PIC_i is the ship price; r is the interest rate; CV is the cargo value; V_i is the shipment volume; PI is the inventory tariff. The transit time is defined as:

$$T_i = \sum_i \frac{D_{ij}}{SP_{ij}}$$

PC_i is the highest grade of Polar Class applicable in voyage i , and is determined by the sea-ice condition.

The constraint conditions are:

$$SP_i \leq SP_{MAX_{ij}}(TH_{ij}, CONC_{ij}, Z_i), \sum_i V_i = TV, \forall Z_i \geq V_i$$

where $SP_{MAX_{ij}}$ is the maximum ship speed under the sea-ice condition and ship size, and TV is the total cargo volume to be shipped.

The objective function is:

$$\min(CS+CC)$$

It can be synthesized as:

$$\min \sum_i \sum_j k_{ij} \cdot D_{ij}$$

$$k_{ij} = \frac{PF \cdot F_{ij} + \frac{ACPAI_i + ACMAN_i + \delta \cdot PIC_i}{365} + \left(r \cdot CV + \frac{PI}{2} \right) V_i}{SP_{ij}} + PIB_{ij}$$

Finally, the greenhouse gas emissions in voyage i can be calculated as:

$$GE_i = GER \cdot \sum_j \frac{D_{ij}}{SP_{ij}} F_{ij}(TH_{ij}, CONC_{ij}, Z_i)$$

Where GE_i is the greenhouse gas emission volume, and GER is the emission rate computed as emissions per ton of fuel consumption. The effect from this component needs more detailed study.

These equations compose the model for an Arctic shipping assessment. Each function in the model should be calibrated with historical data. D_{ij} s are the decision variables. That is, given the transport task (TR) and the sea-ice condition, a carrier will select the shipping route which minimizes the total cost. All in all, this model involves a nonlinear programming problem (NLP), and may be solved by computer.

The model can be used to compare different shipping routes, including traditional ice-free routes. For these routes, TH_{ij} s and $CONC_{ij}$ s are all set to zero, PIB_{ij} s equals zero, $ACPAI_{i,s}$, $ACMAN_{i,s}$, and $PIC_{i,s}$ are much lower than those for ice routes, while $SP_{MAX_{ij}}$ s are higher. Of course, the model can also be used to compare multi-modal routes if the costs from land-legs

and transshipment are added.

POTENTIAL ROUTES

There are many potential routes available to ship cargo between the ports of Eastern Asia and Northwestern Europe. I will identify six such routes between Shanghai and Rotterdam for the purpose of demonstration (see Figure I-2):

- 1) Heavy-ice All-water Route (HIAR): the route via the NSR, which has a very limited navigation season for lower ice-class vessels.
- 2) Medium-ice Intermodal Route (MIIR): a multimodal route that goes through the Chinese domestic railway - Trans-Mongolian Railway - Trans-Siberian Railway to the Russian city of Krasnoyarsk along the Yenisei River, and then goes northward through the inland waterway of the Yenisei River to Dudinka, and then via seagoing vessels sailing to Rotterdam. This route has a longer ice-free season compared to the above one but is limited by the freezing of the Yenisei River. Three countries are covered on land: China, Mongolia, and Russia.
- 3) Light-ice Intermodal Route (LIIR): an intermodal route that goes



Figure I-2 Potential routes between Shanghai and Rotterdam

through the Chinese domestic railway - Trans-Mongolian Railway - Trans-Siberian Railway - Russian domestic railway to the Russian city of St. Petersburg along the Baltic Sea, and then via seagoing vessels sailing to Rotterdam. This route has a very short ice season. Three countries are covered on land: China, Mongolia, and Russia.

- 4) Warm Intermodal Route (WIR): an intermodal route that goes through the Second Eurasian Land Bridge to the Russian city of Novorossiysk along the Black Sea, and then via seagoing vessels sailing to Rotterdam through the Black Sea and the Mediterranean Sea. This route is totally ice-free. Three countries are covered on land: China, Kazakhstan, and Russia.
- 5) Warm All-water Route (WAR): the route via the traditional Asia-Europe sea route.
- 6) Dry Route (DR): the railway route that goes through the Chinese

Table I-1 Details of potential routes between Shanghai and Rotterdam

Route name	Path, distance, and distance ratio of railway leg	Path, distance, and distance ratio of inland waterway leg	Path, distance, and distance ratio of sea leg	Total distance	Recent ice-free season and duration (approx.)	Land border crossed times
HIAR			Shanghai-NSR-Rotterdam; 14,050 km; 100%	14,050 km	From late-Aug. to early-Oct.; 1.33 months	0
MIIR	Shanghai-Beijing-UlanBator-Krasnoyarsk; 5,250 km; 42%	Krasnoyarsk-YeniseyRiver-Dudinka; 2,000 km; 16%	Dudinka-Rotterdam; 5,150 km; 42%	12,400 km	From mid-Jul. to mid-Oct. (sea), from Jun. to Sept. (river); 2.50 months	2
LIIR	Shanghai-Beijing-UlanBator-Perm'-St.Petersburg; 9,600 km; 80%		St.Petersburg-Rotterdam; 2,400 km; 20%	12,000 km	From early-May to late-Nov.; 6.67 months	2
WIR	Shanghai-Urumqi-Almaty-Volgograd-Novorossiysk; 9,600 km; 59%		Novorossiysk-Rotterdam; 6,750 km; 41%	16,350 km	All year; 12 months	2
WAR			Shanghai-Suez Canal-Rotterdam; 19,300 km; 100%	19,300 km	All year; 12 months	0
DR	Shanghai-Beijing-UlanBator-Moscow-Berlin-Rotterdam; 11,900 km; 100%			11,900 km	All year; 12 months	6

domestic railway - Trans-Mongolian Railway - Trans-Siberian Railway - European railway to Rotterdam. Seven countries are covered on land: China, Mongolia, Russia, Belarus, Poland, Germany, and the Netherlands.

These routes are all illustrated in Figure I-2, though this map is somewhat distorted as the areas in high latitudes are exaggerated. The exact distances of the Arctic routes are much shorter than they appear on the map.

The features of these routes are listed in Table I-1. Further analysis would be possible using the model developed in this commentary. However, this step will not be accomplished here.

The shortest of these routes is the DR, while the longest is the WAR (the traditional route via the Suez Canal). Although the former route is much shorter, the transport efficiency of freight trains is far lower than that of ocean-going ships, and it goes through countries with different railway gauges. So, we need further study to find which route is more economical.

The total distances of the MIIR and the LIIR are nearly equal, but the former has a shorter railway leg, so its transport efficiency is higher. However, the ice-free season of MIIR is shorter, and it has a long and slow inland waterway leg. So, which one is more economical requires further

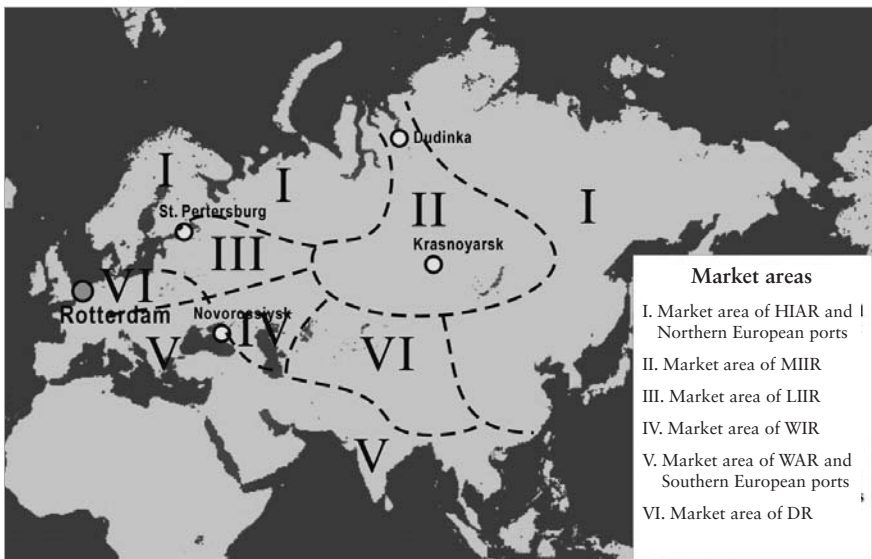


Figure I-3 Market areas of potential routes between Eurasian places and Rotterdam

exploration using the model.

The length of these routes will vary widely due to different origins or destinations. For example, if the destination is an Eastern Mediterranean port, the WIR, which transships at Novorossiysk, will be competitive compared to the upper three routes listed in Table I-1. Moreover, if the origin is chosen among Korean or Japanese rather than Chinese ports, the intermodal routes connecting to the Russian Far East port of Vladivostok for transshipment and going through the Trans-Siberian Railway might be advantageous options. According to this consideration, given the origin (or destination), we can delimitate the destination (or origin) market areas of different routes. The market area of a route is the one in which the route minimizes annual total costs compared to other routes. Based on this step, we can compare each route quantitatively with the cargo volume generated in its market area.

Figure I-3 shows an intuitive delimitation of the origin market areas of the six routes with the destination of Rotterdam, just for demonstration. The actual boundaries should be calculated using the model; this is the next task.

Comments on Chapter 2: Japanese perspective

Toshiyuki Kano and Takahiro Majima

First of all, thanks to Dr. Bjorn Gunnarsson for his paper on “The Future of Arctic Marine Operations and Shipping Logistics.” The issues of Arctic marine operations and shipping have been discussed from many points of views.

I will comment on the following points:

- Greenhouse gas emissions on the Northern Shipping Route (NSR)
- Energy efficiency of ice-class ships
- Navigation and transportation

GREENHOUSE GAS EMISSIONS ON THE NSR

The NSR has distance and time advantages compared to the traditional Suez Canal Route (SCR) with regard to shipments between Northeast Asia and Northwest Europe. However, the comparative advantages of the NSR and SCR should be evaluated not only from the perspective of distance and time savings, but also from an environmental conservation perspective. Developing of environmental measures for vessels and applying them to existing rules are under preparation by the IMO, a key organization.

Ice-Class Vessel Energy Efficiency

From the point of view of environmental conservation, the Arctic Sea is vulnerable to environmental burdens.

Mandatory measures to reduce emissions of greenhouse gases (GHGs) from international shipping entered into force on January 1, 2013. The amendments to MARPOL Annex VI Regulations for the prevention of air pollution from ships add a new chapter 4 to Annex VI dealing with energy efficiency for ships, making mandatory the Energy Efficiency Design Index (EEDI) for new ships and the Ship Energy Efficiency Management Plan (SEEMP) for all ships.

According to the IMO 2012 Guideline¹ on the method of calculation of the attained EEDI for new ships, the attained EEDI of ice-class ships

estimates ship-specific design elements (f_j) and capacity factors (f_i) as followed:

$$\begin{aligned} \text{Attained EEDI} &= \frac{\text{EEDI}_{\text{Numerator}}}{\text{EEDI}_{\text{Denominator}}} \\ &= \frac{f_i \cdot P_{ME} \cdot C_{FME} \cdot SFC_{ME} + P_{AE} \cdot C_{FAE} \cdot SFC_{AE}}{f_i \cdot f_c \cdot \text{Capacity} \cdot f_w \cdot V_{ref}} \end{aligned}$$

Technical Innovation Challenges for Ice-Class Vessels

Dr. Matsuzawam, et al.² of NMRI made a study calculating the values of attained EEDI of the Guideline and DE 57/11/8³ by using the principle particulars of 117 existing ice-class tankers. The values of attained and required EEDI are shown in Figure I-4.

The value of EEDI has to be lower than the required EEDI expressed in a straight line for each phase. However, above 20,000 dwt tankers such as 1AS, 1A are expected to have stronger demands according to the Arctic resource development. From phase 0-3 each 12, 38, 75, and 97% vessel's attained EEDI are required to improve. Currently, exemption from EEDI requirement for ice-class vessel is being considered by the IMO.

However, there are still innovation challenges, and ice-class vessels with higher propulsion performance are demanded.

Simulation Study of Greenhouse Gas Emissions on the NSR and the Traditional SCR

The NSR has apparent distance and time advantages compared to the SCR regarding the shipment of containerized freight between Northeast Asia and Northwest Europe.

While there is a possibility of transiting the NSR with advanced ice-class ships, the economic and operational aspects of this possibility have not yet been fully explored.

Also, the energy efficiency of ice-class ships is inferior to that of conventional ships in Arctic waters as well as in open water. Therefore, reduction of fuel consumption for vessels and GHG emissions due to reduced distance and time savings should be compared and reviewed with an increase in GHG emissions due to the lower energy efficiency of ice-class

ships and ice conditions (ice coverage and thickness of the ice on the route).

Simulation Study on the NSR vs. the SCR

A simulation study of a typical 4,000 TEU container ship traveling from Shanghai to Rotterdam and a crude oil tanker traveling from Murmansk to Shanghai was conducted to analyze the advantages of greenhouse gas emissions on the NSR and SCR. The outlines of the simulation conditions are shown in Figure I-5.

Energy Efficiency of Ice-Class and Conventional Ships

The energy efficiency of ice-class ships has a unique character compared to conventional ships. The EEDI of ice-class and traditional vessels can be compared approximately in ratio correction factor (f_i) and (f_j). The annex of the DE 57/11/8 provides performance data for ice-class general cargo ships, bulk carriers and crude oil shuttle tankers.

According to these datas, the ratio of (f_i) and (f_j) shows that an ice-class vessel's CO₂ increases 10% to 50% compared to traditional vessels at the same speed and loadings (Figure I-6).

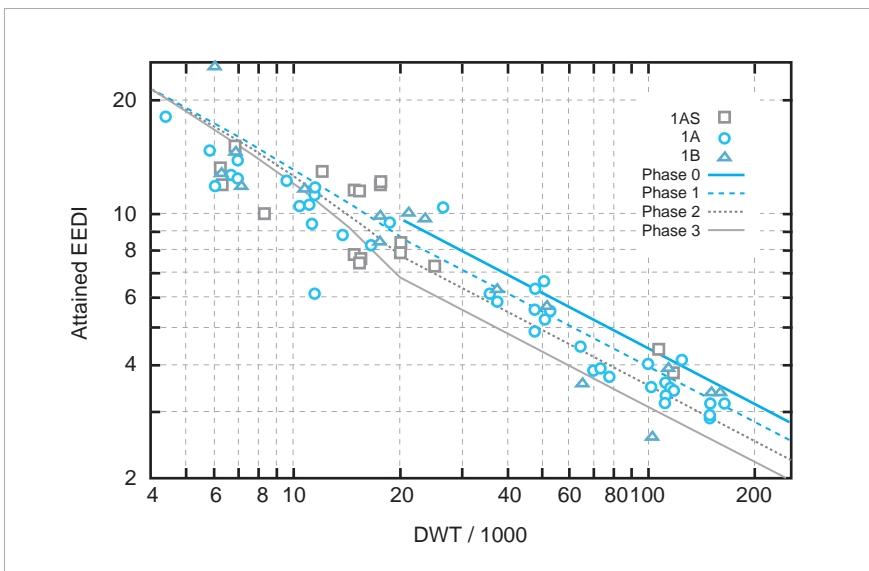


Figure I-4 Values of attained and required EEDI

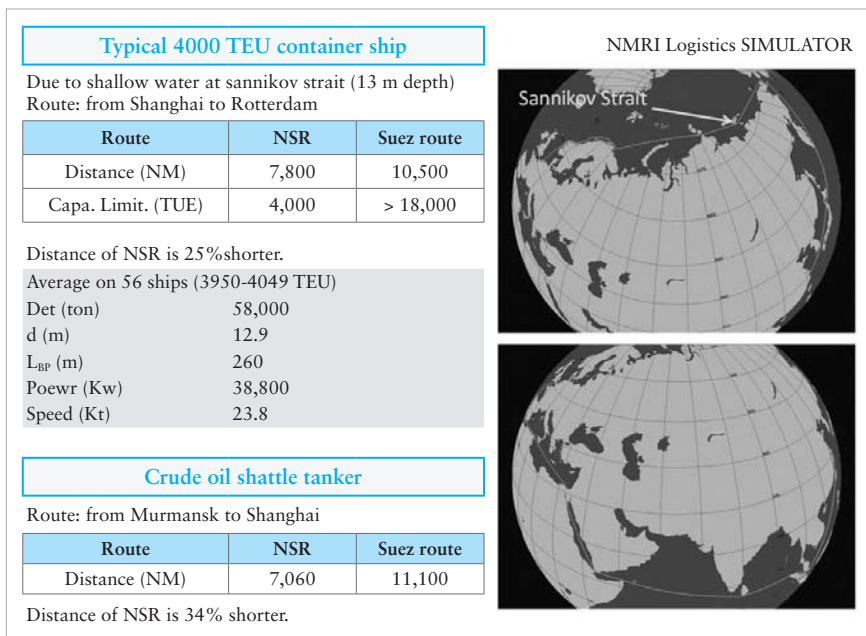


Figure I-5 Outlines of simulation study conditions

Ship Speed Reduction by Ice

An estimation of ship performance in ice from the Annex of the DE shows that a vessel’s speed goes down in accordance with the thickness of the ice (Figure I-7).

Amount of CO₂ Emissions on the NSR and Traditional Route

Taking the energy efficiency of the ice-class ships and reduction of ship speed by ice into account, the simulation results are shown below. Figure I-8 shows the variation of CO₂ emissions amount ratio of the NSR and SCR with ice thickness for different ice coverage ratios (ice covered distance/total route distance).

Almost the same results were obtained in these cases. The advantage of greenhouse gas emissions on the NSR declined as the ice coverage ratio and ice thickness increased. The borderline is in the case of almost 20% ice coverage with 0.7 m ice thickness. In the case of 30% ice coverage, it is unable to keep the time schedule.

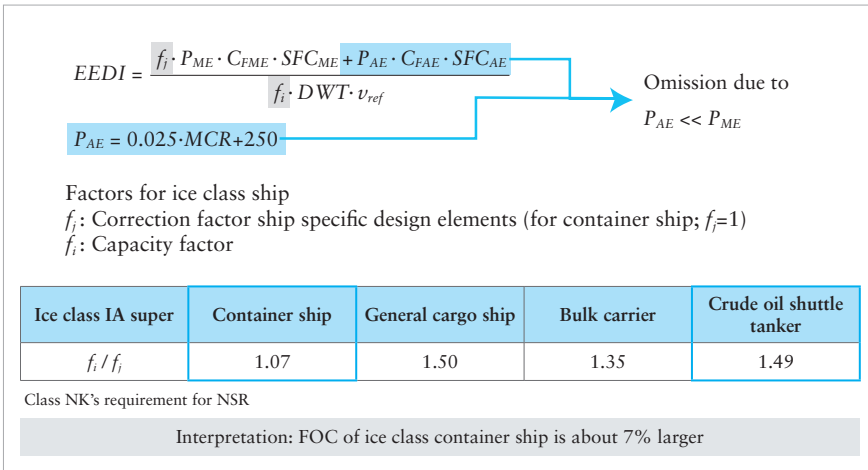


Figure I-6 EEDI of ice-class vessels and traditional ships

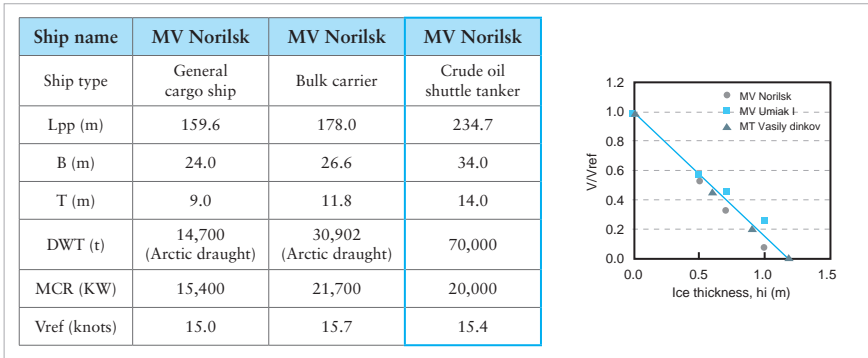


Figure I-7 Ship speed reduction by ice

Monitoring Navigation System

Monitoring navigation information for the NSR can be obtained by a satellite communication system or Automatic Identification System (AIS). The path of the NSR navigation route for a crude oil tanker from May to July is shown in Figure I-9. 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 precisely predicting future ice conditions, we can select the optimum route. A captain can choose the best route, using either the NSR or Suez Canal,

which is called “ice routing,” a term corresponding to “weather routing.”

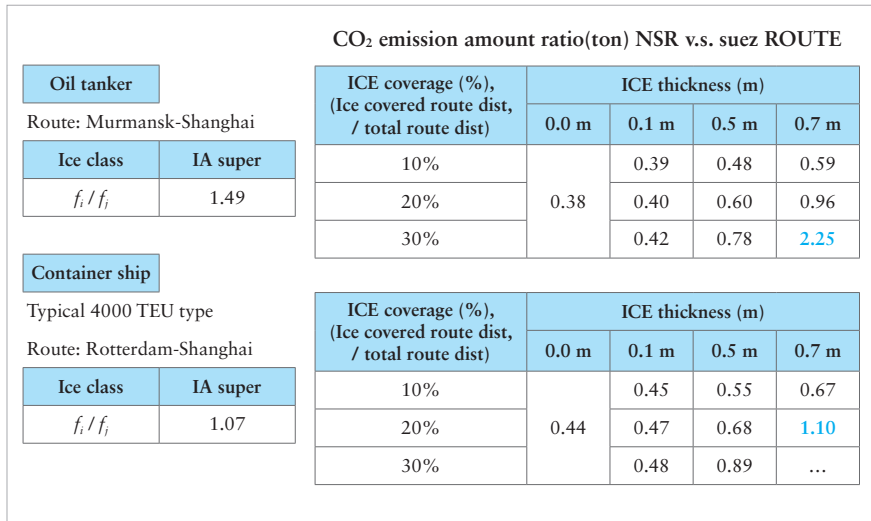


Figure I-8 Variation of CO₂ emission amount ratio of the NSR and SCR



Figure I-9 The path of the navigation route of a crude oil tanker on the NSR

COMMENTS

Greenhouse gas emissions on the NSR

The energy efficiency of an ice-class ship is inferior to that of a conventional ship. Therefore, reduced GHG emissions from distance and time savings should be compared with an increase in GHG emissions due to the lower energy efficiency of ice-class ships, depending on ice conditions (ice coverage and thickness of ice on the route).

The challenge of innovation for ice-class vessel energy efficiency!

Ice-class vessel energy efficiency should be improved.

Monitoring navigation system

A monitoring navigation system that provides information on ice floes and safe routes to ships in the Arctic Sea could help to avoid accidents and make a contribution to safe navigation, leading to environmental conservation.

Notes

1. International Maritime Organization (IMO). Resolution MEPC. 212(63). 2102 Guidelines on the Method of Calculation of the Attained Energy Efficiency Design Index (EEDI) for New Ships. 2012.
2. Dr. Matsuzawa et al. "Effect of EEDI Regulations on Engine Power for Ice-Class Ships." The 13th Research Presentation Meeting of the National Maritime Research Institute, Japan.
3. DE 57/11/8 "Development of a Mandatory Code for Ships Operating in Polar Water." (IMO Subcommittee on Ship Design and Equipment), December 14, 2012. Propulsion Power for Ice-Strengthened and Ice-Going Ships.

Reference

Ice-Class Shipping. 2007. Clarkson Research Services Ltd. 2007.

Comments on Chapter 2: Korean perspective

Sung Woo Lee

Dr. Gunnarsson has presented logistical issues linked to Arctic resource development in the past, present and future from the perspective of navigation in the Arctic. Commenting on our preparedness for the commercialization of the Northern Sea Route (NSR), he also talked about the business side of the NSR, in particular the possibilities of the NSR as a route for the shipment of cargo. Lastly, he observed that he did not think that commercialization of the NSR would revolutionize logistics. However, he added that he was positive about the important role of the NSR in resource transportation in the Arctic Ocean and Siberia.

I am in total agreement with Dr. Gunnarsson. Assessments of the use of the NSR should consider environmental factors first. The more active the route becomes, the more closely we should listen to the concerns of environmentalists. In this regard, the way toward using the NSR will be a long and tedious procedure. I would like to add my own opinions on Dr. Gunnarsson's presentation and will discuss the preparedness of East Asian nations to facilitate use of the NSR.

At the North Pacific Arctic Conference 2012, I gave a presentation on the potential use of the East Asia-North Europe route by a container cargo, consuming time, possible cargo volume, and rivalry between the NSR and the TSR. The conclusion was that although the figure could be different depending on the conditions, about 10 million TEU of cargo would use the NSR if navigation time could be cut by 10 days. Of course, there were preconditions and constraints. For example, the active use of the NSR would happen only after tramp ships were increasingly used and more than 10 years of know-how regarding NSR navigation was accumulated. Constraints included cargo balance, possible damages to the environment, route stability, and passage fees imposed by Russia.

Dr. Gunnarsson also dealt with environmental sensitivity, cargo balance and the necessity of passage fees. He added the need for adequate local infrastructure, public funds for development of such infrastructure, the limited economic validity attributable to ship size and a stable logistics system for the entire Arctic Ocean area. On this front, I am on his side. However, I would like to talk about a few possibilities not addressed by his study and what we should do about them.

The first involves possible intermodal transportation through inland areas of Northeast Asia. China and Russia are jointly developing a new intermodal transportation route that starts from the northeastern part of China and passes through the Jena River to link with the port of Tiksi on the Arctic Ocean, as shown in Figure I-10. A good comparison is the rivalry between the Deep Sea Route and the TSR for east-west logistics transportation going through the Suez Canal. Likewise, the NSR and an inland transportation route in Northeast Asia may compete with one another. Cargo owners will choose one route or the other based on its speed, punctuality, stability, volume, and costs. Eventually, these two routes will complement each other, particularly from the cost side. Just as cargo goes back and forth over the Deep Sea Route according to TSR rates, the NSR and inland transportation route in Northeast Asia are likely to give and take cargo with each other.

The second possibility is that excessive fleet size might jeopardize the global shipping market. Falling rates in the global shipping market are pushing shipping companies toward the brink. Many of them have gone bankrupt. Commercialization of the NSR could aggravate the current crisis in the global shipping market. Generally speaking, use of the NSR can save 10 days of transportation time. This means that vessels that were supposed to navigate for these 10 days have to find other business opportunities.



Figure I-10 Advent of new routes in Eurasia

Moreover, if East Asian nations bring resource cargo from Russia's Far East, Siberia and the Arctic coasts, instead of Africa, Latin America and Australia, demand for ships will disappear by exactly that saved time. Just as with any other market, the shipping market is governed by supply and demand. More ship supply and less demand herald reduced shipping rates, which can bring in another range of problems. Therefore, shipping companies need to streamline their structure or develop new business models to prepare for "rainy days."

The third possibility is the expected change in port competition in North Europe and East Asia. Ports in East Asia now maintain a loose rivalry. The Busan Port deals with both cargos in the hinterland and transshipment cargo in nearby areas. The Shanghai Port is for cargo from the inland and coastal areas of China. The Kaohsiung Port handles transshipment cargo in the southern part of China and Southeast Asia as well as cargo from Taiwan. Meanwhile, The Hong Kong Port mainly handles transshipment cargo in the southern part of China and Southeast Asia. These ports have maintained a "division of labor" relationship so far. For instance, transshipment cargo that departs from Japan and the three northeast provinces of China bound for Europe uses the ports of Shanghai or Kaohsiung, while cargo bound for the United States uses the Busan Port. However, if the NSR becomes commercialized, cargos bound for Europe and the U.S. will use only one port from among Busan, Shanghai and Kaohsiung for transshipment. In this case, chances are that the current loose rivalry will change into a fierce one. This is why each port authority should prepare for such changes.

Fourth, the IMO Polar Code will toughen the environmental aspects of seaborne transportation. Ships that run on heavy fuel oil, in particular, will be banned from operating in the Arctic Ocean. Therefore, alternative ships and fuel, such as LNG ships and nuclear-powered ships, need to be introduced. Only when technological support and efforts are made simultaneously can the NSR produce economic as well as environmental benefits.

The fifth possibility is that intermediate base areas can develop into cities. Industrial complexes will appear in conjunction with resource development in coastal areas of the Arctic Ocean and Siberia. Such development of resources and relevant industry is destined to induce an influx of people along with subsidiary facilities and commodities. Eventually, a city can be created, acting as a relay base port for ships

navigating in the Arctic Sea. At present, candidates for such urbanization are ports at the end of multimodal transportation routes (mostly on rivers downstream) passing through Siberia from the northern part of China or Central Asia. Accordingly, the necessary cities, logistics and energy infrastructure should be developed. As Dr. Gunnarsson pointed out, financial organizations that are public in nature are necessary, and the Russian government should develop relevant facilities.

Sixth, the development of cargo transportation technology should follow to overcome extreme weather conditions. Bulk cargo transportation for resources does not require special technological support. However, transportation of container cargo is different. For example, cargo inside container boxes should remain safe against temperature changes. For that matter, ships and special containers need to be developed along with other technological logistics advances.

Seventh, an ice-class ship shuttle service in the Arctic Ocean may be possible. One idea is to operate ice-class ships both in the Arctic Ocean and in general seas. In that case, however, costs will go up, while ship effectiveness will decline. Such problems can be solved if a shuttle service with ice-class ships or icebreakers is provided between ports near the Bering Sea and the northern end of North Europe. General ships would transport cargo to those ports, and then ice-class ships would carry them on the Arctic Ocean route (from the Bering Sea to ports at the northern end of North Europe). This exclusive transshipment service may become necessary for cost reduction and stable ship operation.

Last but not least are rates imposed by Russia for the use of the NSR. These rates can be lowered through negotiations if the Russian government makes a serious effort and the market demands this. In the case of the TSR, Russia raises rates if a lot of cargo uses the TSR and lowers them if less cargo uses it. Russia is likely to apply such variable rates to the NSR after the route becomes active. Therefore, the Russian government and user countries need to stabilize the rates through rounds of negotiations.

As I pointed out in my presentation last year, commercialization of the NSR will proceed as follows: First, bulk cargo for early resource development will continue to use the route. Second, logistics and industrial bases will be built at relay ports. Third, route stability and cargo size will be secured. Lastly, liner ships (containerships) will use the NSR. By then, technology for cargo transportation protecting against extreme weather and a logistics system in the Arctic area will be in place. And

urbanization of relay ports will create intermediary cargo, while mid-fueling and shelter facilities will be secured. This means that our main concerns, such as stability of navigation, predictability, economic feasibility and environmental stability will be addressed. Of course, the precondition is that we and the international community cooperate on environmental, economic and technological fronts.

3. International Cooperation in Arctic Marine Transportation, Safety and Environmental Protection

Lawson W. Brigham

INTRODUCTION

The early 21st century is the dawn of extraordinary changes in the maritime Arctic. The development of Arctic natural resources is linking the region to global markets and increasing the requirements for safe and efficient marine transportation systems. Hydrocarbon developments in coastal Norway and Russia have stimulated increases in Arctic marine traffic, and Russia's Northern Sea Route has witnessed a resurgence of tanker and bulk carrier traffic in summer. Advanced icebreaking ships continue to explore every region of the central Arctic Ocean during summer in support of science and the delimitation process of the outer continental shelf by the Arctic Ocean coastal states. Large cruise ships have ventured into Arctic waters in summer voyages of 'discovery.' Marine access is also changing in unprecedented ways as Arctic sea ice undergoes a profound retreat and transformation in extent, thickness and character influenced by global and regional anthropogenic warming. Longer seasons of Arctic navigation are becoming much more plausible. In summary, rapid economic and environmental changes are transforming the maritime Arctic.

The central challenge for the Arctic states and the global maritime community is how to implement effective protection for the Arctic people and the marine environment and to ensure the safety of shipboard crews during an era of expanding marine use. This new era has evolved rapidly with no international shipping regulations and rules that have binding or mandatory Arctic-specific provisions. The lack of marine infrastructure such as adequate charting, marine observations and emergency response capacity in most Arctic regions (except for areas along the Norwegian coast and northwest Russia) remains a fundamental and serious limitation to significant increases in Arctic marine traffic (AMSA, 2009). Fortunately,

during the past 15 years the Arctic states working through the Arctic Council have focused some of their cooperative efforts and attention on marine safety and environmental protection. Key progress has been made on response concerns, but less progress on protection issues as these must be addressed globally at the International Maritime Organization (IMO). The Arctic states must continue to identify their common interests and develop unified positions at IMO and other international maritime bodies. The real keys for advancing Arctic marine safety and environmental protection will be the engagement of non-Arctic states and the marine industry in the process at IMO (and other international bodies), and the degree to which the Arctic states are proactive in communicating to the global maritime community the critical need to develop effective (and uniform) international rules and regulations for Arctic operations. This chapter explores ongoing initiatives to fill this need and discusses opportunities for the global maritime community to participate in this complex process.

KEY DRIVERS OF ARCTIC MARINE NAVIGATION

The maritime Arctic is being connected to the global economy because of the region's abundant natural wealth. Although Arctic sea ice retreat provides greater marine access and longer seasons of navigation, the main driver of today's Arctic marine traffic is the development of natural resources influenced by global commodity prices and in the long-term, scarcer resources around the globe (AMSA 2009; Brigham, 2011). The Arctic Council's Arctic Marine Shipping Assessment (AMSA) conducted during 2005-2009 used a scenarios creation process to identify the main uncertainties and factors shaping the future of Arctic navigation. The most influential driving forces among some 120 factors were: global oil prices; new Arctic natural resource discoveries; the marine economic implications of seasonal Arctic marine operations; global trade dynamics and world trade patterns; climate change severity; a major Arctic marine disaster; transit fees on Arctic waterways; the safety of other global maritime routes; global (IMO) agreements on Arctic ship construction rules and standards; the legal stability and overall governance of Arctic marine use; and the entry of non-Arctic flag state ships into the maritime Arctic (AMSA, 2009).

Of importance to the AMSA scenarios effort was the identification of

two primary axes of uncertainty used to develop four plausible futures of Arctic marine navigation (to 2020 and 2050). Among the many uncertainties and drivers, degree of plausibility, relevance to Arctic maritime affairs, and being at the right threshold of influence were criteria resulting in the selection of two primary factors: resources and trade, meaning the demand for Arctic natural resources influenced by the uncertainty of global commodities markets and market developments, and governance of Arctic marine activity, meaning the degree of stability of rules and standards for marine use both within the Arctic and internationally (AMSA 2009). Again, climate change and Arctic sea ice retreat are fully considered by the AMSA scenarios as key to improving marine access, and these changes were understood to continue through the century. However, throughout the conduct of AMSA, global economic factors driving Arctic natural resource developments consistently loomed large as the major determinants of future Arctic navigation. A primary example today is the growth in numbers of large tankers and bulk carriers along Russia's Northern Sea Route (Pettersen, 2012; Brigham, 2013). The fact that large oil tankers, chemical bulk carriers and LNG carriers will be sailing sooner in Arctic waters in greater numbers requires complex regulatory measures and much greater cooperation between maritime states and marine industry. Such voyages require that Arctic marine infrastructure improvements be made much earlier than anticipated to keep pace with the rapid increase in use of Arctic coastal waterways and provide adequate systems for safe navigation.

ARCTIC MARINE ACCESSIBILITY

It is critical to note that from the perspectives of marine use, marine safety and environmental protection, the Arctic Ocean remains fully or partially ice-covered for much of the winter, spring and autumn. It is not an ice-free environment to be regulated, but one covered with sea ice may be more mobile. Therefore, 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. Global climate models project continued Arctic sea ice reductions with plausible ice-free conditions for a summer time period by mid-century or earlier. Such a period would mark the disappearance of old or multi-year sea ice, leaving the Arctic Ocean covered by seasonal, first year ice which is

more navigable. Recent research has focused on how changes in access can be evaluated by using the global climate model sea ice simulations and a range of polar class ship types (Stephenson, 2013). Higher class ships (Polar Class 3) are able to gain access nearly year-round for much of the Arctic Ocean (Stephenson, 2013). Changing sea ice conditions by mid-century may also allow lower polar class vessels (Polar Class 6) and perhaps even non-ice strengthened ships to cross the Arctic Ocean in September (Smith, 2013). However, none of these results indicates the possibility of regular trade routes, just that certain types of ships may have marine access for selected times of the year given a range of climatic projections. This research does provide important new information about what may be plausible, and technically possible, seasons of Arctic navigation. The types of cargoes and the economics of global shipping along with governance and environmental factors will determine which Arctic routes might become viable (Brigham, 2011; Carmel, 2013).

COOPERATIVE RESEARCH ON ARCTIC MARINE TRANSPORTATION

International cooperation in Arctic marine transportation research is an opportunity for public-private partnerships. Possibilities include a consortia of national maritime bodies/institutes, research universities and marine industry. Experience in this form of public-private cooperative research already exists between several national governments and the ship classification societies. New research ventures should be explored that could include multi-national partners and maritime research institutes and think tanks. Five major themes in need of robust and creative research in Arctic marine transportation include: Arctic marine shipping economics; marine infrastructure (planning, investment and technology); marine safety systems; environmental protection measures, and emergency response strategies.

Future research on Arctic marine shipping economics needs to include more work on quantifying marine access (by Polar Class ships and non-ice strengthened vessels) and determining a range of navigation seasons for commercial ships with or without icebreaker escort. Comprehensive economic studies, specifically cost-benefit-risk analyses, are essential for all potential Arctic routes (for both trans-Arctic and destination shipping). These studies would need to identify global demands and key

economic needs for use of these potential Arctic routes, and use realistic estimates of the navigation season. Useful to decision-makers will be a comprehensive and comparative analyses of using Arctic marine shipping (Polar Class ships) versus pipelines for the carriage of Arctic oil and gas to world markets. Also, continued research is critical on the socio-economic responses to global climate change (for example, emission controls) and their potential impacts on Arctic natural resource development and Arctic marine operations.

A selection of notable areas of potential cooperative research that would enhance knowledge of Arctic marine safety and environmental protection include:

- An assessment of the trend of increasing ship size (on global and



Figure I-11 The Arctic Ocean and marine transportation routes

regional trade routes) and the implications for Arctic navigation, including identification of any maximum limitations, technical challenges, and operational constraints for such large ships in potential Arctic trading.

- Risk assessments related to Arctic ship operational challenges, lack of marine infrastructure, and significant ice damages, all of critical importance to the marine insurance industry.
- Studies of the cruise ship industry identifying the constraints, risks and challenges of current practices and future longer seasons of operation in Arctic waters.
- A comparative study of how the Arctic states are addressing liability and compensation, especially for bunker fuel spills and hazardous and noxious substance incidents.
- Conduct of a circumpolar risk analysis to identify the potential locations of emergency response equipment (SAR and environmental response) and marine salvage to respond to Arctic marine incidents.

Considering the ongoing development of a long-term Sustainable Arctic Observing Network (SAON), determining a set of critical parameters to be observed that will be relevant to Arctic marine operations and will enhance Arctic marine safety and environmental protection.

Drawing on IMO's experiences for ship's routing schemes adopted in other regions, examining how Arctic states could address Arctic ship routing in order to protect sensitive areas of the marine environment and meet multiple use challenges such as those between indigenous and commercial users in coastal waters.

There are many other research topics that require attention. But those listed are ripe for international cooperation and perhaps for public-private partnership funding and execution.

THE ARCTIC COUNCIL & ARCTIC STATE COOPERATION

The Arctic Council, an intergovernmental forum, has been the most proactive international body focusing on the challenges of Arctic marine safety and environmental protection. Established by the Ottawa Declaration in 1996, the Council focuses on sustainable development and

environmental protection in the Arctic (Ottawa Declaration, 1996). A key feature of the Council is that six indigenous Arctic peoples' groups (named the Permanent Participants) sit with the eight Arctic state delegations in 'active participation' and 'full consultation' in all Council activities (Ottawa Declaration, 1996). Scientific and policy assessments, and special reports, are developed within six Arctic Council Working Groups: Arctic Contaminants Action Program (ACAP); Arctic Monitoring and Assessment Programme (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Emergency Prevention, Preparedness and Response (EPPR); Protection of the Arctic Marine Environment (PAME), and the Sustainable Development Working Group (SDWG). Recent work has included cross-cutting projects and activities among the groups. For example, AMAP, CAFF and SDWG have participated with PAME in an Ecosystem Approach expert group, and EPPR has worked closely with PAME on the implementation of key recommendations from the Arctic Marine Shipping Assessment. Engagement and input of ideas and issues from non-Arctic state observers, other Council observers, and outside experts are handled primarily through the working groups which are led by Arctic state delegations (subject matter government experts) with Permanent Participant representation.

The most relevant and visible Arctic Council document on marine safety and environmental protection issues is the Arctic Marine Shipping Assessment conducted by PAME for the Arctic Ministers during 2004-2009. AMSA is an outgrowth of the Council's Arctic Climate Impact Assessment which gained global attention when released in 2004. More than 200 experts, led by Canada, Finland, and the United States, focused the assessment on marine safety and environmental protection issues, consistent with the Council's mandate. Thirteen major workshops were held on key topics such as scenarios, human dimensions, environmental impacts and infrastructure, and fourteen AMSA town-hall meetings were held in Arctic communities to gain insights into the concerns and shared interests of indigenous residents. Ninety-six findings are presented in the Arctic Marine Shipping Assessment 2009 Report (a selected list of key findings is presented in Table I-2).

Table I-2 *Select findings of the Arctic Council's Arctic Marine Shipping Assessment (AMSA, 2009)*

Arctic Sea Ice	Global climate model simulations indicate a continuing retreat of Arctic sea ice through the 21 st century. However, all simulations indicate an Arctic sea ice cover in winter.
Governing Legal Regime	The Law of the Sea, as reflected in the 1982 United Nations Convention on the Law of the Sea (UNCLOS), sets out the legal framework for the regulation of (Arctic) shipping according to maritime zones of jurisdiction.
Key Drivers of Arctic Shipping	Natural resource development and regional trade are the key drivers of increased Arctic marine activity. Global commodities prices for oil, gas, hard minerals, coal, etc. are driving the exploration for Arctic natural wealth.
Destinational Shipping	Most Arctic shipping today is destinational (versus trans-Arctic), moving goods into the Arctic for community resupply or moving natural resources out the Arctic to world markets. Nearly all marine tourist voyages are destinational as well. Regions of high concentration of shipping occur along the coasts of northwest Russia, and in the ice-free waters of offshore Norway, Greenland, Iceland and the Bering Sea.
Impacts of Arctic Shipping on Arctic Communities	Marine shipping is one of many factors affecting Arctic communities, directly and indirectly. The variety of shipping activities and the range of social, cultural and economic conditions in Arctic communities mean that shipping can have many effects, both positive and negative.
Most Significant Environmental Threat	Release of oil in the Arctic marine environment, either through accidental release or illegal discharge, is the most significant threat from shipping activity.
Special Areas	There are certain areas of the Arctic region that are of heightened ecological significance, many of which will be at risk from current and/or increased shipping.
Charting and Marine Observations	Significant portions of the primary Arctic shipping routes do not have adequate hydrographic data, and therefore charts, to support safe navigation. The operational network of meteorological and oceanographic observations in the Arctic, essential for accurate weather and wave forecasting for safe navigation, is extremely sparse.
Marine Infrastructure Deficit	A lack of major ports and other maritime infrastructure, except for those along the Norwegian coast and the coast of northwest Russia, is a significant factor (limitation) in evolving and future Arctic marine operations.
Uncertainties of Arctic Navigation	A large number of uncertainties define the future of Arctic shipping activity including: the legal and governance situation; degree of Arctic state cooperation; climate change variability; radical changes in global trade; insurance industry roles; an Arctic maritime disaster; new resource discoveries; oil prices and other commodity pricing; multiple use conflict (Indigenous and commercial), and future marine technologies.
Central Arctic Ocean	Increased traffic in the central Arctic Ocean is a reality (in summer) – for scientific exploration and tourism.
Ice Navigator Expertise	Safe navigation in ice-covered waters depends much on the experience, knowledge and skill of the ice navigator. Currently, most ice navigator training programs are ad hoc and there are no uniform international training standards.

The entire body of work in AMSA can be viewed in three related ways: as a baseline assessment and snapshot of Arctic marine use early in the 21st century (developed from data collected by the Arctic states on ship/vessel type, marine use, season of operation, and region of operation); as a strategic guide to a host of states, Arctic residents, users, stakeholders and actors involved in current and future marine operations, and as a policy

framework document of the Arctic Council and the Arctic states focused on protecting the Arctic people and the environment. The key aspect of the AMSA 2009 Report is that the seventeen recommendations were negotiated by the Arctic states and consensus reached so that the final report could be approved by the Arctic Ministers at the Arctic Council Ministerial Meeting in Tromsø, Norway in April 2009. The work of AMSA continues to this day as follow-up status reports have been requested by the Arctic Ministers and the Senior Arctic Officials. Two status reports on the implementation of the AMSA 2009 Report recommendations have been issued by the Arctic Council in May 2011 and May 2013. A third status report on implementation is planned for a 2015 release at the next Ministerial Meeting (see Table I-5 under projects for PAME). Thus, AMSA is a 'living' document and a process with a worthy, long-term goal of implementing all seventeen recommendations, each an integral part of a whole policy strategy.

AMSA's seventeen recommendations as approved in 2009, focus on three inter-related themes: (1) Enhancing Arctic Marine Safety, (2) Protecting the Arctic People and the Environment, and (3) Building the Arctic Marine Infrastructure. Table I-3 indicates the specific recommendations and actions required under each of these three broad themes. All of the recommendations require increased international cooperation, among the Arctic states, among the maritime nations at IMO (and other bodies), and in the development of new public-private partnerships. The most significant recommendation in theme 1 is for mandatory IMO standards and requirements for ships operating in Arctic waters, and the augmentation of IMO ship safety and pollution prevention conventions (such as MARPOL) with Arctic-specific requirements. Another recommendation notes the importance of strengthening passenger ship safety in Arctic waters. Theme 2 has a key recommendation for the need to conduct comprehensive surveys of indigenous marine use. These are necessary if integrated, multiple-use management principles or marine spatial planning concepts are to be applied to Arctic areas. There also are calls for identifying areas of heightened ecological and cultural significance and for exploring the need for specially designated Arctic marine areas (such as IMO Special Areas or Particularly Sensitive Sea Areas). The elements of the third theme on marine infrastructure were believed by the AMSA team to be of critical importance. Most of the Arctic marine environment is poorly charted and requires increased hydrographic surveying to support safe Arctic navigation. The

region is in need of many key investments for improved communications, an effective monitoring and tracking system, more observed environmental information (weather, climate, sea ice and more), and environmental response capacity. The infrastructure initiatives are all complex projects and long-term and each will require significant funding.

Table I-3 *The Arctic Marine Shipping Assessment recommendations by theme: A framework policy for the Arctic Council (AMSA, 2009)*

I. Enhancing Arctic Marine Safety:
A. Linking with International Organizations
B. IMO Measures for Arctic Shipping
C. Uniformity of Arctic Shipping Governance
D. Strengthening Passenger Ship Safety in Arctic Waters
E. Arctic Search and Rescue (SAR) Instrument
II. Protecting Arctic People and the Environment:
A. Survey of Arctic Indigenous Marine Use
B. Engagement with Arctic Communities
C. Areas of Heightened Ecological and Cultural Significance
D. Specially Designated Arctic Marine Areas
E. Protection from Invasive Species
F. Oil Spill Prevention
G. Addressing Impacts on Marine Mammals
H. Reducing Air Emissions
III. Building the Arctic Marine Infrastructure:
A. Addressing the Infrastructure Deficit
B. Arctic Marine Traffic System
C. Circumpolar Environmental Response Capacity
D. Investing in Hydrographic, Meteorological and Oceanographic Data

Although AMSA was focused appropriately on Arctic marine safety and environmental protection, it did provide an overview of some of the issues and challenges of trans-Arctic navigation (AMSA, 2009). The AMSA scenarios creation effort indicated the primary driver of marine traffic would be the Arctic natural resource development. Regional traffic levels would relate to offshore development and shipping of resources out of the Arctic to global markets. The development of potential trans-Arctic routes will depend in part on the continuing presence of sea ice. The seasonality and reliability of Arctic navigation routes will be key factors in trying to integrate Arctic routes into most global marine operations. Any integration efforts involving Arctic ships (Polar Class vessels) will contend with many uncertainties and potentially high operating costs. Although many new icebreaking carriers are designed to operate independently in ice, in some regions, such as along the NSR, escort by icebreaker and

mandatory pilotage will be significant economic issues relevant to the viability of commercial voyages. The prospect of long voyages in ice beyond the summer season (presenting risks for ships and cargo), the lack of marine infrastructure as a safety net, and schedule disruptions will be key factors for the marine insurance industry in establishing Arctic rates. While the conduct of trans-Arctic navigation is technically possible today with advanced icebreakers and Polar Class carriers, the operational, economic, and environmental challenges for routine voyages are not yet fully understood.

Since the release of AMSA, two key recommendations have been acted on by the Arctic states using the Arctic Council process (with Permanent Participant and observer involvement) to negotiate agreements. A treaty on the Arctic search and rescue (SAR), the Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic, was signed by the Arctic Ministers of the eight Arctic states during the Arctic Council Ministerial meeting in Nuuk, Greenland on 12 May 2011. It is a binding agreement strengthening SAR cooperation and coordination in the Arctic and establishing areas of SAR responsibility for each of the Arctic states.

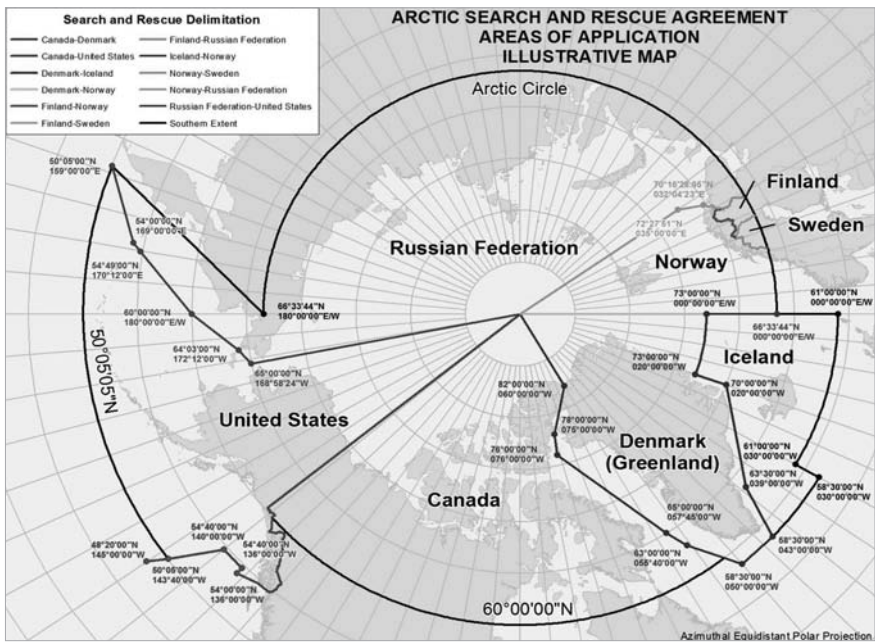


Figure I-12 The Arctic search and rescue agreement areas of application (Illustrative map).

These areas of responsibility (see Figure I-12, SAR Agreement Map), noted in the agreement, do not prejudice any other boundaries between the states or their sovereignty. The agreement also fosters the conduct of joint Arctic SAR exercises and training, lists information on the Arctic states' rescue coordination centers, and addresses the issue of requests to enter the territory of a Party for SAR operations. The Arctic SAR agreement entered into force on 19 January 2013 following ratification by each of the eight (Arctic) signatory states.

A second agreement negotiated under the auspices of the Arctic Council is the Agreement on Cooperation on Marine Oil Pollution Preparedness and Response in the Arctic signed by the Arctic Ministers in Kiruna, Sweden on 15 May 2013. This agreement focuses on Arctic oil spills and addresses a range of practical issues: requirement of a national 24-hour system for response; facilitation of cross-border transfer of resources; notification of the Parties; monitor spills; conduct of exercises and training; joint reviews of responses to Arctic spills, and a set of operational guidelines in an appendix. Both agreements are in their implementation phases and the Arctic Council and maritime community will be able to follow the progress of the Arctic states in developing their cooperation in the practical aspects of Arctic emergency response.

NON-ARCTIC STATE OBSERVERS: ROLES IN THE ARCTIC COUNCIL

Six new, non-Arctic state observers were approved by the Arctic Ministers at the May 2013 Ministerial Meeting in Kiruna, Sweden (Kiruna Declaration, 2013). There are now twelve such observers in the Council: China, France, Germany, India, Italy, Japan, Republic of Korea, the Netherlands, Poland, Singapore, Spain and the United Kingdom. A key challenge for the Arctic states and these observers is how to facilitate non-Arctic state contributions into the work of the Arctic Council. How can experts from the non-Arctic states bring meaningful and useful concepts and information to the Council's working groups? From the symbolic and diplomatic perspectives, these observer states should be present at the Ministerial and Senior Arctic Official Meetings of the Council. While their roles are limited and constrained at these high level meetings, it is important for the Arctic community, and for the observers' diplomats, that

they witness the dialogue and broad range of Arctic issues being addressed by the Council. It is also critical that the observers witness firsthand the role of the Permanent Participants in the Council's deliberations and how indigenous issues are woven into the Council's deliberations. The Senior Arctic Officials have adopted an observer manual to provide guidance to the working groups and other Council bodies on the roles to be played by the observers and meeting logistics (Kiruna Declaration, 2013). The chair of any Arctic Council subsidiary body (working group, task force, etc.) should invite observers to a meeting (no later than 30 days in advance). Of key importance is the procedure 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" (Arctic Council a, 2013). Thus, the Arctic Council is encouraging the observers to make contributions primarily at the working group/subsidiary body level.

For Arctic marine safety and environmental protection issues, EPPR and PAME are the most appropriate council working groups for engagement by the non-Arctic state observers. Their maritime ministries, coast guards, and response organizations have technical and scientific expertise that can be valuable in the deliberations and review of PAME/EPPR special reports, guidelines and strategies. Table I-4 provides a select list of the broad themes and projects being undertaken by EPPR during 2013-15; notable are efforts focused on Arctic oil spill response, safety systems and radiation response issues. PAME's 2013-15 ongoing select projects are listed in Table

Table I-4 Select 2013-15 projects, activities and lead countries for the Arctic Council's Emergency Prevention, Preparedness and Response (EPPR) working group (Arctic Council b, 2013)

• Arctic Rescue (Best Practices, Emergency Risks Assessment System, Emergency Preparedness Exchange of Information) (Russia)
• Development of Safety Systems in Implementation of Economic and Infrastructure Projects (Russia and Norway)
• Arctic Region Oil Spill Response Resource and Logistics Guide (United States and Canada)
• Arctic Guide for Emergency Prevention Preparedness and Response: Update (United States)
• Radiation Emergency Training and Exercises (United States and Russia)
• Community Radiation Information ~ Public Communications/Information Sharing (United States and Russia)
• Arctic Automated Mutual Assistance Vessel Rescue Network: A AmverNet (United States and Canada)
• Operational Safety and Health of Arctic Oil Spill Response Workers (United States)
• Agreement on Cooperation on Marine Oil Pollution Preparedness and Response Operational Guidelines: Update (All States)

I-5. PAME is focused on continued implementation of AMSA's seventeen recommendations, revising the Council's 2004 *Arctic Marine Strategic Plan*, and forming an experts group to continue work on an ecosystems approach to management of Arctic marine areas. Non-Arctic state observers have a broad selection of themes in which to contribute and to observe Arctic marine policy developments in PAME and the formulation of response strategies in EPPR.

Table I-5 Select 2013-15 Projects and Lead Counties for the Arctic Council's Protection of the Arctic Marine Environment (PAME) Working Group (Arctic Council b, 2013)

-
- Arctic Marine Shipping Assessment (AMSA) Recommendations ~ Follow-up: Linking with International Organizations; IMO Measures for Arctic Shipping; Heavy Fuel Oil in the Arctic; Passenger Ship Safety in Arctic Waters; Arctic Indigenous Marine Use Surveys; Specially Designated Arctic Marine Areas; Impacts on marine Mammals; Air Emission Reductions; Addressing the Arctic Marine Infrastructure Deficit; Arctic Marine Traffic Systems; Updating the AMSA Arctic Ship Traffic Data; AMSA Implementation Progress Report for 2015 (Previous Reports 2011 and 2013)

 - Development of a Sustainable Tourism Initiative (Canada and the United States)

 - Health, Safety and Environmental Systems for Arctic Offshore and Gas Operations (United States)

 - Arctic Ocean Review Follow-up ~ Matrix of Activities to Address the Recommendations (Canada, Norway and the United States)

 - Revision of the Arctic Council Arctic Marine Strategic Plan (AMSP) of 2004 (Canada, Iceland, Norway and the United States)

 - Ecosystem Approach to Management (Integrated Assessment, Comparing Cases & Reviewing Existing Methodologies) (Norway, the United States and Canada)

 - Framework for an Arctic Marine Protected Areas (MPA) Network ~ Formation of an MPA Expert Group (Norway, the United States and Canada)

 - Arctic Biodiversity Assessment (ABA) ~ Follow-up ABA Recommendations Relevant to PAME

 - AMSA Recommendation on Areas of Heightened Ecological and Cultural Significance ~ AMSA, AMAP, CAFF and SDWG working group collaboration

INTERNATIONAL MARITIME ORGANIZATIONS: COOPERATION ON ARCTIC ISSUES

All the Arctic states and the non-Arctic state observers to the Arctic Council (20 states) are members of IMO, the International Hydrographic Organization (IHO), the World Meteorological Organization (WMO), and the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA). This is not surprising, since these states all have a rich maritime heritage and an active involvement in global maritime operations and cooperation. Importantly, each of these international bodies has a

stake in the future of the ‘new’ maritime Arctic; each has specific initiatives underway where member states can contribute their expertise and voice their concerns, hopefully in more unified approaches.

The IMO is central to any discussion of the Arctic marine safety and environmental protection. The ongoing, complex process to develop a mandatory IMO International Polar Code will establish a unified and enhanced Arctic marine safety and environmental protection regime, providing it is fully adopted and implemented by the Arctic states with the support of the global maritime community. The work on the Polar Code has a lengthy history dating to the early 1990s. An Outside Working Group (IMO language) of technical experts met from 1993-97 (Brigham, 2000). The Polar Code was never intended to duplicate or replace existing IMO standards for safety, pollution prevention and training. Additional measures focused on polar ship construction standards, polar marine safety equipment, and ice navigator standards for training and experience. These elements are included in IMO’s voluntary Guidelines for Ships Operating in Polar Waters (IMO, 2009). Recent Polar Code work has focused on defining the risks for various classes of ships operating in ice-covered and ice-free polar waters, identifying marine hazards and then relating to how these hazards can be adequately mitigated to lower (and acceptable) levels. The second challenge has been how to include select environmental protection measures in a Polar Code when they may be more appropriate as Arctic specific annexes to major IMO conventions such as MARPOL. 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 the Arctic people and the marine environment.

One of the evolving challenges for the Arctic states is to identify areas in the Arctic marine environment where special IMO provisions may be developed and implemented. Table I-6 indicates that there are *no current MARPOL Special Areas designated in the Arctic* requiring strict controls on discharges of oil, noxious liquid substances, sewage, and garbage. IMO has designated many sensitive marine areas in other regions such as the Baltic Sea, Mediterranean Sea, Black Sea, and others; noted in Table I-6 is an Antarctic Area (in the Southern Ocean south of 60 degrees South) that has gained strict controls on oil, noxious liquid substances and garbage. No IMO designation of an Emission Control Area for stricter standards

regarding emissions of air pollutants in the Arctic has been developed and approved. The Arctic Council and its working groups, especially PAME, will be conducting assessments and developing plans for future special area designations which the Arctic state delegations to IMO will propose; non-Arctic state observers to the Council (and other observers) should follow these deliberations and contribute to the dialogue long before they reach the IMO technical committees. One Arctic region that will surely be given future attention is the Bering Strait Region, an international waterway (strait) with sensitive ecological systems and significant human subsistence use.

Table I-6 Summary of IMO MARPOL Special Areas (IMO, 2012)

Annex I	Oil (10):	Mediterranean Sea, Baltic Sea, Black Sea, Red Sea, 'Gulfs' Area, Gulf of Aden, Antarctic Area*, North West European Waters, Oman Area of the Arabian Sea, and Southern South African Waters
Annex II	Noxious Liquid Substances (1):	Antarctic Area*
Annex IV	Sewage (1)	Baltic Sea (1 January 2013 Entry into Force)
Annex V	Garbage (8):	Mediterranean Sea, Baltic Sea, Black Sea, Red Sea, 'Gulfs' Area, North Sea, Antarctic Area*, and the Wider Caribbean Region including the Gulf of Mexico and the Caribbean Sea
Annex VI	Air Pollution (Emission Control Areas) (4):	Baltic Sea (SO _x), North Sea (SO _x), North American (SO _x , NO _x and PM), and United States Caribbean Sea (SO _x , NO _x and PM)

* Antarctic Area: South of Latitude 60 Degrees South

The Arctic states, primarily as outcomes and recommendations from AMSA, will be dealing with a number of additional, key Arctic issues at IMO:

- Restrictions on heavy fuel oil use in the Arctic waters.
- Monitoring and Arctic traffic domain awareness (use of data from IMO mandatory AIS transponders and the application of IMO's requirement for the Long Range Identification and Tracking of Ships).
- Future mandatory ice navigator training and experience ~ mandatory standards (beyond the voluntary guidelines in the 2011 Manila amendments to the International Convention on Training, Certification and Watchkeeping for Seafarers or STCW).
- Passenger ship safety in Arctic waters and enhanced guidelines.
- Identification of Arctic heightened ecological and cultural significance and potential measures for protection.
- Addressing the uniformity of Arctic marine shipping regulatory regimes and potential measures for protection of the central Arctic

Ocean (beyond coastal state jurisdiction).

Each of the above issues has ramifications for the global maritime industry operating in the Arctic. However, none of these issues should come as a surprise; several are focused on making sure there are uniform and non-discriminatory regulations established at IMO for the Arctic. Proactive engagement with the Arctic states on the part of non-Arctic states and the maritime industry will assist in developing mandatory standards that are effective and appropriate for the Arctic shipping risks involved.

The IHO, established in 1921, is a key intergovernmental consultative body that supports safety of navigation and the protection of the marine environment. It coordinates the activities of the national hydrographic offices, sets standards to foster worldwide uniformity in nautical charts, and supports development of new techniques for conducting and exploiting hydrographic surveys. Since its inception, IHO has established fifteen regional hydrographic commissions. The 16th commission, the Arctic Regional Hydrographic Commission (ARHC), was established in October 2010 by the five Arctic Ocean coastal states, Canada, Denmark, Norway, Russia and the United States. Finland and Iceland are now observers to the ARHC. The Arctic Ocean coastal states recognized the need for such a body in an era of increasing Arctic traffic with little availability of reliable navigation and environmental data. The ARHC noted that today, less than 10% of Arctic waters are charted to modern international navigation standards (IHO, 2010). The establishment of ARHC is an important contribution to improving Arctic marine infrastructure, and its commitment to cooperate with the marine transportation community and other intergovernmental bodies bodes well for sharing critical navigation information related to evolving Arctic safety and protection measures. IHO member states can contribute to the work of ARHC and foster cooperation between ARHC and their national hydrographic offices. The IHO, ARHC, and its member states should explore with the global maritime industry the potential for public-private partnerships in surveying and mapping the extensive, uncharted waters of the Arctic.

As a specialized agency of the United Nations, the WMO is a global body focusing on weather, climate and hydrology. WMO has promoted the establishment of worldwide networks for a broad range of meteorological, climatological, hydrological and geophysical observations. WMO fosters the standardization of data and facilitates the global free exchange of

information and observations. Increasingly engaged in climate change issues, WMO is a leading organization for global monitoring, protecting the environment, and developing adequate monitoring/observing systems. WMO, in concert with IMO and IHO, established five new WMO METAREAs (IMO NAVAREAs) covering the Arctic. The new areas became operational in June 2011 with Canada, Norway and Russia taking responsibility for providing services (IMO, 2011). WMO is also linking with the International Ice Charting Working Group (IICWG), a forum of the national ice services, to develop and implement policies and procedures for sea ice mapping, ice forecasts, and ice-edge information (IICWG, 2007).

The development of future Arctic observing systems is another area where the membership of WMO, IMO, IHO and IICWG should seek to develop public-private partnerships and funding mechanisms so that a comprehensive set of observations can support safe Arctic navigation. The involvement of Arctic marine industries in such an initiative - commercial shipping, cruise ship tourism, and offshore development - is essential as they are key providers of regional data as well as significant marine users.

The International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) is a non-governmental organization and international technical association that fosters the harmonization and development of marine aids to navigation (IALA, 2006). Members include National Authorities responsible for marine aids to navigation, associate members (other service or scientific agencies), and importantly, industrial actors (manufacturers, distributors and technical service providers). IALA has recently developed a Northern (Arctic) Strategy in support of the design and operation of Arctic aids to navigation as well as support infrastructure such as vessel monitoring systems and remote communications. IALA is also addressing the overall information needs for safe Arctic navigation and the technical challenges of virtual aids to navigation. Two strengths of IALA are apparent: it continues to focus on Arctic navigation infrastructure issues and it has members with technical expertise from the marine industry. All maritime states should proactively support the work of IALA as an important contribution to the establishment of safe and efficient Arctic navigation systems for individual ships and vessel traffic. IALA's effort to promote close, international cooperation between national agencies and the maritime industry is a key strategy in using the latest technologies and advancing best practices for newly deployed Arctic navigation networks.

BRIDGING THE NORTH PACIFIC, ARCTIC AND NORTH ATLANTIC: COOPERATIVE OPPORTUNITIES

Two relatively new international coast guard organizations can contribute to a future dialogue on Arctic maritime issues. The North Pacific Coast Guard Forum (NPCGF), established in 2000 at the suggestion of Japan, and the North Atlantic Coast Guard Forum (NACGF), established in 2007, are venues (not bound by treaty, but working via consensus) to facilitate multilateral cooperation on a range of maritime issues. The members of both organizations are listed in Table I-7. Significantly, Canada, Russia and the United States are members of both groups and all eight Arctic states are members of NACGF. The areas of focus for NPCGF and 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 and maritime domain awareness an important topic for discussion. All the areas of focus have relevance to Arctic operations and future response strategies to increasing Arctic marine activity.

Table I-7 Member States of the North Pacific Coast Guard Forum (NPCGF) and North Atlantic Coast Guard Forum (NACGF) in 2013

NPCGF (6)	Canada, China, Japan, Republic of Korea, Russia and the United States
NACGF (20)	Belgium, Canada, Denmark, Estonia, France, Finland, Germany, Iceland, Ireland, Latvia, Lithuania, Netherlands, Norway, Poland, Portugal, Russia, Spain, Sweden, United Kingdom and the United States.

The advantage of these forums is that they focus on practical and operational aspects of marine safety and security. The meetings bring together technical experts and the heads of the coast guard (or equivalent maritime organizations). Expanding their dialogue and joint exercises to include Arctic operations and transportation issues would be an important and logical extension. Already, during a recent meeting in Iceland, the NACGF dealt with a simulated large cruise ship ‘disaster.’ Although the forums do not wish to duplicate any ongoing international work by other bodies, Arctic policy issues and operational expertise could be brought together by several initiatives:

- Establishing links with the Arctic Council’s EPPR and PAME.
- Planning a meeting among EPPR, NPCGF and NACGF that would

focus on the challenges of Arctic marine safety and environmental response.

- Exploring the broad aspects of Arctic marine domain awareness as one avenue to bridge (across the Arctic) the work of both organizations.
- Participating with other bodies (including EPPR, PAME, IALA, WMO and IHO) and industry in a venue addressing the large Arctic marine infrastructure ‘deficit’ identified in the Arctic Council’s AMSA.

The initiatives of NPCGF and NACGF can be complementary to the Arctic work of other bodies, including the Arctic Council, in addressing key Arctic maritime issues such as marine safety and environmental protection. The two coast guard regional organizations can contribute to bridging the Arctic by addressing the importance of a comprehensive Arctic marine traffic awareness system and enhancing data sharing in near-real time among its member states.

CONCLUSIONS

Arctic marine transportation issues including critical, regional challenges in marine safety and environmental protection require enhanced the levels of global maritime cooperation. Despite the increased cooperation among the Arctic states at the Arctic Council and within international organizations such as IMO and IHO, the Arctic states cannot move these issues along by themselves. A greater understanding of the Arctic issues and proactive cooperation must be developed among the Arctic and non-Arctic states, and a host of stakeholders and actors in the global maritime community. International cooperation can be fostered by the following:

- Increased Arctic state engagement at IMO with maritime states which have active interests in Arctic maritime operations; initial focus should be on gaining support for a uniform and mandatory Polar Code for all ships operating in the Arctic marine environment.
- Involvement of experts from non-Arctic state observers to the Arctic Council in the council’s working groups especially within PAME and EPPR. The objectives are to develop unified approaches to Arctic marine environmental protection and foster coordinated strategies for

enhanced emergency preparedness and response.

- Fostering the engagement of non-Arctic states and maritime stakeholders with Arctic indigenous peoples so that the challenges and opportunities of expanded marine use are fully understood by local communities.
- Arctic state actions to develop new partnerships with non-Arctic states within key international organizations such as IHO, WMO and IALA with a focus on closing the Arctic marine infrastructure deficit.
- Closer cooperation between the Coast Guard international forums in the Pacific (North Pacific Coast Guard Forum) and Atlantic (North Atlantic Coast Guard Forum) with regular discussions on Arctic maritime issues with EPPR, PAME and other bodies.
- Development of creative public-private strategies and partnerships focusing on investments in marine infrastructure such as ports, ocean observing systems, communications, aids to navigation, charting, and response capacity.

One of the clear benefits of closer international cooperation on 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 can set the stage for development of uniform rules and regulations (at IMO) and build lasting relationships with members of the maritime community who will operate in a future Arctic. Addressing together the many environmental security challenges of Arctic navigation can foster an era of unprecedented cooperation among the maritime states, the people who live in the Arctic, and marine industry.

References

- Arctic Council a. May 2013. Arctic Council Observer Manual for Subsidiary Bodies. Kiruna, Sweden.
- Arctic Council b. May 2013. Working Groups Report on Their Achievements in 2011-2013 and Work Plans for 2013-15. Senior Arctic Officials Report to Ministers. Kiruna, Sweden.
- Ellis, B. and L. Brigham. Eds. 2009. *Arctic Marine Shipping Assessment 2009 Report*. Arctic Council.

- Brigham, L. 2000. "The emerging International Polar Code: bi-polar relevance?" In: Vidas, D. (Editor) *Protecting the Polar Marine Environment*. Cambridge: Cambridge University Press. 242-262.
- Brigham, L. 2010. "Think Again: The Arctic." *Foreign Policy*, Sept./Oct. 2010.
- Brigham, L. 2011. "Marine Protection in the Arctic Cannot Wait." *Nature* 478:157, 13 October 2011.
- Brigham, L. 2013. "Arctic Marine Transport Driven by Natural Resource Development." *Baltic Rim Economies Quarterly Review* 2: 13-14.
- Carmel, S. 2013. "The Cold, Hard Realities of Arctic Shipping." *U.S. Naval Institute Proceedings* 139/7/1,325.
- International Association of Marine Aids to Navigation and Lighthouse Authorities. 2006. IALA Constitution, 23 May 2006.
- International Hydrographic Organization. October 2010. Statement of the Arctic Regional Hydrographic Commission (ARHCC1-07D).
- International Ice Charting Working Group. October 2007. Charter and Terms of Reference.
- International Maritime Organization. 2009. Guidelines for Ships Operating in Polar Waters. Adopted by the IMO General Assembly on 2 December, Resolution A, 1014(26).
- International Maritime Organization. 2011. IMO Briefing Paper *Expansion of World-Wide Navigational Warning System into Arctic Waters by IMO, WMO and IHO Chiefs*, 8 March 2011.
- International Maritime Organization. 2012. List of Special Areas under MARPOL and Particularly Sensitive Sea Areas, London, MEPC.1/Circ. 778/Rev.1, 16 November.
- Arctic Council. 2013. Kiruna Declaration. Arctic Council Secretariat, Kiruna, Sweden, 15 May.
- Mikkola, H. and J. Kapyla. April 2013. "Arctic Economic Potential." *The Finnish Institute of international Affairs Briefing Paper* 127.
- Arctic Council. 1996. Ottawa Declaration. Declaration on the Establishment of the Arctic Council, 19 September 1996.
- Pettersen, T. 2012. "46 Vessels through Northern Sea Route." *Barents Observer*, 23 November 2012.
- Smith, L. and S. Stephenson. 2013. "New Trans-Arctic Shipping Routes Navigable by Midcentury." *Proceedings of the National Academy of Sciences Plus*. DOI: 10.1073/pnas.1214212110
- Stephenson, S., L. Smith, L. Brigham, and J. Agnew. 2013. "Projected 21st-century Changes to Arctic Marine Access." *Climatic Change*. DOI: 10.1007/s10584-012-0685-0
- The Moscow Times. 2013. "Northern Sea Route Slated for Massive Growth." *The Moscow Times*, 4 June 2013.

Comments on Chapter 3: USCG perspective

David A. Vaughn

As so eloquently articulated in Dr. Brigham’s paper, the “opening” of the Arctic due to changes in sea ice coverage has broad multinational implications involving:

- Access to a vast array of minerals and other valuable natural resources.
- Potential for shorter trade routes between Europe and Asia.
- Traditional culture and food security for the indigenous Arctic peoples.
- Environmental protection.
- Climate change, including the potential release of methane gas from melting permafrost.
- Multinational sovereignty and boundary claims.
- Law of the sea and freedom of navigation.
- National and homeland security.

Home to vast amounts and varieties of mineral wealth, undiscovered global energy reserves, endangered wildlife, and vulnerable indigenous cultures, the Arctic has witnessed a dramatic increase in maritime activity in the form of resource exploration and extraction, adventure tourism, and commercial vessel traffic. This activity includes accommodating more than one million adventure tourists annually, and cargo trans-shipment increases totaling 100% or more each year (e.g., 46 transits in 2012; 204 transit permits issued by Russia’s Northern Sea Route Administration in 2013). There is open water where there used to be ice in the summer and early fall, while relatively undeveloped infrastructure and a developing governance structure provide both challenges and opportunities to engage in a proactive, integrated, coordinated, and sustainable manner to foster the United States’ and international initiatives.

STRATEGY/POLICY

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, 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 efforts to establish a functional Arctic governance structure and infrastructure. The White House approved a *National Strategy for the Arctic Region* in May 2013. The strategy identifies three primary strategic objectives:

- (1) Advance United States security interests.
- (2) Pursue responsible Arctic region stewardship.
- (3) Strengthen international cooperation.

The 2013 strategy builds on the U.S. Arctic policy set forth in the January 2009 National Security Presidential Directive (NSPD) 66/Homeland Security Presidential Directive (HSPD) 25, “Arctic Region Policy,” which acknowledges the effects of climate change and increased human activity and identifies national objectives for the Arctic region.

Importantly, for the U.S. Coast Guard, the U. S. National Strategy and Arctic Region Policy documents direct relevant agencies, including the Department of Homeland Security (DHS), to work with other nations and through the International Maritime Organization (IMO) and Arctic Council to provide for safe and secure maritime transportation in the Arctic region. They also direct the Secretaries of State, Defense, and Homeland Security, in coordination with heads of other relevant executive departments and agencies, to carry out the policy as it relates to national security and Arctic homeland security interests. Executive Order 13547 (Stewardship of the Ocean, Our Coasts, and the Great Lakes) of July 19, 2010 adopts and directs Federal agencies to implement the recommendations of the Interagency Ocean Policy Task Force. These recommendations include, as one priority objective, identifying and implementing actions to address changing conditions in the Arctic through better stewardship, science-based decision-making and ecosystem-based management.

Shortly after the White House issued its *National Strategy for the Arctic Region* and the 2013 ministerial meeting of the Arctic Council, the USCG published the “Coast Guard Arctic Strategy” in late May 2013. This USCG strategy aligns with national policy and provides a theater

strategy for Coast Guard operations in the Arctic region. Although not an implementation plan, it will guide efforts to accomplish national and Coast Guard objectives in the region by leveraging the service's capabilities, authorities, and partnerships.

In 2015, the United States will assume the chair of the Arctic Council after Canada's two-year chairmanship concludes. During the upcoming four-year tenure of the North American chairmanship, the U. S. will continue to work closely with our Canadian partners to ensure consistent themes are brought forward that support the implementation of national and Coast Guard Arctic strategies, including improved Arctic Domain Awareness and sustainable economic development. An area of particular focus will be the development of the Arctic common operational picture (COP) of commercial activity and location of response assets. The COP is vital to successful planning for high-consequence events such as a cruise ship sinking or a large oil spill and will build on work completed by the council over the last two years in the form of the search and rescue and oil spill preparedness and response agreements.

OPERATIONAL ENVIRONMENT

The Arctic contains a wealth of emerging opportunities for energy, shipping, fishing, and adventure tourism. Increased activity in the Arctic necessarily brings additional threats to U.S. interests as well as operational risks inherent to human activity in such a remote and harsh environment. The presence of more open water in the Arctic region does not represent a lower risk environment. Rather, the unpredictable nature of the weather and ice conditions actually creates more hazardous operating conditions for vessel operators and first responders as they try to push further into the region and undertake more-ambitious activities. Weather conditions in the Arctic can be hazardous much of the year, with fog, sub-zero temperatures, and more hurricane-force storms than in the Caribbean. The harsh climate and lack of shore-based infrastructure greatly complicate what would be considered a straightforward response in more traditional Coast Guard operating areas, such as the Gulf of Mexico or Eastern Pacific Ocean.

CURRENT STATUS

The Department of Homeland Security and the U. S. Coast Guard have a broad range of statutory responsibilities to ensure the safety, security, and stewardship of U.S. citizens, assets, resources, and interests in the Arctic maritime domain. With one heavy icebreaker, the USCGC “Polar Star,” and one medium, science-focused icebreaker, the USCGC “Healy,” the Coast Guard has the capability to operate in the region of ice-covered waters. Seasonal environmental conditions now permit a greater Coast Guard presence during the summer months, and there is the prospect of an extended presence, should the ice continue to recede. While cutters are a vital resource for Arctic operations, they do not cover the full spectrum of potential needs, and the Coast Guard is improving awareness and testing operational capabilities by conducting front-line operations in the region. Our first challenge is to improve our understanding of the Arctic operating environment and its risks, including determining which Coast Guard capabilities and operations will be needed to meet future mission requirements.

For the past several years, Coast Guard District 17 has conducted Arctic Domain Awareness flights along the North Slope and over the Arctic Ocean, assessing aircraft endurance and performance and monitoring maritime activity. Since 2008, the Coast Guard has conducted summer operations in the region, deploying personnel, boats, and aircraft to communities on the Arctic coast such as Barrow, Kotzebue, and Nome. While there, Coast Guard personnel tested cutters, small boats, and aircraft for usability in Arctic conditions. The USCG also worked closely with the Army and Air National Guard and the Public Health Service to provide medical, dental, and veterinary care to isolated outlying communities. In return, the Coast Guard learned about living and operating in this environment from long-time residents.

Operation Arctic Shield 2012 was a three-pronged interagency operation in Alaska’s coastal Arctic domain consisting of outreach, operations, and assessment of capabilities. Outreach included delivering safety training and health, dental, and veterinarian services for Arctic indigenous communities. Operations involved the deployment of major cutter forces, air assets, communication equipment, and mission support to conduct the Coast Guard’s missions. Additionally, an oil spill contingency exercise in Barrow, Alaska tested Coast Guard and U.S. Navy skimming

equipment launched from a 225-foot Coast Guard buoy tender.

Arctic Shield 2013 will focus more on the Bering Strait region and types of traffic and commercial activities occurring during the summer. It involves employment of the CGC “Polar Star,” a National Security Cutter, and a deployed HH-60J helicopter among other assets.

Moreover, the Coast Guard Research and Development Center is planning an Oil in Ice Recovery Technologies Demonstration in the Arctic in September 2013. This demonstration will be accomplished in partnership with the DHS Science and Technology University Center of Excellence Program, NOAA, and BSEE. It will build on previous demonstrations conducted in 2012 in the Arctic and in 2011, 2012, and 2013 in the Great Lakes. During this demonstration, various types of oil spill response equipment will be deployed from the Coast Guard Cutter “Healy,” including a small unmanned aircraft, an unmanned underwater vehicle, a remotely operated vehicle, and a brush skimmer. Testing this equipment in Arctic conditions is vital for identifying and developing resources to meet the Coast Guard’s growing Arctic mission.

As a military service, the Coast Guard enforces U.S. sovereignty, ensuring freedom of navigation and providing maritime security. Although the risk of an incident in ice-covered U.S. waters is currently low, the nation must plan for ice-capable assets in the future that can effectively carry out year-round search and rescue, environmental response, and other Arctic operations. The Coast Guard is working closely with key federal partners, particularly the National Oceanographic and Atmospheric Administration (NOAA) and the U.S. Navy, to lead and coordinate the interagency effort in the Arctic. The Coast Guard has significant experience and success bridging the traditional divides between military and law enforcement at the federal level, and synchronizing efforts between federal, state, local, tribal, and private-sector stakeholders. Simultaneously, a military service, law enforcement, regulatory agency and an intelligence community member, the Coast Guard is in a unique position to exercise leadership and carry out missions in this emerging maritime frontier.

CHALLENGES

Lack of operational presence undermines national interests. The U.S. government needs a maritime surface and air presence in the Arctic

sufficient to support prevention and response regimes as well as diplomatic objectives. An improved operational presence would enable the nation to respond to vessels in distress, save lives, and protect the environment. It would also ensure enforcement of vessel routing systems, compliance with safety, security, and environmental laws, enforcement of fishery laws, and assertion of sovereignty.

The increase in vessel traffic and other human activities presents challenges for incident prevention and response in the Arctic region. A major accident involving a large cruise ship in the Arctic would pose a significant challenge to responders. If an oil tanker spilled its cargo or an oil well blew out in the Arctic waters, the potential impact on the marine environment would be profound, and removing the oil in icy waters would be a major challenge.

The USCG recognizes the need for further Arctic research. The Coast Guard is addressing this need by working with the Arctic Submarine Laboratory and the Naval Ice Center, and providing support for the establishment of an Arctic Fusion Center, an Arctic Center of Expertise, and other scientific research activities that promote responsible operations in, and use of, the Arctic.

COOPERATIVE OPPORTUNITIES

As suggested in Dr. Brigham's paper, the North Pacific and North Atlantic Coast Guard Forums have served as excellent examples of international cooperation, tackling a number of difficult maritime challenges. Perhaps the addition of an Arctic working group under these forums would be useful. But a clear definition of the role of these forums will be critical to ensure they are not overlapping work done by other organizations.

Comments on Chapter 3: Chinese perspective

Jiayu Bai

INTRODUCTION

The Arctic Ocean is a sea area covered by ice, as characterized by the United Nations Convention on the Law of the Sea (UNCLOS). For a long time, it attracted little attention and was usually ignored. Due to climate change, the Arctic Ocean's ice and snow are melting. The ice extent in April from 1979 to 2013, for example, has declined sharply decade by decade. In the middle of September 2012, the Arctic region recorded the lowest summer sea ice cover on record. The melting of Arctic ice will cause the sea level to rise and other environmental disasters, including losses for people around the world. However, the opening of the Arctic's Northwest Passage (NWP), Northern Sea Route (NSR), and Transpolar Passage to Arctic shipping would shorten the distance of intercontinental sea-lane transportation, which in turn, people would benefit from these new routes.

DEVELOPMENT OF ARCTIC SHIPPING REGULATIONS ON A NATIONAL LEVEL

The Arctic shipping regulatory system encompasses regulations on national, regional and global levels. The Arctic is changing, and the Arctic shipping regulatory system is also experiencing development. Russia and Canada have the most significant jurisdiction over the NSR and NWP, respectively. It is necessary to discuss these states' national regulations for these new Arctic routes.

There are four main regulations and guidelines in Russia for navigation on the NSR. They require guidance by Russian icebreakers with Russian ice pilots on board when foreign vessels navigate through the NSR. Russia's Marine Operations Headquarters collects payments according to the icebreaking services used. Those requirements are sometimes challenged by non-Arctic states considering the interpretation of Article 234 of UNCLOS. The Rules of Navigation on the Water Area of the NSR under the Code of Commercial Navigation of the Russian Federation in 2013 changed the requirement for mandatory icebreaker guidance to one of permission,

which means that fees will be charged only when icebreaker services are provided.

Canada's regulation of the NWP started with its Arctic Waters Pollution Prevention Act of 1970. Two subsequent regulations stipulated pollution prevention measures in detail. The Canada Shipping Act specifies shipping activities and requirements in Canadian waters, including Arctic waters. The 1970 Act specified a 100-mile jurisdiction from straight baselines and zero tolerance for discharges in Arctic waters. Since 1977, Canada has operated a voluntary reporting system requiring cargo and cruise vessels passing through the Canadian archipelago to provide ship reports to the Canadian Coast Guard. The Northern Canada Vessel Traffic Services Zone Regulations in 2010 extended the reporting requirements from 100 to 200 miles and also made them mandatory.

DEVELOPMENT OF ARCTIC SHIPPING REGULATIONS ON A REGIONAL LEVEL

Russian President Mikhail Gorbachev gave a speech in Murmansk in 1987 that called for greater cooperation among Arctic states to turn the Arctic into a "zone of peace." Environmental protection was one of the cooperative issues enunciated in that speech. In 1991, the Declaration on the Protection of the Arctic Environment established the Arctic Environment Protection Strategy on a soft-law basis. This led to the establishment of the Arctic Council in 1996 to address issues of sustainable development and environmental protection in the Arctic. The council is the most influential regional organization involving Arctic states, but it is also a political forum established in a soft-law format. However, the council has played a role in the development of two hard laws: the 2011 Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic and the 2013 Agreement on Cooperation on Marine Oil Pollution Preparedness and Response in the Arctic. These laws aim at strengthening the cooperation and coordination among the Arctic states under the umbrella of the International Convention on Maritime Search and Rescue (SAR) and the International Convention on Oil Pollution Preparedness, Response and Cooperation (OPRC). The adoption of legally binding instruments under the auspices of the Arctic Council reaffirms the commitments of the Arctic states to their legal obligations under the SAR

and OPRC conventions, but does not change the soft nature of the council.

DEVELOPMENT OF ARCTIC SHIPPING REGULATIONS ON A GLOBAL LEVEL

What developments relating to the regulation of Arctic shipping have occurred at the global level? From a law of the sea perspective, UNCLOS is the ocean constitution. It entered into force in 1994 and has been ratified or acceded to by 165 countries. Russia ratified the convention in 1997 following its main regulations about navigation in the NSR, and Canada ratified the convention in 2003 after its Arctic Waters Pollution Prevention Act and Shipping Act. Article 234 of UNCLOS is the only specific provision applicable to the Arctic in the law of the sea. Arctic coastal states are entitled to stipulate laws and regulations with higher standards than generally accepted international rules, but must meet five requirements: they should be nondiscriminatory laws and regulations; should be about the prevention; reduction and control of marine pollution from vessels; should be within the limits of EEZs only in ice-covered areas; should pay dues regarding to navigation, and should be based on the best available scientific evidence.

The United States and European Union regard the NSR and the NWP as international straits, so the treaty requirements affecting ship operation in the polar region under the IMO should be considered first. These include the International Convention for the Safety of Life at Sea (SOLAS), the International Convention for the Prevention of Pollution from Ships (MARPOL), the International Convention on Standards of Training, and the Certification and Watchkeeping for Seafarers (STCW), which are relevant to navigational safety, environmental security, and crew qualifications. In 2010, the Manila Amendments emphasized the importance of experience for officers navigating or engineering in polar waters. Those treaties apply not only to Arctic high seas, but also to other shipping in EEZs and high seas. The IMO has made recommendations for ships operating in polar waters in a soft-law format (the Guidelines for ships operating in Arctic ice-covered waters of 2002). Revised guidelines in 2009 apply to both the Arctic and Antarctic waters with high standards for environmental protection. As a soft-law arrangement, the 2009 guidelines are still voluntary.

A mandatory Polar Code is necessary for unified environmental protection standards, manning, and construction technique requirements for vessels. Work on one began in 2010 with intended completion in 2012. However, due to the complex issues it addresses, the code may only be available around 2014. Work on the code addresses ship design, construction and equipment, operational and training concerns, search and rescue, and protection of the marine environment. A range of complex issues are involved in drafting the code. It should reflect the differences between Arctic and Antarctic waters, apply to SOLAS cargo and passenger ships and non-SOLAS ships, effectively protect the marine environment, and control vessel-source pollution in polar waters. Then, the question is whether it is feasible for the Polar Code to include both mandatory and recommendatory requirements, and whether it should be placed under existing IMO instruments or articulated in a separate instrument. A mandatory code placed under existing IMO instruments might be more effective.

COORDINATION OF REGULATIONS AT DIFFERENT LEVELS

How can regulations be coordinated at different levels? First, the Arctic coastal states should regulate under the current UNCLOS framework, meet the requirements of Article 234, and harmonize their regulations with IMO guidelines and a prospective mandatory code. Second, Arctic coastal states should commit to obligations in multilateral treaties and not cause conflict with the treaty laws by unilateral regulation. Third, a mandatory IMO Polar Code should be consistent with the existing international rules applicable to Arctic shipping.

Here is a summary of the development of Arctic shipping regulations. First, coastal states' regulations on Arctic shipping share more similarities than before (i.e., mandatory reporting, no fees for transit only, no mandatory icebreaker requirements, and high marine environmental protection standards). Second, regional regulations initiated by the Arctic Council do not empower the council's legislative function, but reaffirm Arctic states' legal obligations under the original SAR and OPRC frameworks in Arctic waters. Third, it is necessary to adopt a mandatory Polar Code through the adoption of amendments to particular instruments.

Fourth, a comprehensive and fragmented regulatory regime of Arctic shipping will continue.

CHINA'S CONTRIBUTION TO THE DEVELOPMENT OF ARCTIC SHIPPING REGULATIONS

What can China contribute to the development of Arctic shipping regulation? We may also discuss this at the global, regional and national levels. On a global level, China possesses the world's fourth-largest fleet as of 2012 and has been granted IMO A member state status 12 times. China's involvement in the Polar Code and participation in IMO initiatives is of great significance for the stable, sustainable development of world shipping. On a regional level, China was granted observer status by the Arctic Council on May 15, 2013. Although a council observer has no right to vote, it is important to participate in the council because of its influential stature in the field of Arctic environmental protection. On a national level, bilateral arrangements between China and Russia, Canada, and other Arctic states are helpful for prospective destination bulk cargo and transit container transportation.

In conclusion, Arctic shipping regulation is undergoing rapid development. China will contribute to the sustainable and peaceful use of Arctic shipping routes and to the prosperous development of world shipping.

Comments on Chapter 3: Japanese perspective

Kiyoshi Nakashima

As reported by the world media, on August 11 and 12, 2013, Cosco attempted China's first commercial transit of the Northeast Passage with the full container vessel "Yong Sheng." This event attracted the attention of the world's shipping companies, which anticipate that Arctic routes will be developed to form a new axis of world marine transport.

This commentary focuses on economic and commercial issues that need to be considered to open the Arctic waterways and make it more accessible to the world's shipping industries.

As Professor Brigham pointed out in his paper, there are numerous issues to be solved in the areas of safety and environmental protection. It is a big challenge for the concerned states to harmonize their individual interests and establish new rules for a higher level of Arctic governance. Substantial investments are required to develop marine infrastructure to ensure safe transit, such as additional icebreakers, navigation aids, meteorological observation facilities, SAR facilities, shelters, and so forth. Likewise, large-scale investment for environmental protection is required.

From an economic viewpoint, the major concerns of shipping lines include how much they will need to pay for the services rendered by the owners of those facilities and how much they will need to contribute to environmental protection.

The Arctic routes are now recognized as a shortcut linking Asia with Europe and the east coast of North America. However, such a geographical advantage will not be important unless it is economically justified. The question is whether the shipping industry can benefit from reduced sailing costs and time in the navigation of Arctic routes.

The United Nations Convention on the Law of the Sea (UNCLOS) embraces the principle of equitable and efficient use of the seas and oceans as common resources around the globe. Having been ratified by the Arctic littoral countries except the United States, UNCLOS is currently recognized as the law that governs seaborne traffic in the Arctic Ocean.

To ensure free access of ships at a reasonable cost, the following provisions are included in UNCLOS:

Article 26: Charges which may be levied upon foreign ships

1. *No charge may be levied upon foreign ships by reason only of their passage through the territorial sea.*
2. *Charges may be levied upon a foreign ship passing through the territorial sea as payment only for specific services rendered to the ship. These charges shall be levied without discrimination.*

These provisions prohibit the littoral states from charging a royalty or commission unless it is a reasonable compensation for a specific service. They must also refrain from discriminating against users in levying service charges.

A recent study by the Japan Institute of International Affairs (JIIA) shows that, in the case of the Northern Sea Route (NSR), the following fees are levied by Russian authorities on ships in transit:

- Ice certificate issue fee.
- Ice permission issue fee.
- Icebreaker escort fee, pilotage, etc.

The JIIA estimated the total amount of the above for a bulker navigating from Europe to Asia through the NSR as USD \$229,000, while the same ship would pay USD \$277,000 for passage through the Suez Canal toll and anti-piracy measures.

Though these services are controlled by Russia's Northern Sea Route Administration (NSRA) and governed by the federal Merchant Shipping Code of the Russian Federation, many observers have noted that there is a vague area in the application of the tariff rates. For example, the official service tariff (http://www.arctic-lia.com/nsr_tariffsystem) announced in June 2011 sets the maximum rate of icebreaker fees for bulk cargo at 707 roubles per ton, amounting to as much as USD \$750,000 for a 35,000 det handy max, which is far more than the amount of the Suez Canal toll. Another example reported is that for the crew of a ship who cannot speak Russian, a pilot has to be hired to communicate with the icebreaker. But Russian-flagged ships are exempt from this requirement.

From the facts above, some questions could be raised about whether or not those charges are actually acceptable under the terms of UNCLOS and whether there may be a risk of arbitrary administration by the NSRA in applying those rates in the future.

Analogies to the argument above can be found in the following facts: in

the aviation field, Aeroflot has levied a mandatory trans-Siberian royalty fee on the world's airlines since 1967 (which the EU and Russia have agreed to abolish by the end of 2013). This fee has long been criticized by the aviation industry as conforming to the Convention on International Civil Aviation (Chicago Convention), because it is exorbitant compared with the estimated costs of air traffic control and because it is charged to foreign airlines only.

In July 2012, the Panama Canal Authority (ACP) suddenly announced an increase of the canal toll for many ship types, excluding container ships, of 15% in two consecutive years. In response to strong objections by the shipping industry, the Authority finally delayed raising tolls for three months.

The Suez Canal Authority (SCA) also raised its toll 3% in March 2012, and another 3% in May 2013. The media presumed that the Authority took that action against the background of Egypt's difficult political and economic situation.

In this setting, it is necessary for the world shipping industry to keep a close and persistent watch over the behavior of the littoral countries, including Russia, to monitor compliance with the provisions of UNCLOS and ensure transparency in the service cost breakdown.

Comments on Chapter 3: Korean perspective

Jong Deog Kim

INTRODUCTION

Last May 15, the Arctic Council made a decision regarding the new observer states.¹ As a result, six countries, including Korea, gained observer status on the Arctic Council. The addition of six new observers will strengthen the capability of the council and promote a balanced discussion on various issues. Although they are not Arctic coastal states, Korea, China and Japan – Asian countries in the North Pacific – affect the climate of the Arctic region and are affected by climate change in the Arctic. These countries have trade-based economic systems with the shipping industry as one of their important of economic pillars. They make up a huge energy and resource market, consuming 19% of global oil and trading and 58% of global LNG. They also account for 22% of the global trade in fish. Korea, in particular, obtains 40% of its animal protein from fisheries. For this reason, a stable supply of fish is critical for the national health in Korea.

The three countries own 29% of the global merchant fleet and account for about 60% of international trade in LNG, ashare that might increase when economic development and other regional circumstances are considered. They dominate the global market in shipbuilding with a market share of almost 80%.

In addition, the three countries are major providers as well as consumers in the global logistics market. In the case of container throughput, they account for 40% of the total global market, a figure likely to increase, particularly in the case of China.² In a nutshell, the North

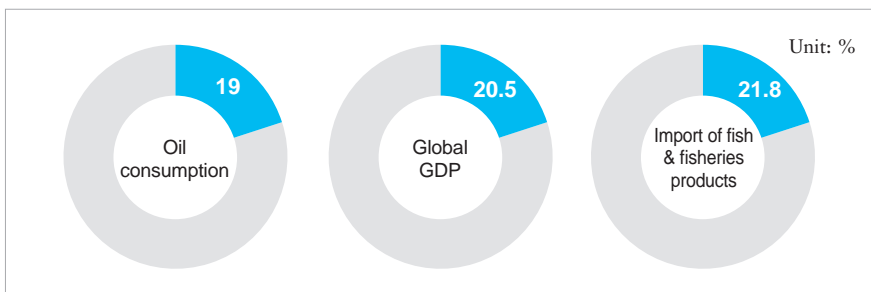


Figure I-13 China, Japan and Korea in the global economy (1)

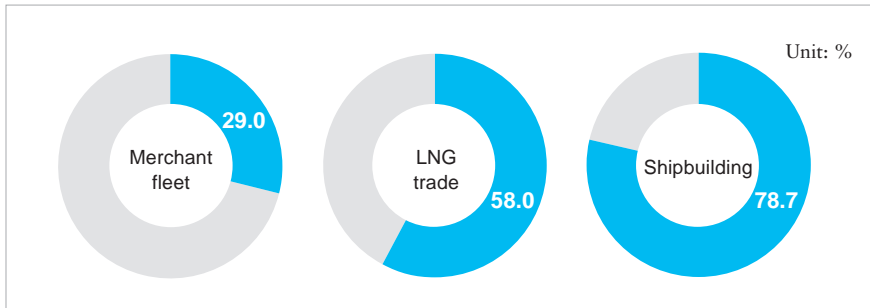


Figure I-14 China, Japan and Korea in the global economy (2)

Pacific Asian region has now become the center of the global shipping industry and holds a substantial position as a resource consumer as well as a provider of ocean development equipment. Moreover, Korea, China and Japan have a high competence in marine R&D relating to shipbuilding and offshore plants, which give them responsibilities, rights and capabilities in various issues in the Arctic.

For these reasons, the three countries are paying close attention to the Arctic from both a short-term and long-term perspective.

INTRODUCTION OF THE REPUBLIC OF KOREA'S NEW ARCTIC POLICY

Since Korea established the Dasan Arctic Research Station in NyAlesund, Svalbard in 2002, it has constantly carried out Arctic research. Its Arctic research activities were expanded with the commissioning of the research icebreaker “Araon” in 2009. Moreover, Korea recently conducted socioeconomic analyses, including throughput predictions for Arctic shipping routes, and announced the Arctic Policy Advancement Direction in 2012. On July 25 2013, the Korean government announced the Comprehensive Arctic Policy Framework Plan (“framework plan”), the basic direction for its systematic Arctic cooperation policies.³ The framework plan was prepared on a pan-governmental basis with the Ministry of Oceans and Fisheries at the center. Its core principle is to cooperate with the Arctic Council and Arctic states, as well as with global and regional communities. The main objective of the plan is sustainable development of economic opportunities, such as the Northern Sea Route

(NSR), while contributing to the international society through cooperation in climate change response, marine environmental protection and scientific research. According to the time schedule of the plan, a national policy tentatively named the “Arctic Policy Master Plan” is to be prepared by the end of 2013.

Meanwhile, the Korea Maritime Institute (KMI) conducted a survey with 23 domestic experts regarding the expectations of cooperation in the Arctic region last May. The results were 5.5 points (out of a seven-point scale), far higher than last April (4.5). This implies that becoming an Arctic Council observer boosted positive expectations, even though the number of respondents were limited. As for future cooperation areas, the respondents first chose scientific research and analysis, followed by governance cooperation with the Arctic Council, a cooperative response to climate change, logistics cooperation including the NSR, and cooperative protection of the marine environment.

In addition to direct Arctic activities since 2000, Korea has made remarkable achievements in overall economic cooperation through bilateral collaboration with the Arctic states. Korea signed Free Trade Agreements with six of the eight Arctic state members, excluding Canada and Russia, and nine of the 11 observer states.⁴

Moreover, Korea concluded shipping agreements with four of the five Arctic coastal states, excluding Canada, and four observer states out of 11.



Figure I-15 FTAs with Korea

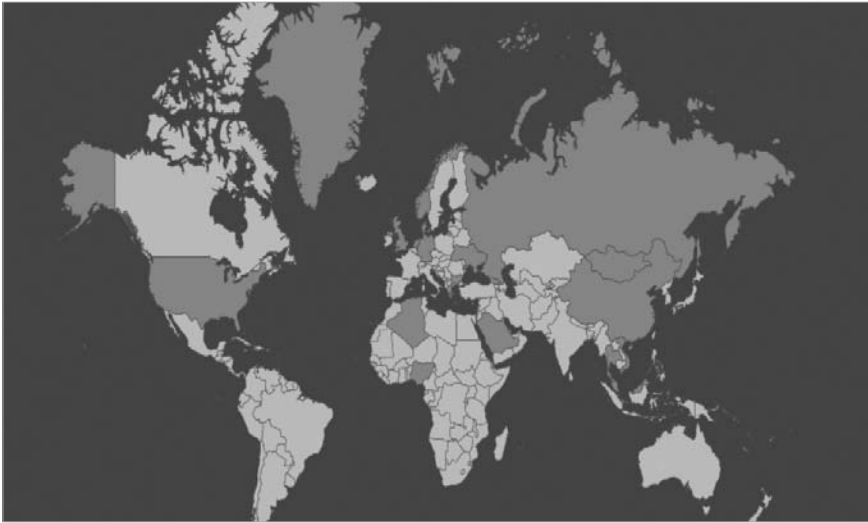


Figure I-16 Shipping agreements with Korea

The Korean government plans to strengthen cooperation with the Arctic Council, particularly with the council's working groups, and actively participate in cooperation with the IMO, other international organizations and NGOs.

In addition, Korea will pursue technology development, seek to reduce the risks of activities in the Arctic Ocean, and pursue bilateral and multilateral cooperation on emergency response. Concerning the long term goals, Korea will expand cooperation and exchanges for mutual development. It plans to work closely together with local communities, including coastal states and indigenous peoples, on economic matters such as use of the NSR, energy, and fisheries resource development.

OPINION ON THE PRESENTATION

Diagnosis and Direction

Professor Brigham noted that “The maritime Arctic is being connected to the global economy due to the region's abundant natural wealth.” I agree and I also share his recognition that international society should be prepared for, or respond to, the current situation where international

shipping regulations and rules with binding or mandatory Arctic-specific provisions do not exist. I think his points on cooperative research in Arctic marine transportation have a huge implication for the sustainable and responsible operation of the NSR in the future. Based on the Arctic Marine Shipping Assessment (AMSA) report, he also analyzed the direction for the Arctic Council and Arctic states regarding AMSA's 17 recommendations approved in 2009 and focused on three interrelated themes: enhancing Arctic marine safety, protecting the Arctic people and the environment, and building an Arctic marine infrastructure. I believe this analysis will be helpful in understanding future policies of the Arctic states. Such a diagnosis is expected to be the foundation for establishing policies and cooperative direction with non-coastal states as well as with the Arctic Council members, particularly for shipping activities.

Cooperation in Arctic Shipping

The 2009 AMSA report is one of the most important achievements of the Arctic Council. The report not only evaluates and predicts Arctic shipping, but also identifies many research projects for the use of the NSR. Therefore, understanding the report can bring mutual benefits through cooperation within the region and between regions. I would like to comment in particular on some of the 35 research opportunities presented in the AMSA Report.

First, *facilitating development of the Sustained Arctic Observing Network (SAON)*. The Arctic region, with its huge sea and land areas, limits observation activities, while the harsh natural environment makes constant management difficult. I think this calls for the community-based, or supported, observation system already considered in SAON. A regular monitoring system conducted by local people of the local social and economic phenomena, as well as their observations on natural phenomena can secure useful data. Korea has experience in building an ocean waste monitoring system through cooperation with local island communities and in remote areas as well as utilizing the system for marine environmental management.

Second, *building a database on ship accidents in the Arctic Ocean*. If the ship accident records of each coastal nation are connected to geographic information and causes and background information are provided, then ships can be alerted about navigation risks and their navigation safety can

be enhanced accordingly. Based on reliable information, certain areas can be designated as special risk zones and the risk involved can be lowered.

Third, *a comprehensive economic research, including cost-benefit-risk analyses, for all potential routes of trans-Arctic shipping*. It is important to conduct an economic validity study for major base ports in the North Pacific and North Atlantic, considering various cargoes, ship conditions, and operation timing and conditions. It is also important to identify unrealistic factors and share the results. A comprehensive analysis of the results of the already conducted pilot operations is significant as well. Many research institutes are conducting validity studies based on the preconditions they have set. Organizing a discussion on those studies will generate substantial results.

Cooperation Scope to be Additionally Considered

Navigation in the Arctic Ocean will require the support of icebreakers for a long time. However, only Russia owns commercially operable icebreakers, only some of which are in actual operation. Without the support of icebreakers, navigation risks will increase and crisis response capability will be cut. Therefore, the possible supply of icebreakers as well as fees for their services should be closely calculated and monitored.

How much can the currently available icebreakers satisfy the demand for stable operation of the NSR? According to the route's governing body, the Northern Sea Route Administration, it has granted permission for more than 600 shipping trips through the passage and 71 transit voyages as of the end of 2013, and the figure is expected to rise. Most of the cargoes will be liquid headed towards the Asian nations in the North Pacific. Accordingly, possible problems, such as support by icebreakers and operational conditions should be addressed by a responsive system including companies and governments in states of origin and destination.

In addition, I would like to suggest that the traditional knowledge of local communities, including indigenous peoples, needs to be considered by the shipping sector. The local communities have first-hand, long-term experiences of the climate, natural phenomena, migration of living organisms, and ecosystems. Their knowledge will enhance the safety of the routes and contribute to local communities.

An evaluation of environmental carrying capacities by sub-region is necessary to ensure sustainable development of the region. If the sub-region

is a major base on the route, the carrying capacity of the services involved in development should be analyzed. Regional development should be supplemented with assistance measures.

Moreover, joint research and analyses should be conducted on migratory living organisms (e.g., migratory birds that move between the Asia region and the Arctic coasts) as well as changes in their habitat. Some researchers have pointed out the possibility that birds carry bacterial pathogens. If this happens, ramifications will be huge and affect the livelihood of the indigenous peoples and local ecosystems.

The destinations of ships using the NSR are usually outside the scope of the Arctic Ocean as determined by the SAR agreement in 2011. Therefore, sea areas near the Arctic Ocean need to be considered, and a ship safety management system should be built through information sharing. As Professor Brigham rightly pointed out, a sub-regional SAR cooperative foundation linked with the Arctic Ocean can be built. Such a foundation will be a good way to ensure the safety of rising ship navigation.

CONCLUSION

With the framework plan as the foundation, Korea will consider building a second research icebreaker, enhance its research station and science and technology research, and carry out pilot operations for stable use of the NSR. In addition to these efforts, it will develop various cooperation programs. It will also establish a consultative NSR support body composed of the private, government, industry, and academia sector for sustainable and safe use of the NSR, and review measures to cut costs at ports for NSR users. Moreover, Korea intends to strengthen cooperative networks through information sharing, joint research, seminars, and sea crew training programs with major Arctic coastal states. It plans to expand the participation of technical experts in the development of the IMO Polar Code, gearing its efforts to secure the highest ship safety.

The NPAC is expected to play a role as an important international network under the framework plan. I hope the NPAC will provide a candid, informal and open discussion opportunity for relevant experts, researchers, industry representatives, local residents, and policy makers on various Arctic issues, in particular in the North Pacific region. Moreover, NPAC will aid in the sharing of our ideas and opinions with other forums such as the

Arctic Council. Providing innovative approaches to challenges, including those suggested by the AMSA report, may be another contribution for sustainable development of the Arctic. As for the shipping sector, an in-depth discussion of the magnitude of risks and sustainable measures to avoid or overcome risks is viable through joint research with currently participating experts.

Notes

1. KIRUNA DECLARATION, 15 MAY 2013.
2. KMI report, Sung Woo Lee, 2012.
3. <http://www.mof.go.kr/cop/bbs/selectBoardArticle.do>
4. <http://okfra.kita.net/ftaInfo.do?method=korStatus>

PART II

THE FUTURE OF ARCTIC OIL AND GAS DEVELOPMENT

American perspective

Lucian Pugliaresi

INTRODUCTION

Oil and gas development is often constrained by the so-called “above the ground problems.” These obstacles can include political turmoil, government corruption and mismanagement, unpredictable political and legal risks, lack of contract sanctity (or even stability), uncertain tax regimes, poorly defined property rights, regulatory mismanagement, environmental activism, and extreme and harsh operating conditions. Nevertheless, large volumes of oil and gas have been produced even in environments where these risks are substantial. Many international oil companies (IOCs) have long experiences in managing a wide range of above the ground concerns, achieving profitable oil and gas production in such diverse political environments such as Libya, Iraq, Nigeria, and Russia.

Even when political and regulatory environments are stable, the harsh environment, limited infrastructure, extended development time and long distances required to bring production to markets common in the Arctic require a willingness to undertake substantial financial and technical risk. Arctic oil and gas projects are characterized by large capital commitments, complex and long-term project management, advanced engineering, and a requirement for high-volume reserves and production to justify capital

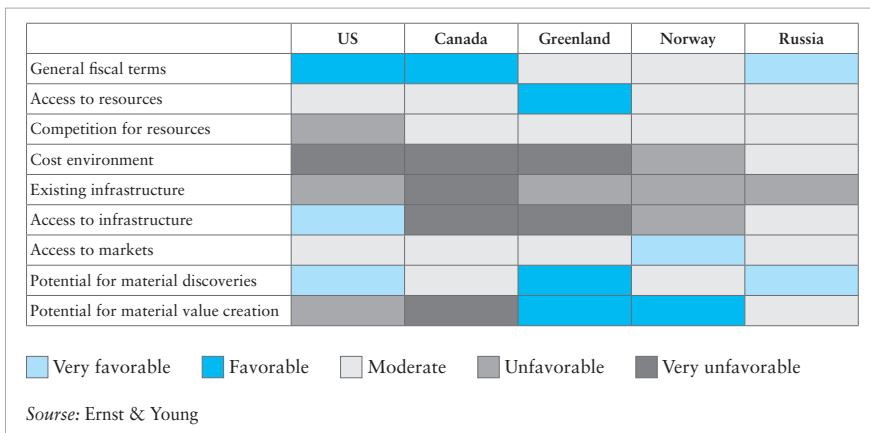


Figure II-1 Challenges to Arctic development by country

outlays. In general, Arctic projects are costly and lumpy, i.e., they tie up large amounts of capital for a long period of time before initial production. A recent report by Ernst & Young ranked the range of technical and financial conditions for oil and gas development among the countries with Arctic resources.¹ These are shown in Figure II-1.

The Ernst & Young assessment confirms conventional wisdom – it is expensive and risky to develop Arctic resources. If the price environment is favorable and advances in technology can reduce development costs, these risks 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. At prices 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.

The second constraint to widespread development of Arctic resources is competition from lower-cost resources made available through advances in the production of oil and gas from so-called unconventional resources, now largely focused on the expansion of new supplies from the United States and Canada, but offer the potential for growth in other major world petroleum provinces. The U.S., in particular, has shown remarkable growth in oil and gas production from so-called tight formations, particularly shale deposits in Texas and North Dakota. Recent proposed reforms for the petroleum sector in Mexico may further expand the North American petroleum output.

Although it is too early to know whether the rapid expansion of oil and gas production in the U.S. can be replicated in other petroleum provinces, a recent assessment by the Energy Information Administration (EIA) and the private research group Advanced Research International (ARI) of world shale deposits lifts technically recoverable world reserves by 11% for liquids and 47% for natural gas compared with estimates made as recently as 2011.² An often overlooked feature of shale resource development is that financial and project risks are low. Although per barrel production costs for shale production can be relatively high by world standards, for the most part, shale development in the U.S. does not require massive capital outlays for long periods of time before initial production.

UNCONVENTIONALS: SHALE AND OIL SANDS

Since 2007, the U.S. has experienced large increases in both natural gas and crude oil production, raising domestic production to levels not seen since 1990. The U.S. resurgence as a major petroleum producer began with the rapid and sustained development of natural gas from shale formations in Texas and Pennsylvania. This expansion of domestic natural gas output has produced a paradigm shift in the outlook for U.S. natural gas supplies. In 2008, conventional wisdom operated under expectations that the U.S. was to become a major importer of LNG; a large number of costly LNG import terminals were constructed, and European and Middle East suppliers were looking to the U.S. as a major outlet for LNG shipments. The rapid expansion of U.S. production, combined with new discoveries of natural gas supplies worldwide, has limited the pricing power of major exporters such as Australia, Qatar, and Russia.

According to the U.S. Energy Information Administration, natural gas production is likely to see sustained production increases (Figure II-2) over the next 20 years even in a period where natural gas prices remain well below USD \$6-7/mcf. The reason for such an optimistic production outlook

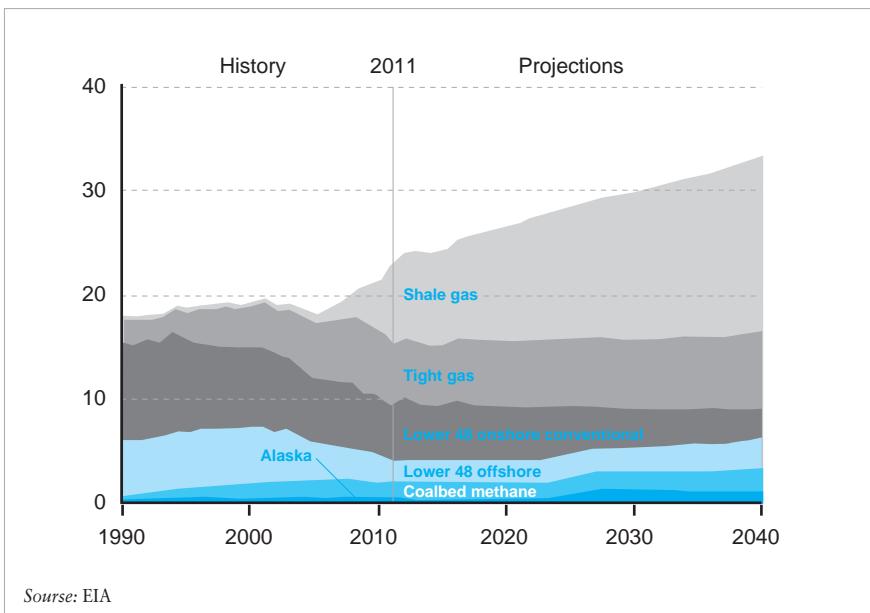


Figure II-2 U.S. natural gas output likely to continue growth (trillions of cubic feet/year)

is the continued domestic growth in natural gas output from growing volumes of associated gas from shale oil development. The high value of oil production is promoting low-cost natural gas production.

Technologies and production techniques (both art and science) contributing to rising natural gas production from tight formations are also available to oil-prone domestic shale plays. For shale oil development, North Dakota and Texas have been the largest success stories in the U.S. North Dakota's Bakken shale is responsible for a crude production increase of 600,000 barrels/day (b/d) in just five years, from an average production of 172,000 b/d in 2008 to 773,000 b/d in 2013. Texas alone is accountable for nearly a third of the U.S. production, standing at 2.4 million barrels/day (mbd) for 2013. The relatively recent development of the Eagle Ford play has added over 1 mbd to Texas' production since 2008. The application of innovative technologies and relatively favorable "above the ground" conditions has brought about a surge in oil and gas production in North America.

These growth trends are likely sustainable for some time to come. While initial achievements in lateral drilling and multistage fracking tapped the reservoirs, continual advances in technology have been and will continue to play an integral role in unlocking more barrels out of this tight source rock. To date, only a small fraction of the reserves are being

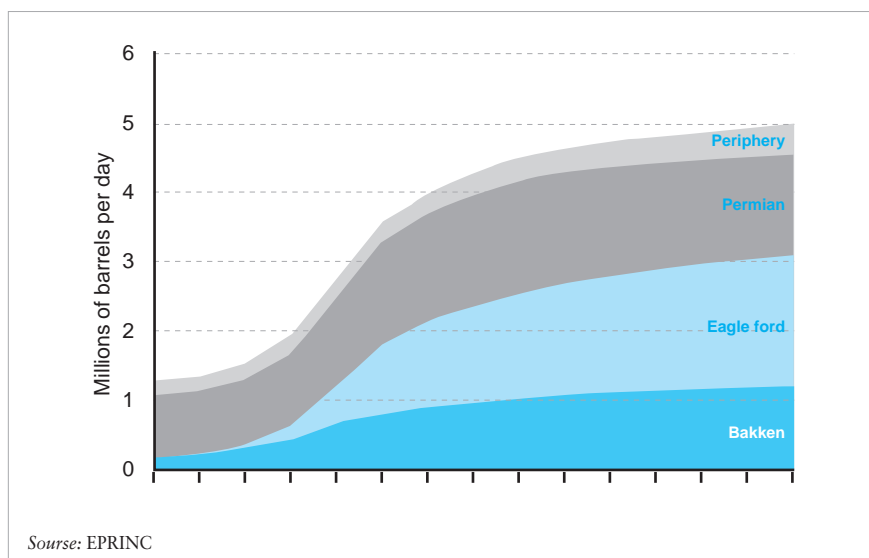


Figure II-3 U.S. Unconventional oil production forecast

extracted from within these reservoirs. Through technological advances, producers are realizing that there is far less drainage of the reservoir than originally expected. As a result, companies have begun to downsize their acreage spacing between wells and place more horizontal wells both next to each other and on top of one another in stacked formations.

To help explain this production growth and its potential, EPRINC has developed a forecast model (Figure II-3) for the three major shale plays in the U.S.: the Bakken, the Permian Basin, and the Eagle Ford.³ A “periphery” play category has also been added to designate other plays contributing to the U.S. production, such as the Niobrara in Colorado and the many stacked plays in Oklahoma. While there are justifiable reservations regarding this forecast should oil prices fall below USD \$50-60/bbl, this is a relatively conservative calculation given current production rates, EPRINC’s assessment of the technical difficulty of each play, pace of new drilling permits, and economics of production. Clearly, the experience to date with shale production has played to inherent strengths in the U.S. petroleum investment environment, among which are well-defined property rights for the mineral resources and a robust oil and gas service infrastructure. These conditions generally do not exist outside of the U.S.

The growth in the U.S.’ lower 48 crude oil output has been paralleled by growing production in Canada. Oil sands production in the Western

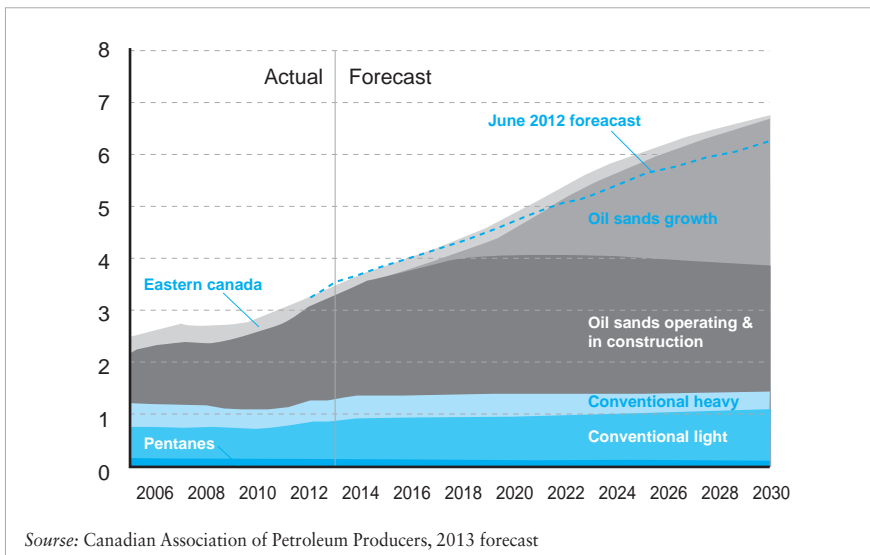


Figure II-4 Canadian production growth (millions of barrels/year)

Canadian Sedimentary Basin has been gaining momentum for the last five years as substantial financial commitments are now underway to continue Canadian production growth, as shown in Figure II-4.

COST COMPRESSION

Cost compression occurs when rising development project costs cannot be passed through – hence the compression. The rapid increase in oil prices over the last decade has brought about substantial investment and explosive growth in the worldwide petroleum service industry, including construction of deep water rigs, drill ships, specialty steels and products, as well as advanced engineering and technical services. The run-up in capital costs for exploration and development is shown in Figure II-5. The rate of increase accelerated in the beginning of 2005 and is no doubt a feature in recent announcements of not just major Arctic projects, but a long list of deep water prospects, and rising regulatory costs and delays as operators adjust to a post-Macondo world.

Against this background of rising costs for exploration and production, there is growing evidence that these costs are unlikely to find accommodation through rising prices. Figure II-6 provides an estimate of the capacity of the U.S. economy to adjust to rising oil prices.

In this model, economic growth is constrained as rising oil prices

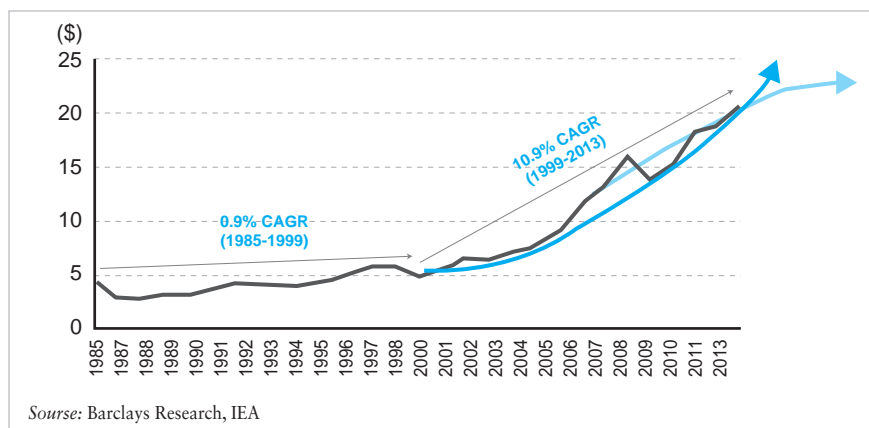


Figure II-5 Cost outlook scenarios, growth in exploration and capital expenditures, per barrel

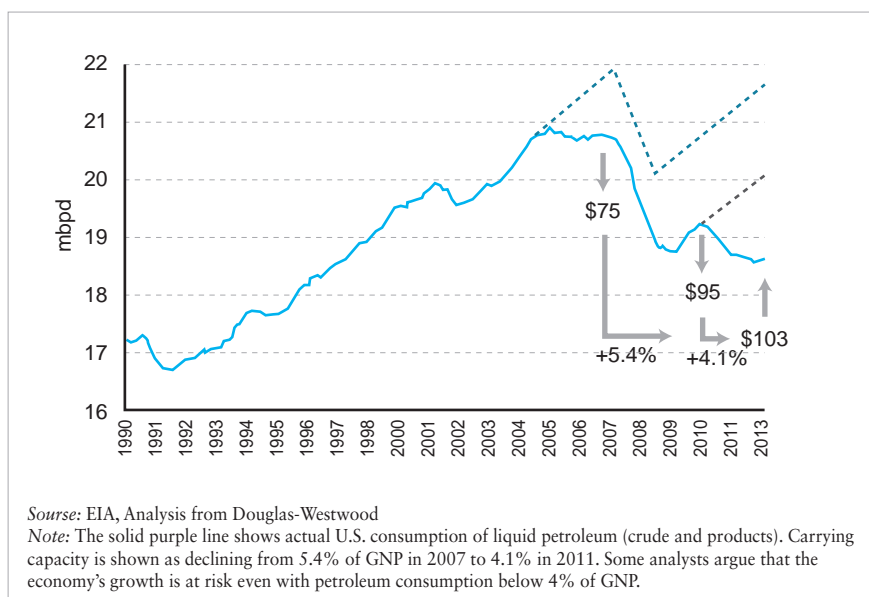


Figure II-6 U.S. oil consumption with carrying capacity estimates

act much like rising interest rates, choking off investment and consumer confidence and bringing about lower growth rates.⁴ The lower growth rates cut oil demand and potential growth in oil prices.

What does all this mean for Arctic petroleum development? Clearly, managing both cost and price risks are central elements of any investment in petroleum development. However, Arctic projects offer much longer time exposure to both risks. We can expect more delays in the Arctic development and a cautious approach in taking on major projects where any combination of regulatory risks, long lead times to development, and limited infrastructure are prevalent. The decision by Statoil to pull out of the Russian Shtokman gas field project and the Johan Castberg oil field project, both in the Barents Sea, is driven by more than concerns over costs and price risks. But these concerns are now an important factor in any Arctic project. Royal Dutch Shell cancelled plans to drill off Alaska during 2013 after having spent USD \$4.5 billion since 2005. The company may not return for another attempt in 2014. ConocoPhillips, which was working with Keppel to develop a landmark ice-class Arctic rig, has put the project on hold, and has shelved plans to drill in the Chukchi Sea in 2014. Total has publicly stated that the petroleum industry should refrain from

developing resources in the Arctic.

None of these development delays are set in stone, and circumstances can change. But policy makers should not fret over a massive (black) gold rush in the Arctic. Except for some unique opportunities, large-scale petroleum development in the Arctic will remain on hold.

Notes

1. "Ernst & Young Provides Arctic Assessment." *Oil & Gas Journal*. N.p., n.d. Web. Aug 11, 2013.
2. Technically Recoverable Shale Oil and Shale Gas Resources: An Assessment of 137 Shale Formations in 41 Countries outside the United States, Energy Information Agency. June 13, 2013. <http://www.eia.gov/analysis/studies/worldshalegas/>
3. Forecasts are from a forthcoming report to be published in September 2013 by the Energy Policy Research Foundation, Inc. (Washington, DC). The project author is Trisha Curtis, director of upstream and midstream research.
4. Lenzer, Robert. "The Price of Oil Is the New Economic Spoiler." *Forbes Magazine*. September 12, 2012. Lenzer provides an extensive review of the research on how higher oil prices curtail growth.

Russian and Norwegian perspectives

Arild Moe

KEY DEVELOPMENTS

In terms of offshore development, the most dynamic area in the Arctic is Norway's part of the Barents Sea. Exploration in this area started in 1980, though the first field came on stream only in 2007: the gas field Snøhvit ("Snow White"), located 40 km from shore at the northernmost point in Norway. The oil field Goliat, located closer to the mainland, is slated to start producing in 2014. In recent years, several promising discoveries have been made, and development is expected to start within this decade. Moreover, 20 new licenses for exploration and development in the Barents Sea were allocated in 2013.

In 2011, a delimitation treaty between Russia and Norway for the Barents Sea and Arctic Ocean entered into force. This meant that a virgin area of some 175,000 square kilometers equally divided between the two sides straddling the new boundary line could be opened for exploration. Norway immediately started seismic surveys that were concluded the following year. It is expected that a licensing round for blocs on the Norwegian side of the boundary, will be announced as soon as the collected data have been processed. The Norwegian decisions seem, to some extent, to be connected to developments on the Russian side of the boundary. The Norwegian government wants to have the best possible knowledge of the geology and the potential of discovered fields in the area in case discoveries are made on the Russian side that extend across the boundary.

Several international major companies and many smaller companies are already involved in the Norwegian Barents Sea, as operators or as members of license groups. This is the only Arctic offshore area that will see production this decade (with one exception in Russia). This means that the area will be important for companies developing their Arctic operations and technologies. But the Norwegian Barents Sea does not have ice problems. It is the least difficult Arctic Sea area; experience from this area has limited applicability to ice-infested areas.

On the Russian side of the Barents Sea, developments started at about the same time as in Norway. In the 1980s, several promising discoveries were made, including some super-giant gas fields and several medium-

sized and small oil fields, but little effort was made to develop these fields. Arctic offshore resources were regarded as a long-term option, and the oil and gas industry had their hands full with onshore projects. There were two exceptions to this story, however. Plans for development of the Prirazlomnoe oil field, located in shallow waters 57 km offshore in the southeastern part of the Barents Sea (also called the Pechora Sea), were already developed in the mid-1990s. Construction of a giant steel caisson to sit on the bottom of the field, protecting drilling, storage and loading facilities from the drifting ice in the area, started in a naval yard in the Arkhangelsk Province. The project, managed by a subsidiary of Gazprom, met with serious technological and financial problems. The platform was completed only in 2012, when it was towed into position. After further delays, it has been announced that production will commence at the end of 2013, eventually reaching a level of 6.5 million tons per year.

The experience of developing Prirazlomnoe has been mixed, to say the least, and nobody seems to know the full cost picture. However, once the platform is in place and operating, it will change the prospects for several small and medium-sized fields in its vicinity. The platform can also be used for storage and loading for these fields. Some exploration work, albeit limited, has been carried out on these fields in recent years and renewed interest is likely. In two of these projects, Rosneft has concluded an intentional agreement with the China National Petroleum Corporation (CNPC).

The other, and potentially far larger, project in the Russian Barents Sea is the Shtokman gas and condensate field, thought to contain around 3.9 trillion cubic meters of gas. Discovered in 1988, serious development efforts in this field started only in 2003, once technological developments made it feasible and the gas market in the United States seemed promising, with expectations of rising prices. After twists and turns, a special-purpose company, Shtokman AG, was set up in early 2008. Owned 51% by Gazprom, 25% by Total, and 24% by Statoil, the company was intended to develop and operate a third of the field. But it would not own the license or sell the gas. Disagreement on technical solutions as well as cost problems became apparent from the start. Yet it was the changed market outlook that finally broke the camel's back. In 2012, the partners concluded that they could not go ahead with the proposed project. Even though it has not been officially shelved, it seems that Gazprom has concluded that development would have to be postponed.

The lessons foreign companies draw from the Shtokman experience are manifold: Some are related to the framework conditions that were known before cooperation started, namely the restricted role foreign companies are allowed to play on the Russian continental shelf. Other problems became more acute in the course of the cooperation, including the complications that foreign partners experience in cooperating with a state-dominated monopolist that is pursuing several parallel agendas. Of course, the Russian side has also learned from this ill-fated project. A clear division of responsibilities between Russian and foreign partners is required, and the “Shtokman model” in its pure form, where the foreign partner is not allowed to sell the product, is probably no longer feasible. An obvious lesson is that Arctic offshore gas is marginal in today’s market and that the effectiveness and cost of development is crucial. Russian companies are in no position to develop such fields on their own. The need for foreign project experience and technology is absolute.

After the delimitation of the Barents Sea and after Norway had started its seismic surveying, the Russian government awarded the state-dominated company, Rosneft, license to cover the whole Russian part of the previously disputed area. In April 2012, Rosneft announced cooperation agreements with ENI for the southern part of the area and with Statoil for the northern part. These deals include seismic surveying and exploration drilling to start before 2020. Activities will be conducted within the framework of joint ventures that are two-thirds sowned by Rosneft and one-third by the foreign partner. The areas are huge and largely unexplored. Expectations are high on the Russian side, but it will necessarily take time to carry out comprehensive exploratory drilling. In the event that several important discoveries are made, it is likely that the licenses will be split to allow more partners to come in. Developments in this area will be followed closely by the international oil industry.

The deals in the Barents Sea have the same structure as the agreement Rosneft concluded with ExxonMobil a year earlier for an area of some 126,000 km² in the Kara Sea. This area, as with the area where Statoil will cooperate with Rosneft, has ice and is located far from the infrastructure. Rosneft has announced that drilling will start in August 2014.

In early 2013, an area further east in the Kara Sea as well as large acreage in the Laptev and Chukchi seas were included in the Rosneft-ExxonMobil cooperation. Altogether, the joint exploration areas of the two companies in the Arctic amount to about 730,000 km². It appears that

the companies will concentrate on the areas in the Kara Sea first. Rosneft's president has announced that the first oil may be produced before 2020, but this is unlikely.

Gazprom signed an MOU with Shell in 2013 for joint exploration in the Russian part of the Chukchi Sea. Shell, however, sees this as a long-term option. In 2013, Gazprom also received several new licenses for very large gas and gas condensate fields in the Barents and Kara seas. Only limited seismic surveying is expected in the coming years, due to the uncertain demand for Arctic gas. Gazprom also has oil interests through its oil subsidiary Gazprom Neft, which is engaged in exploring the Dolginskoe oil field in the Pechora Sea. Rosneft has protested the right of this company to operate on the Russian continental shelf.

Meanwhile, the most advanced new gas project in the Russian Arctic is Yamal LNG. This project, in the Tambeyskoe group of fields on the eastern side of the Yamal Peninsula, is not an offshore project. However, the business plan is to build an LNG factory on the site and ship out the product via the Northern Sea Route (NSR). The project is 80% owned by the independent Russian gas company Novatek and Total owns the other 20%. In September 2013, it was announced that CNPC of China would buy a 20% stake in the project from Novatek, coupled with contracts for gas deliveries.

The project is expected to reach a production level of 16.5 million tons of LNG per year. Primary markets are in Northeast Asia, but deliveries to the Atlantic market in the winter months also are foreseen. A complicating factor was that Gazprom by law holds an export monopoly, which Yamal LNG challenged. By autumn 2013, Yamal LNG was granted export rights. Front-end engineering design work on the project was completed in 2012 and Daewoo of South Korea won an option to build 16 ice-strengthened carriers in 2013. The technical details and marketing of the LNG continue, and a final investment decision for the project is expected by the end of 2013.

Currently, Alaska accounts for approximately 13.2% of U.S. oil production. Output is declining, but there is a potential for further development of Alaskan oil and gas resources. Although existing fields have reached maturity, new reserves are likely to be found both onshore and offshore. The U.S. Bureau of Ocean Energy Management estimates that there are 6.94 billion barrels of mean recoverable oil and a mean projection of 32 tcf of natural gas offshore in the Beaufort Sea. With huge geological

structures, the continental shelf under the Chukchi Sea offers great promise. The same agency estimates a mean of 15.4 billion barrels of oil and 77 tcf of gas there.

Many of the large U.S. oil companies are present in Alaska. The companies are making investments in order to prolong production from existing fields, as in the Prudhoe Bay area. There are several initiatives involving new exploration. Shell developed a plan for oil exploration in the Chukchi Sea off Alaska's northwest coast, which would be the first offshore exploration drilling in the U.S. Arctic in two decades. In September 2012, however, the company announced that it was cancelling its drilling program for 2013 after a containment dome designed for a potential oil spill in Arctic waters was damaged. ConocoPhillips and Statoil have also postponed plans for drilling in this area. Nevertheless, expectations for drilling will start in a few years and new leases in the area will be sold.

Recent development related to the Point Thompson field located on the coast 60 miles east of Prudhoe Bay has ignited new optimism regarding oil and gas development in the North Slope area. It is Alaska's largest undeveloped oil and gas field, holding an estimated 8 trillion cubic feet of natural gas and hundreds of millions of barrels of oil and gas liquids. Current plans call for an initial output of 10,000 barrels of natural gas condensate and 200 million cubic feet of natural gas a day.

Canada's offshore petroleum activities are dominated by fields off its east coast, near Newfoundland and Labrador. There are expectations of large discoveries in the Beaufort Sea and several major oil companies hold licenses for exploration in that area. A joint venture involving BP, ExxonMobil and Imperial Oil seems to have the most mature plans for an exploration drilling program. The regulatory framework is not yet in place and drilling is not likely to start before late in this decade.

In Greenland, Cairn Energy, the only company presently active there, has been drilling since 2010, searching for petroleum in Baffin Bay off the west coast, so far without success. Other companies also hold licenses. At present, the government seems to follow a cautious line, pursuing a slow exploration program.

TECHNOLOGICAL ISSUES

It seems that most major companies believe the technological challenges in

the Arctic can be tackled in principle with existing technologies, but that the risk level requires the highest quality and redundancy in all equipment. Particular technologies are highlighted by some companies. Shell maintains that during drilling, “We use a number of early detection measures such as sophisticated sensors that immediately alert specialists at our global real-time operations centers. And we use mechanical barriers such as ‘blowout preventers’ to seal off the wells. Mechanical barriers work rapidly and effectively. But in the unlikely event these measures fail, it is possible to drill a relief well alongside that can pump cement or heavy mud into the original well to cut off the flow. We also have a stringent process in place to ensure the safe and controlled temporary suspension of operations if needed.”¹ According to Statoil, “Subsea or down hole separation of water with associated direct injection back into the field will also be essential in handling production both above and below ice. Strong technological development in multiphase transport of mixtures of oil, gas and water is expected to further increase [possible] transportation distances.”² ExxonMobil stresses the need to handle icebergs: “In continuing to improve our ability to design structures to resist iceberg loading, ExxonMobil used new technology to perform complete 3D shape surveys of about 30 icebergs (both above and below the waterline) offshore Newfoundland and Labrador. This unique data set allows us to understand how icebergs interact with various structure geometries and to better predict the potential magnitude of ice impact loading.”³ Development of new technologies and systems for the handling of oil spills is especially underlined by BP, but is a concern for all players in the region. In general the challenge is seen to be not so much technology itself, but operation systems and procedures that can enhance safety.

Transportation technologies are available already, but advances in ship design may increase the season for sailing without icebreaker assistance. The economies of projects can thus be improved.

NATIONAL POLICIES

Policies with regard to offshore Arctic development vary considerably among the coastal Arctic states.

Norway is currently pursuing an active licensing policy. This is partly explained by the expected reduction in output from fields in the North

Sea and Norwegian Sea and the need to sustain the activity level in the industry, which is of paramount importance to the Norwegian economy. As mentioned above, there may also be additional interest in developing the previously disputed area in the Barents Sea, in anticipation of cross-boundary fields. Norway also has, however, a strong green opposition that opposes forays in the Arctic. Depending on the balance of forces in the new parliament elected in the autumn of 2013, a more cautious attitude toward new licensing is a possibility.

Russia has given the development of Arctic resources as a high priority through official plans and statements over the last ten years. However, there have been other important developments in Russian energy policy. Assets were transferred to state-dominated companies and they received privileged access to resources, notably through changes in legislation in 2008 that granted Rosneft and Gazprom a monopoly on operating new offshore projects. The two companies were also given licenses for large areas. However, these two companies did not show the expected resolve offshore. This was understandable, given their limited offshore experience and extensive activities onshore. Other Russian companies with offshore experience, notably Lukoil, were barred from operating or seeking licenses.

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 Ministry of Natural Resources has harbored the ideas of opening up the continental shelf for other Russian companies. However, the Rosneft deals preempted attempts at liberalizing access to the Russian continental shelf and extensive offshore licensing to Rosneft and Gazprom in 2012-2013 indicate that those who wanted a more liberal policy have been defeated. With so much promising offshore acreage already licensed, serious openings for private Russian companies are hard to imagine without unbundling the activities of Gazprom and Rosneft. There is not much opposition to Arctic offshore development as such, but the internal rivalries are likely to continue to put a brake on development.

In the U.S., the urgency of Arctic energy development is much lower than a few years ago, due to the revolution in unconventional gas and oil. Gas is less interesting for economic reasons, and the market for production in the Arctic would probably have to be LNG exports to Asia. Presently, exports are not allowed, but this could change. Oil companies are interested – particularly in oil – and in principle the government is prepared

to sell leases offshore Alaska. Nevertheless, it is evident that environmental considerations loom even larger than they did before the Mexican Gulf catastrophe.

The situation in Canada is much the same. The development of 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. The industry momentum is there, though, and will probably lead to exploration in some years.

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

Notes

1. <http://s06.static-shell.com/content/dam/shell/static/future-energy/downloads/arctic/technology-in-thearctic.pdf>
2. <http://www.norden.org/no/nordisk-ministerraad/samarbeidsministrene-mr-sam/arktis/kalender/arctic-changing-realities/taler-og-presentasjoner/hege-marie-norheim-strategies-for-oil-and-gas-development-in-the-arctic>
3. http://www.exxonmobil.com/Corporate/files/news_pub_poc_arctic.pdf

Conservation perspective

Alexander Shestakov

The Arctic, as defined by the Arctic Council's Conservation of Arctic Flora and Fauna working group, is much larger than the area defined by the Arctic Circle – it includes the tundra and boreal forest, and ocean environments ranging from almost ice free to permanently ice covered. The Arctic of today and tomorrow is one of the most rapidly changing parts of the world. It is warming twice as fast as any other region of the planet, causing multiple effects in the physical environment and in biota. The Arctic is cast as environmentally fragile because of its harsh environment and relatively low numbers of plant and animal species. At the same time, it is enormously powerful, providing numerous and varied ecosystem services for the benefit of Arctic indigenous peoples, northern communities, and the entire globe. The following factors may inform discussions about development in the Arctic:

ENVIRONMENT

- About 4 million people
- Some of the largest intact ecosystems in the world
- Unique, highly specialised species and human communities
- Warming twice as fast as the rest of the world
- Four of the 10 largest fisheries in the world
- An enormous carbon sink, including methane in permafrost
- 279 species of migratory birds (including 80% of the world geese population)
- Short food chain

DEVELOPMENT

- No easy resources
- No reliable technologies
- No infrastructure
- No strategic assessments
- No strong Arctic-specific sectoral standards
- No solid knowledge of ecosystems and impacts

- No comprehensive international governance regime
- No adequate system of insurance for major disasters

Any discussions about hydrocarbon development in the Arctic should include the entire operation cycle and also distinguish between different parts of the Arctic and different types of operations:

- Operations in the High Arctic (ice covered) and in Arctic/sub-Arctic with open water (where companies claim to have some so-called Arctic experience);
- Offshore, deep-water high Arctic operations versus onshore or near-shore (artificial island and shallow coastal water) operations.

WHAT ARE THE MOST PRESSING ENVIRONMENTAL CHALLENGES ASSOCIATED WITH ARCTIC PETROLEUM ACTIVITIES?

New hydrocarbon development in the Arctic will further foster climate change through additional burning of fossil fuels, aggravating the current worrying trends and speed of changes in the Arctic. This development is very much against countries' commitments to the goal of keeping the global average temperature from rising by more than two degrees. As some of the world's biggest producers of greenhouse gas pollution and exporters of oil and gas to the world markets, the Arctic states have an obligation to lead in this process.

Petroleum activities in the Arctic will bring numerous environmental challenges (impacts) associated with every stage of hydrocarbon development in both on- and offshore operations. The most pressing issues include, but are not limited to, the following (largely associated with offshore activities):

- Sound pollution and disturbances affecting marine life (in particular marine mammals) during the offshore seismic operations (these can be reduced and some mitigation measures may be taken; currently there is a lack of unified and coordinated regulations in the Arctic, and it depends on the company's approach and varies between operators);

- Pollution from oil spills, especially in and under ice and in ice-infested waters;
- Destruction of species and their habitats, including species essential for traditional use and traditional cultural practices;
- Pollution, including black carbon, causing degradation of biota and further melting of sea ice;
- Further emissions of greenhouse gases;
- Additional disturbances and destruction of sea ice and corresponding ice habitats;
- Threats to the provisioning of basic ecosystem services, including food security, to indigenous and local communities; and
- Others (the list is very long).

Table II-1 Percentage of time during the operating season when no response to in-situ burning, mechanical containment or recovery and areal dispersant application is possible (WWF, 2011)

		Percentage of time when no response is possible							
		Jan.-May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Beaufort Sea	Near Offshore	≤100	66	54	56	62	81	≤100	≤100
	Far Offshore	≤100	82	65	66	66	84	≤100	≤100
Davis Strait	Central	≤100	≤100	83	44	44	59	84	≤100
	West Central	≤100	≤100	≤100	45	48	59	84	≤100

Note: The dark shaded cells represent months outside the potential drilling season, when no countermeasure is possible.

In addition to direct environmental impacts, there are other risks that might directly affect the safety of operations associated with petroleum activities in the Arctic. Some of these are related to general environmental conditions in the region, including low temperatures, visibility and darkness, icing, sea ice and icebergs, melting permafrost, strong coastal erosion, etc.

In addition to extreme weather conditions, there are risks associated with inadequate technology, unavailability of proper, close and effective infrastructure, and the unavailability of qualified personnel to operate in those conditions. These difficulties and unreadiness to drill were graphically illustrated by Shell’s series of mishaps as it attempted to drill off Alaska last year.

The risks inherent in Arctic drilling are not only identified by environmental organizations, they are also recognized in reports by

governments, insurance agencies, and even in statements by oil companies. They include recent reports from the U.S. Geological Survey, Lloyds, the Canadian National Energy Board, the UK Parliament's Environmental Auditing Committee, and U.S. Senators. To condense the risks, they are ones not fully known and understood, identified but not fully assessed and known (e.g., major spills) but currently unmanageable or too expensive to effectively mitigate and reduce.

“The environmental consequences of disasters in the Arctic arguably have the potential to be worse than in other regions. The resilience of the Arctic's ecosystems in terms of withstanding risk events is weak, and political sensitivity to a disaster is high.” *Arctic Opening: Opportunity and Risk in the High North*, Lloyds/Chatham House

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.

A recent study conducted by the WWF provides evidence that the risk is not just from oil extraction; gas and gas condensate extraction also have significant environmental impacts that are still not fully understood and require further research.

ARE THERE ANY WAYS TO DEVELOP ARCTIC OIL AND GAS THAT WOULD SATISFY ENVIRONMENTAL CONCERNS ABOUT THE DANGER OF OIL SPILLS UNDER ARCTIC CONDITIONS? WHAT COULD BE DONE TO MINIMIZE THE DANGERS OF OIL SPILLS IN THE ARCTIC?

Currently there are no reliable technologies to fully deal with an oil or gas condensate spill under the sea ice, in the ice and to a great extent on the ice, or with oil in water mixed with ice.

“5.10. Finding: ... While efforts are ongoing to develop countermeasures to address the potential of an oil spill in the Arctic and ice-covered waters, it remains unclear when and where any one of these countermeasures, or countermeasures in combination, will be available under current and future weather, sea state, ice, and light conditions of the Arctic – or whether they will work even if available.”
An Evaluation of the Science Needs to Inform Decisions on Outer Continental Shelf Energy Development in Chukchi and Beaufort seas, Alaska, USGS

If oil and gas companies (and the governments that license them) decide to proceed despite the risks, a number of actions could be taken to reduce the danger and effects of spills. Those may include:

- Introducing sensitivity mapping approaches as an obligatory part of the EIA and contingency plans;
- Identifying the most important, productive, vulnerable and sensitive areas (both biologically and culturally), including protected areas, and build “no-go zones” (no oil and gas activities) around them using marine spatial planning tools;
- Carrying out full, comprehensive, open, participative and transparent strategic assessments and environmental impact assessments for all projects;
- Arctic states and companies cooperating with full transparency in contingency plans, operations and information about spills (including full implementation of the Arctic Council agreement on cooperation on marine oil pollution preparedness and response);
- An obligatory response gap assessment with identification of seasonal restrictions;
- Taking full financial responsibility with appropriate funds allocated (secured) before operations;
- Establishing and enforcing Arctic-specific technical requirements;

Technical requirements to reduce oil spill risks may include:

To maintain well control:

- BOPs and/or wellhead control systems;
- Proper well design, casing and cementing;
- Each well is drilled from start to finish using an uninterrupted BOP control system; and
- Government or independent inspectors verify BOP testing, casing and cementing plans
- Measures to stop a blowout:
 - Same-season relief well capability;
 - Alternate drill rig to be available within 72 hours technically capable of operating in specific location and includes qualified crew
- Measures to contain a blowout:
 - Pre-constructed, field tested containment system (including ongoing storage and transport of recovered oil), deployable and on site within 24 hours
- Sufficient level of infrastructure:
 - Communications, weather/ice forecasting and reporting, ice breaker availability, deep-water ports, airstrips, hangars etc.

- Strictly enforcing development of national, regional and site-specific contingency plans based on worst-case scenario,

Requirements for contingency and response plans:

- Based on a worst-case scenario (with realistic daily blowout rate and number of days needed to drill a relief well for a particular location)
- Meeting a defined oil spill response/removal standard (that ensures a specifically defined amount of oil, e.g., % of total discharge, to be removed)
- Referring to capabilities of equipment and response systems that :
 - are established through field tests (not the hypothetical efficiency of a component)
 - include encounter rates (assessment of ability to access the oil)
 - are established under a range of expected environmental conditions in the proposed drilling location (e.g., for all seasons)
 - are certified by an independent third party

- Including seasonal limitations (operations limited to only those periods when the oil spill removal performance standard can be met)
- Is open to the public

- Implementing a precautionary and stewardship approach based on principles of ecosystem-based management;
- Having same-season relief well capacity;
- Having infrastructure development and appropriately trained personnel; and
- Fully engaging society and in particular indigenous and local communities with full transparency of plans and operations.

Regardless of all the aspects mentioned above and in fact generally agreed on, including lack of knowledge, technologies, experience, regulations, and high risks to the environment and human safety, industry and governments continue their efforts in the Arctic development. However, if two or three years ago there really was a “gold rush” for Arctic hydrocarbons, a more sober assessment of such projects and related risks would have resulted in a number of postponed and cancelled projects in the Arctic offshore. In 2012, the Arctic’s unpredictable features were demonstrated in full.

ARE INTERNATIONAL ENVIRONMENTAL AGREEMENTS LIKELY TO AFFECT THE DEVELOPMENT OF ARCTIC ENERGY PROJECTS?

A number of international agreements are currently applicable to hydrocarbon development in the Arctic, although they do not have region-specific regimes or cover all aspects of development. New initiatives also were taken at the regional level by the Arctic Council. The WWF believes the council can play a very significant role in putting in place Arctic-specific regulations. Processes such as the G20 are nearing issues related to the energy sector as a whole and specifically for offshore development. However, there is no coordinated or harmonized Arctic-specific system of regulations at the international level (that fully addresses Arctic

conditions) that could provide a full governance regime necessary for Arctic exploration. Arctic governments should work further to ensure a stronger coherence in their national approaches to regulate oil and gas activities in the Arctic based on joint approaches to avoid double standards or unfair usage of loopholes in legislation. This can be done through stronger international efforts at different levels (bilateral, regional and global). It is crucial to make national regulations at the highest possible level, as well as to meticulously work on the obligations agreed to in the Arctic Council Agreement.

HAVE INTERNATIONAL OIL COMPANIES MADE CHANGES IN RISK MANAGEMENT OR NORMS THAT AFFECT THEIR ARCTIC OPERATIONS AND STRATEGIES?

Companies are working internally and jointly (for example, through joint industry projects) to develop new technologies and reduce risks. However, it is difficult for the public to assess progress, as most of this work is not transparent. Many announced developments and tools have not been confirmed by real-life tests with full public access.

Last year and early in 2013, the industry made many new, more sound statements. Total warned about drilling for oil in the Arctic and Lukoil echoed this statement. Shell, BP, Conoco, and Gazprom postponed or cancelled projects in the Arctic offshore due to environmental risks and insufficient preparedness, and the Shtockman project was cancelled because it was not financially viable.

This seems to be a sign that a rational approach to risk assessment is being applied to operations in the Arctic. However, many things still depend on national regulations, which vary significantly from country to country. Thus, the U.S. Department of the Interior, in its 60-day review of Shell's operations, came up with serious recommendations on significant discrepancies in project planning and coordination (i.e., soft risk management tools), but no significant improvement in regulations have been observed in other parts of the Arctic. For example, in Russia, huge licensing blocks were granted without any competition. In fact, this means that even if the industry intends to stay on the safe side, differences in national regulations create inevitable intentions to go further to the Arctic,

while major infrastructure and technologies for preparedness, prevention and response are only about to be developed and constructed sometime in the future.

In the Arctic, the risks of exploiting hydrocarbons are clear, both on a local and 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.

Community perspective

Edward S. Itta

I was asked to join this distinguished panel because I am an indigenous resident of the Arctic. My people are the Inupiat Eskimo, who have lived along the Arctic coast of Alaska for thousands of years. We are Inuit and are related to the Inuit of Canada, Greenland and the Russian Far East.

I was born in Barrow, which is the hub community of Alaska's Arctic. I grew up learning the subsistence of whaling and hunting traditions that enabled our survival and knit us together as a community. We lived off the land and the ocean in a harsh environment. That environment shaped us; it continues to define us as Inupiat. We still depend on whaling and hunting for our nutritional needs, and these practices continue to function as the central activities of our traditional cultural life.

I was the mayor of the North Slope Borough from 2005 to 2011. It is the regional government that represents the eight communities along Alaska's northern coast. These communities are predominantly Inupiat, so the borough has always provided a strong voice for Inupiat concerns.

The terms of reference for this gathering call for discussion of ways in which oil and gas development affect the Arctic coastal communities; issues that arise in coastal communities as a result of this development, and strategies for minimizing negative community impacts and maximizing benefits from development. This commentary provides a general description of what I consider the most important elements for our discussion.

Oil and gas development is nothing new in our region. In 1968, the largest oil field in North America was discovered onshore at Prudhoe Bay, 150 miles east of Barrow. The Trans-Alaska Pipeline was built across 800 miles of the state in order to get all that oil to an ice-free port. In nearly 35 years of production since then, tremendous wealth has been created from the flow of oil headed south.

Our experience with onshore oil and gas development at Prudhoe Bay is instructive as oil companies begin to explore what they believe to be the next big Alaskan oil and gas provinces offshore in the Chukchi and Beaufort Seas. Prudhoe Bay spawned infrastructure that spreads across the tundra far beyond what was envisioned in the early stages of development. Along with the economic benefits of that expansion, there have been increased environmental impacts as well as an expansion of the area that

is off-limits to traditional subsistence hunting on the part of villagers living nearby.

The most important concept to understand is that the effects from the expanding infrastructure on our subsistence way of life are cumulative. At the request of Congress, the U.S. National Research Council conducted a study to examine the impacts of oil and gas development on the North Slope (“Cumulative Environmental Effects of Oil and Gas on Alaska’s North Slope,” National Research Council, 2003). A statement at the end of the study is worth repeating:

“Continued expansion will continue to exacerbate existing effects and create new ones. Whether the benefits derived from oil and gas activities justifies acceptance of the foreseeable and undesirable cumulative effects is an issue for society as a whole to debate and judge.”

As one can see, this is an acknowledgement that there are impacts and at the same time there are only a few definitive answers.

Offshore development may well follow a similar pattern, with the success of one or two drilling sites leading to wider and wider exploration. That is the best of all possible results for companies that have invested heavily in the outcome.

For local residents, on the other hand, more and more development and placement of associated infrastructure is not necessarily the best result. As the offshore oil province expands, so will the extent of impacts on the underwater ecosystem. There will be more stress on migrating whales as the level of underwater noise and habitat disruption interferes with all the marine populations. When the bowhead whale is under stress, the Inupiat are under stress.

It is clear 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 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?

I believe this is possible. First of all, it requires that federal policymakers recognize the economic value of subsistence activities. People migrated to Alaska’s North Slope thousands of years ago because the subsistence

resources – whales, seals, walrus, caribou, fish, etc. – held tremendous value for them. These resources were (and are) the currency of survival. So they have economic value.

Once the economic value of subsistence is recognized, we need to identify areas so biologically productive for subsistence purposes are with drawn from consideration for petroleum development. This has been done (at least temporarily) onshore around a lake in the Federal government's National Petroleum Reserve about 70 miles southeast of Barrow. Similarly, rich subsistence areas offshore could be identified and exempted from industrial activity.

Next, standards uniquely responsive to Arctic conditions should be created and applied appropriately offshore. You cannot just take the Gulf of Mexico standards and tweak them for the far north. Arctic standards should include the ice classification of vessels used in operations. These standards must take into account also the vast distances involved in Arctic operations, including distances from significant response capabilities. The Federal government is currently scoping a set of Arctic standards that will apply to offshore oil and gas activity in the region.

A third consideration involves the creation of a system to replace the subsistence value lost as a result of offshore development with some sort of economic equivalent, which could include an ownership stake. Such a system would recognize that the Inupiat are rights-holders in the ocean environment by virtue of their occupation and users of the region for many centuries. Our people have a clear and legitimate interest in any issue affecting subsistence, onshore or offshore. The way I like to put it is that the Inupiat are not separate from the Arctic environment – we are a part of it.

A system to replace lost subsistence value also recognizes that the contemporary Inupiat economy is a mixed economy. It relies on both subsistence resources and cash income to make ends meet. This has been the case since Alaska Native land claims were settled in 1972 through the transfer of land and the creation of for-profit corporations whose shareholders are the state's indigenous peoples. The resolution of Alaska Native land claims largely succeeded in creating a fair deal for Alaska Natives because it did two things: the settlement recognized the importance of a land base to the continuation of Native culture, and it created the potential for the Native peoples to have an ownership stake in resource development.

These two underlying principles – the accommodation of our traditional cultural values and the opportunity to have a stake in the cash economy

– need to be at the core of the terms by which offshore oil development takes place. The land claims act took care of the issue for onshore development. The same thing needs to be done for development beyond the water's edge.

Chinese perspective

Kang Wu*

This brief note summarizes the Chinese perspective concerning oil and gas development in the Arctic. The following questions will be addressed: How important is the Arctic for China's long-term energy supplies? Under what conditions are Arctic oil and gas attractive to China? What role is likely for China in the development of Arctic energy, as an industrial participant, an investor, or a buyer of energy? Does China prefer to proceed bilaterally in dealing with Russia on such issues?

CHINA'S LONG-TERM ENERGY SUPPLIES: THE ROLE OF THE ARCTIC

Since becoming a net importer of all three types of fossil energy – oil, gas, and coal – in the late 2000s, China's appetite for energy continues to grow, despite its strong efforts to reduce energy intensity. As a result, the issue of energy security has been looming larger for Chinese policy makers in recent years.

Of the three types of fossil energy, China has the highest import dependence on oil. In 2012, China imported a total of 6.4 million barrels per day (b/d) of oil (crude oil and refined products combined) and exported some 540,000 b/d. The net imports of 5.9 million b/d were the highest in history, accounting for some 60% of China's total petroleum product consumption, up from 50% in 2007 (Figure II-7).

In comparison, the net oil import dependence of the United States – the world's largest oil-consuming country ahead of China – declined from 67% in 2007 to 51% in 2012 (BP 2013). Looking forward, China's oil demand is expected to rise continuously, but domestic production has stagnated. As a result, every incremental barrel of oil will be translated into more oil imports, leading to a higher import dependence ratio. According to Facts Global Energy (2013a), the net oil imports as a share of total oil consumption in China is forecast to go up to 67% in 2020.

* The author hereby acknowledges the research input provided by Robert Young, a Yale University undergraduate and research intern with FGE.

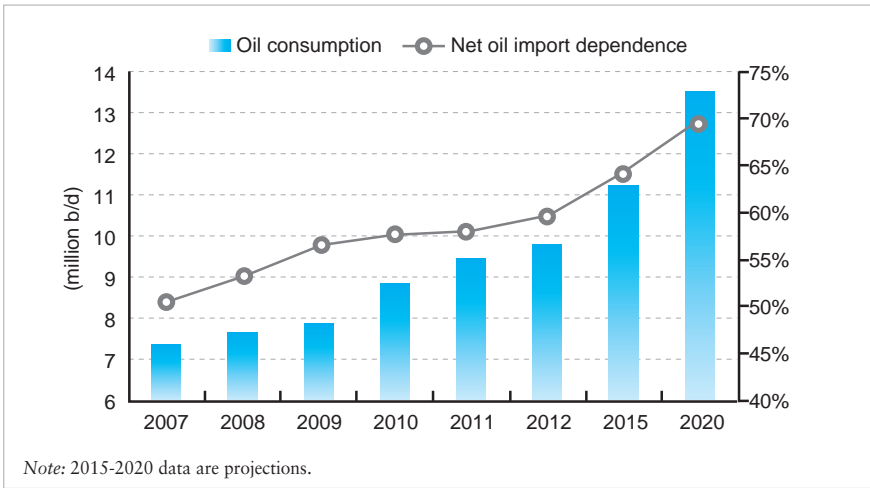


Figure II-7 China's oil consumption and net import dependence, 2007-2020

China has a small but fast-growing natural gas market. Until 2006, China did not import a single cubic meter of gas. The amount of imported gas has since grown rapidly and has become an important part of gas use in China. In 2012, the share of natural gas in China's total primary commercial energy consumption (PCEC) was under 5%, way below the global average share of 24% and 30% for the U.S., and less than one third of the average share of 19% for the rest of the Asia-Pacific region (BP 2013). Despite the small share in total PCEC, China is the largest natural gas consuming country in Asia. In

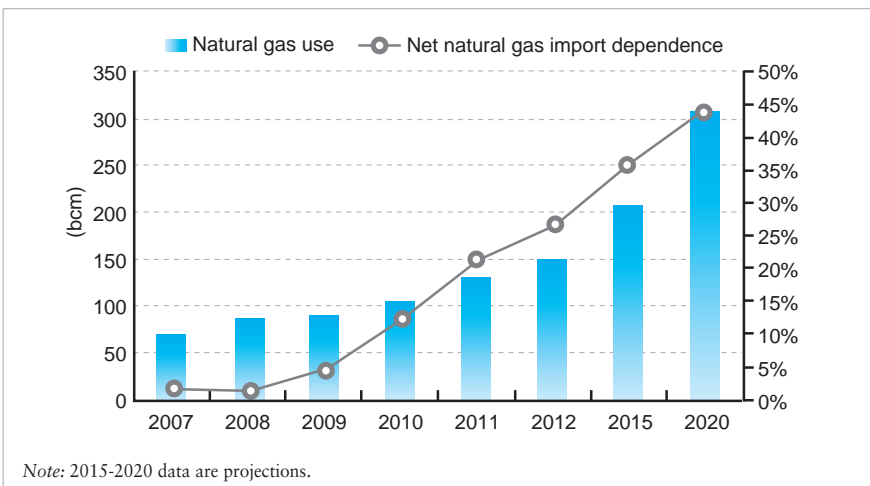


Figure II-8 China's nature gas use and net import dependence, 2007-2020

2012, China imported 14.7 million tonnes (mmt) of LNG (23 billion cubic meters or bcm) and 23 bcm of pipeline gas. After taking out the volumes of Chinese gas exports to Hong Kong, the net gas imports accounted for 27% of China's total gas consumption in 2012, up from merely 2% in 2007 and 1% in 2008 (Figure II-8).

Unlike oil, China's domestic natural gas production still has huge room to grow. The emergence of shale gas, along with other unconventional types of gas, such as coal-bed methane (CBM) and coal-to-gas (CTG), will add more to the domestic supply. However, with the rapid growth of gas demand, China will still need to import more LNG and pipeline gas. By 2020, the share of net natural gas imports in China's total natural gas use is likely to go up to 44% (FGE 2013a). If domestic unconventional gas is included, the share of imports is lower both at present and in the future.

When it comes to coal, which is not the focus of this note, the situation is quite different. China was a net coal exporter for decades. But in 2009, it switched to a net importer. In 2012, China imported 288 mmt of coal, the highest in the world, ahead of Japan. However, the share of China's net coal imports was only 7% of the country's total coal consumption.

Given the above circumstances, energy security has become vital for China. Since the early 2000s, the Chinese government adopted a series of measures to address the issue of energy security. As far as oil and gas are concerned, some of the key measures are to: (1) establish strategic upstream oil and gas reserves, (2) enhance domestic oil and gas exploration and production activities, (3) diversify sources of oil and gas imports, (4) strengthen overseas investments, (5) increase investments in the oil and gas infrastructure, and (6) speed up unconventional gas development.

Of these key measures, 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. To diversify sources of energy supplies, China imports oil from all over the world. In 2012, the Middle East accounted for half of China's crude oil imports, followed by Africa with 24%, Russia, Central Asia, and Latin America with 23%, and the rest of the world with 3%. For natural gas, while China imported all of its pipeline gas from Turkmenistan in 2012, imports of LNG were more diversified. Altogether, China imported 54% of its gas (LNG and pipeline gas combined) from Central Asia (Turkmenistan), 26% from the Asia-Pacific region (including Russia), 19% from the Middle East, and 1% from the rest of the world. For both oil and gas, China is eager to diversify its

sources of imports further. As such, seeking supplies from the Arctic, if they are available and economically viable, fits naturally into this strategy.

China's push in the area of overseas investments has been strong and steady since the late 1990s. The cumulative actual and intended investments by Chinese national oil companies (NOCs) and other players have exceeded USD \$120 billion. In 2012, China's equity oil production from overseas operations reached an all-time high of 1.7 million b/d. That was 41% of China's domestic oil production and one-sixth of China's total oil demand.

In the above picture, the Arctic has become increasingly important. 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. These efforts include the opening of two oil pipelines (one from Kazakhstan and one from Russia) and two natural gas pipelines (one from Turkmenistan via Uzbekistan and Kazakhstan and another one from Myanmar), the pending operation of a third oil pipeline (Myanmar-China), and expansions of the existing gas and oil pipelines from Central Asia and Russia. Any potential new supply from the Arctic for China will thus satisfy the Chinese government's desire for continuous import diversification.

Regarding overseas investments, 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.

As far as diversification of oil and gas supply sources and increasing overseas oil and gas investments are concerned, the importance of the Arctic can be viewed from a number of angles. First, commercially available oil and gas from the Arctic in the future represents a new source of supply that can help China better manage its external energy flows. Second, the Arctic is one of the new frontiers for Chinese NOCs to expand their overseas investments. Third, through energy trade and investment, China can expand its activities in other areas of Arctic business. Finally, although China does not border the Arctic, it is geographically "close" to the region. As China integrates with the rest of the world as a regional and global power, it is only natural for it to get more involved in all aspects of Arctic affairs, including energy.

Arctic oil and gas is generally attractive to China mainly because of the huge resource potential and future prospects there. However, the Chinese NOCs are currently moving in small steps. To make Arctic oil and gas more

attractive to the Chinese government and NOCs, several conditions need to be met. First is the need for direct links of Arctic oil and gas supplies to the Chinese market. With direct links, the Chinese government will be more supportive in viewing the Arctic as a new source of energy supply. Second is the embrace of foreign investment from China by the Arctic countries. Third is the matter of transparent regimes and open acreage for foreign investment in the Arctic. Fourth is the existence of opportunities to form joint ventures with local or international companies engaged in Arctic oil and gas development and purchase of local energy assets. Last, the Chinese NOCs need international partners to ensure the availability of all technologies needed to conduct oil and gas exploration, development, and production.

CHINA'S ROLE IN THE DEVELOPMENT OF ARCTIC ENERGY

China is not a claimant state regarding the Arctic, but that does not prevent it from desiring to play a role as a global power in the region. After years of applying, China was granted observer status in the Arctic Council in May 2013, along with India, Italy, Japan, Singapore and South Korea (Myers 2013). Since the mid-2000s, China has gained recognition as a player in the Arctic business mainly due to its rising economic might, growing interest in investments, and willingness to be a responsible economic partner (Struzik 2013). For the Arctic's energy and natural resources, China seeks to participate in exploration, development, and eventually production as a major investor (Wu 2012). As mentioned previously, China will be a major market for oil and gas produced from the Arctic.

More specifically, China's role in the development of Arctic energy can be assessed from both trade and investment perspectives. For trade, China is the biggest market for any future oil and gas exported from the Arctic region. Even with Arctic oil and gas flowing to other parts of the world, a large portion of the displaced volumes from sources supplying those markets will also come to China. In that regard, China plays an important role in Arctic oil and gas developments even without direct investment there.

In the early stage of Arctic development, China can play a bigger role in the area of investment. As mentioned in the previous section, overseas

investment has for years been one of the key energy security measures adopted by the government. The Arctic is a new frontier area for Chinese investors, led by the NOCs, which mainly consist of China National Petroleum Corporation (CNPC) and its publicly listed subsidiary PetroChina, China Petrochemical Corporation (Sinopec) and its publicly listed subsidiary Sinopec Corp., China National Offshore Oil Corporation (CNOOC) and its publically listed subsidiary CNOOC Ltd., and Sinochem Corporation. Among these four, CNPC/PetroChina and Sinopec have various energy investment projects in Russia with Rosneft, Novatek, and others. Concerning the Arctic, CNPC/PetroChina signed a deal with its partner Rosneft in March 2013 for oil and gas drilling in three areas of the Pechora and Barents seas (Bloomberg 2013). Separately, following China's acceptance as an observer with the Arctic Council, CNOOC has entered into a partnership with Eykon Energy of Iceland in seeking a license for oil and gas exploration in Iceland's Arctic waters (Williams 2013). If the application goes through, it will be the first direct exploration project by a Chinese NOC in the Arctic outside of Russia. In June 2013, CNPC signed a Framework Agreement to acquire a 20% equity share in the Novatek-led Yamal LNG project. A deal was finalized in early September 2013, under which CNPC committed to the purchase of at least 3 mmtpa of LNG from the project. CNPC agreed to help procure external financing for the Yamal LNG project from Chinese financial institutions. As a result, the China Development Bank Corporation, Industrial and Commercial Bank of China, Bank of China, and China Construction Bank will consider taking roles in the project financing of Yamal LNG (FGE 2013b).

In short, the likely role for China in the development of Arctic energy will be both an investor and a buyer of energy. China can participate in investment during the oil and gas exploration stage and then import energy at a later stage when resources are developed and produced. China is also likely to be an active player in non-energy trading, investing, shipping, infrastructure buildup, local developments, and some industrial activities in the Arctic.

RUSSIA-CHINA ENERGY COOPERATION IN THE ARCTIC CONTEXT

Russia-China energy cooperation is wide-ranging, and has been nurtured

by both sides at the government and company levels. Russia is the only country that sends all three types of fossil energy to China: it is currently the largest pipeline oil exporter to China, and it sends coal and LNG to China as well, albeit in smaller volumes. The biggest disappointment for energy cooperation between Russia and China is the failure to reach a natural gas pipeline deal after tortuous negotiations of nearly a decade.

In the Arctic context, Russia-China energy cooperation is also important. Of all Arctic Council members, Russia is rather unique from China's perspective. Russia is the third-largest oil exporting country to China (accounting for 9% of China's total in 2012) and 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. Russia is not only the largest Arctic country, but also the only one that shares a border with China. Russia is also rich in oil and gas resources, which can only grow with the development of the Arctic.

As mentioned earlier, Russia's Rosneft has already begun engaging CNPC/PetroChina in oil and gas investment activities in the Arctic areas. It is expected that other Chinese NOCs will follow suit in the not-so-distant future.

China and Chinese NOCs generally prefer to deal with Russia and Russian companies on a bilateral basis. For the Chinese government, it is a tradition to deal with important partners, particularly big ones, bilaterally. Chinese NOCs follow that tradition. More importantly, the NOCs compete among themselves in the domestic energy business, and they also often compete in international arenas. To have Chinese NOCs cooperating with each other is difficult and a challenge in itself, let alone having wider cooperation with partners from other countries. However, individual NOCs in China have experience and prefer to work mostly with international oil companies in jointly bidding for projects around the world. China and Chinese NOCs need to learn to work with other companies, particularly those from Japan and Korea.

CONCLUDING REMARKS

Various studies show the potential of oil and gas resources in the Arctic and surrounding regions. The U.S. Geological Survey (USGS) released two studies in 2012. A study of the Amerasia Basin petroleum province

(Houseknecht et al., 2012a) shows 3 billion barrels of oil equivalent discovered but not produced, and 9 billion barrels of oil and 57 trillion cubic feet of natural gas undiscovered but technically recoverable resources. A study of the Arctic Alaska petroleum province (Houseknecht et al., 2012b) indicated that the undiscovered, technically recoverable resources are estimated at 30 billion barrels of oil and 219 trillion cubic feet of natural gas. At the 2012 North Pacific Arctic Conference, Moe (2012) stated that oil and gas resource potential in the Arctic is huge. For proven reserves, the Arctic accounts for 4% of the world's total for oil and 19% for gas. If the unproven portion is added, the share of the Arctic is 7% for oil and 24% for gas. The move from unproven or technically recoverable resources to proven reserves is a big step. However, with continuous growth in energy use with a large base, the implications of the resource potential in the Arctic are still huge for China in the long run.

Overall, the Arctic is important for China's long term-energy supplies due to the continuous growth of its energy needs and the sheer volume required in the long run. While Arctic oil and gas is attractive to China, several conditions, such as direct links of Arctic oil and gas supplies to the Chinese market, acceptance of foreign investment from China by Arctic countries, transparent regimes and open acreage, opportunities to form joint ventures with local or international companies, and technology availability need to be met before Chinese NOCs massively invest in the region. China can play an important role as both an energy buyer and investor in the development of Arctic energy. Lastly, 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.

Notes

1. The author hereby acknowledges the research input provided by Robert Young, a Yale University undergraduate and research intern with FGE.

References

- Bloomberg. 2013. "Russia Lets China into Arctic Rush as Energy Giants Embrace." March 25. Accessed July 29, 2013. <http://www.bloomberg.com/news/2013-03-25/russia-cuts-china-intoarctic-oil-rush-as-energy-giants-embrace.html>
- BP (British Petroleum). June 2013. BP Statistical Review of World Energy 2013.
- FGE (FACTS Global Energy). 2013a. *FGE Data Books*. Spring.
- FGE. 2013b. *Global LNG Monthly Series: Markets*. September 23.
- Houseknecht, D. W., Bird, K. J., and Garrity, C. P. 2012a. *Assessment of Undiscovered Petroleum Resources of the Amerasia Basin Petroleum Province, Scientific Investigations Report 2012–5146*. Reston, Virginia: U.S. Geological Survey.
- Houseknecht, D. W., Bird, K. J., and Garrity, C. P. 2012b. *Assessment of Undiscovered Petroleum Resources of the Arctic Alaska Petroleum Province, Scientific Investigations Report 2012–5147*. Reston, Virginia: U.S. Geological Survey.
- Moe, A. 2012. "Arctic Oil and Gas Development: What Are Realistic Expectations?" Paper presented at the 2012 North Pacific Arctic Conference, August 10-12, East-West Center, Honolulu, Hawaii, USA.
- Myers, S. L. 2013. "Arctic Council Adds 6 Nations as Observer States, Including China." *The New York Times*, May 15. Accessed July 27, 2013. http://www.nytimes.com/2013/05/16/world/europe/arctic-council-adds-six-members-including-china.html?_r=1&
- Struzik, E. 2013. "China Signals Hunger for Arctic's Mineral Riches." *Guardian Environment Network*, June 4. Accessed July 27, 2013. <http://www.theguardian.com/environment/2013/jun/04/china-arctics-mineral-riches>
- William, S. 2013. "China's CNOOC Eyes First Foray Into Offshore Arctic Oil Drilling." *The World Street Journal*, June 5. Accessed July 29, 2013. <http://online.wsj.com/article/BT-CO-20130605-707202.html>
- Wu, K. 2012. "Potential Arctic Oil and Gas Developments: Chinese Perspective." Paper presented at the 2012 North Pacific Arctic Conference, August 10-12, East-West Center, Honolulu, Hawaii, USA.

Japanese perspective

Fereidun Fesharaki and Tomoko Hosoe

This commentary summarizes the implications of Arctic petroleum development for Japan. We consider the potential importance of Arctic energy supplies for Japan. We also highlight the changes needed at the federal government level to formulate a coherent Arctic energy policy and thereby encourage investment. Finally, we contemplate the potential for cooperation with Russia to spur Japanese investment – and possibly energy procurement – from the Arctic region.

JAPAN'S LONG-TERM ENERGY SUPPLIES: THE IMPORTANCE OF SUPPLY SECURITY

Japan is almost 100% dependent on imports to guarantee its energy supplies. Given its lack of indigenous fossil fuel reserves, the importance Tokyo assigns to “security of supply” has always been significant. However, the issue assumed even greater prominence in the 1970s, when Japan was impacted by the two global oil crises that unfolded during that decade. Japan’s response was swift and multifaceted:

- Cognizant of its huge reliance on imported Middle Eastern oil, Japan encouraged the growth of gas in the nation’s energy supply mix, with a preference for sources outside the Middle East. This accounts for Japan’s patronage of LNG projects in the Asia-Pacific region, which continues to this day.
- Japan also emphasized the role of nuclear power in its power generation mix in a bid to reduce its dependence on energy imports.
- Tokyo also implemented a series of energy efficiency and conservation measures.

Japan’s commitment to energy supply security remains steadfast. But the two energy supply responses devised by Tokyo in the 1970s to address concerns about dependence on supplies from the Middle East are losing ground. The reasons for this are simple. Some of the Asia Pacific LNG projects launched in the 1970s and 1980s that were essentially dedicated to

Japan are maturing. Japanese buyers are consequently seeking LNG supply sources elsewhere, such as from North America and Russia, to compensate for declining “legacy” LNG supply contracts and to meet new gas demand.

Also, the 2011 Tohoku earthquake and tsunami resulted in the closure of vast quantities of Japanese nuclear power generation capacity. As of August 2013, all but two of the country’s 50 nuclear power generation units (2.4 gigawatts out of over 46 GW) remained closed (Hosoe 2013). Fossil fuels are compensating for some of the shortfall. But given the 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.

We believe that more nuclear plants could be back online toward the end of 2013, although the long-term outlook for nuclear power in Japan is poor. Four companies have submitted papers seeking to resume operations at four nuclear power plants around the country, representing 11.3 GW of capacity (see Hosoe 2013). The country’s Nuclear Regulation Authority (NRA) is set to release the safety examination results for these plants by the first quarter of 2014. If all goes well, Japan might have five nuclear plants back in service – toward the end of the year. Two new facilities currently under construction will also be placed into service upon completion.

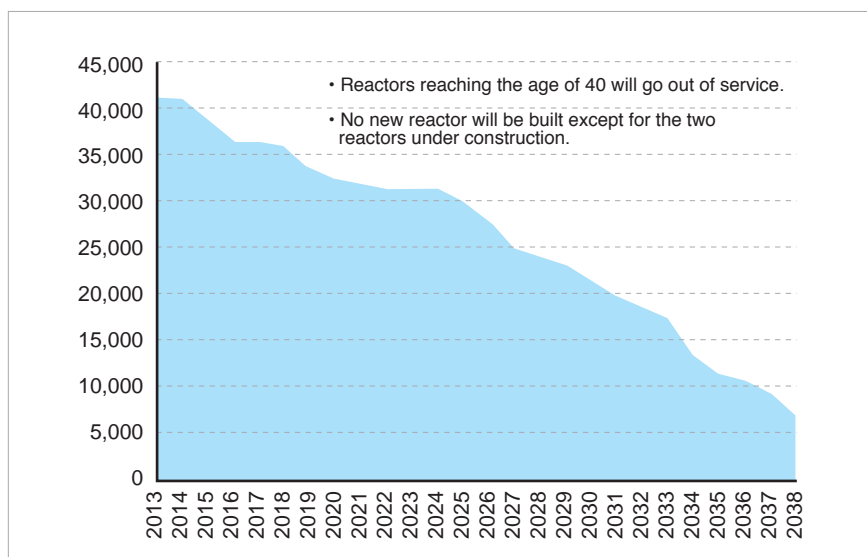


Figure II-9 Forecast Japanese nuclear capacity declines (MW)

However, no more new construction is expected. Older, existing plants will be decommissioned once they reach the age of 40. As a result, Japan's nuclear power generation capacity could dip below 30 GW by the middle of the next decade (see Hosoe 2013).

Given the circumstances outlined above, energy security has become even more of a hot-button issue for Japan. To guarantee its petroleum supplies, Japan has long followed a multi-pronged strategy. This includes: (1) the creation of a state-controlled strategic oil reserve as well as private oil reserve, (2) a focus on domestic petroleum exploration and research, especially in the field of unconventional petroleum sources such as gas hydrates, (3) diversification of petroleum import sources, and (4) participation in the petroleum projects that supply Japanese imports, especially the upstream components of these projects.

Of these key measures, Japan's quest to diversify its petroleum import sources and its record of participating in many overseas oil and gas projects that supply Japanese demand are the most pertinent to this analysis. The Arctic represents a brand new potential source of supply for Japan. It is a frontier location for conventional hydrocarbons, albeit a long-term one. The Arctic holds an estimated 13% (90 billion barrels) of the world's undiscovered conventional oil resources and 30% of its undiscovered conventional natural gas resources, according to a 2012 U.S. Geological Survey (USGS) assessment (USEIA 2013). Given the region's remoteness and the technical challenges inherent in exploiting Arctic reserves, the Arctic is unlikely to see development for at least another couple of generations – assuming, of course, that oil prices are high enough to support it. But fossil fuel exploitation is a very long-term play, and hence, it is not premature to consider the implications of Arctic resource development for Japan at this juncture.

At this time, the Arctic holds a considerable promise for Japan, not only as a potential new supply region, but also in terms of potential Japanese business opportunities. There are numerous precedents for Japanese companies investing in the development of their fossil fuel supply sources. For example, upstream companies such as INPEX and gas/power utilities like Tokyo Gas and Tokyo Electric Power are already project participants and offtakers from LNG supply projects in Australia (e.g., Darwin LNG and Ichthys LNG). Additionally, Japanese trading houses' financial support has paved the way for utilities to patronize LNG projects in the Asia-Pacific region (e.g., Australia's North West Shelf project, Russia's Sakhalin

II project) and the Middle East (e.g., Abu Dhabi's ADGAS project). Finally, in addition to the customary roles for upstream companies, trading houses, and utilities, the Arctic offers new prospects for Japanese financial institutions, engineering companies, and shipping companies.

JAPAN'S ROLE IN THE DEVELOPMENT OF ARCTIC ENERGY

Owing to its geographical location, Japan does not have a legal title to access natural resources in the Arctic region. But the nation was granted observer status by the Arctic Council in May 2013, along with India, Italy, China, Singapore, and South Korea. These additions reflect the heightened interest by some of the world's most powerful economies in the Arctic region's resources, which include petroleum as well as minerals, seafood, and new transportation possibilities (Associated Press 2013).

Until fairly recently, framing a policy on Arctic issues was not a priority for Tokyo, as the industry was "hopelessly bewildered" on the subject of formulating an Arctic business strategy (Ocean Policy Research Foundation 2012). But this is apparently changing. Melting ice in the polar region increases the feasibility of ships traversing the Northern Sea Route (NSR) across the top of Russia and the Northwest Passage through Canada's Arctic Archipelago. This offers the potential benefit of reduced shipping costs for Japan. Already, there have been forays in Arctic resource shipments to Asia. In June 2011, the independent Russian petroleum company Novatek sent 60,000 tons of condensate from Murmansk to the Chinese port of Ningbo. In late 2012, Russian state-controlled gas giant Gazprom sent an LNG cargo from Norway's Snøhvit liquefaction terminal in Hammerfest to the Japanese port of Tobata. The route was cleared by Russian icebreakers (Hiscock 2013).

It remains to be seen how Japan will use its newfound Arctic Council observer status. Japan readily admits its historic lack of a unified Arctic policy/strategy, especially on the topic of fuel resources. Although it is rapidly recognizing the importance of remedying this deficiency, it might take some time. To accomplish this, the particular characteristics of the Japanese government administration, where horizontal ministerial cooperation is rare, must be overcome (Tonami and Watters 2012). Today, various ministries deal with specific issues relating to the Arctic

(environmental issues, scientific research, foreign policy, energy security issues, ocean policy and the shipping industry). The idea of an organized government body that speaks with one voice on the topic of Japan's approach to potential future Arctic resource development, or even the idea of high-level cooperation between the various departments, is therefore novel. But in our view, a cross-ministerial, centralized Arctic policy to support business/industry is essential for Japan if it hopes to benefit from the development of Arctic resources. It is hoped that Japan's new observer status, together with a clearer delineation of the Arctic region's resource potential, will provide the incentives needed for Tokyo to devise a coherent Arctic strategy. It is further hoped that Japan's new Arctic Council status will set the wheels in motion for government/industry coordination conducive to an agreeable investment climate for Japanese companies.

RUSSIA-JAPAN ENERGY COOPERATION IN THE ARCTIC CONTEXT

Japan is not an Arctic coastal state. To carve out a role in the region's resource development, it must focus its attention on bilateral relations with states that do have an Arctic presence,¹ most likely Russia. Of all the Arctic countries, Russia has the longest Arctic coastline, and is certain to assume a prominent role in the region's resource development. Moreover, Russia and Japan have already established a relationship as a petroleum supplier/off taker, which could form the basis of new initiatives. For example, Russia's Sakhalin II LNG export project, which exported its first LNG cargo in 2009, was predicated on LNG sales to Japan. Russia's Gazprom and a consortium of Japanese companies are also working together, with the express backing of Moscow and Tokyo, to develop the green field Vladivostok LNG project.

Given this preexisting relationship, and the fact that Russia can claim vast tracts of land and sea for Arctic resource exploration by virtue of its sheer size, any Japanese quest to seek Arctic resources will probably use the existing Russo-Japanese relationship as a starting point. However, there are unresolved issues between the two nations, especially the long-running dispute over the Kuril Islands. Although the dispute has not blocked the Russo-Japanese development of Sakhalin II and cooperation on Vladivostok LNG, it could rear its head in the future. Efforts by both

countries to establish a bilateral framework for Arctic issues might be necessary, which could include high-level talks between ministries and a private-public collaborative “Japan-Russia Arctic Forum” of sorts (see OPRF 2012) to maintain goodwill. Before making any overtures to Russia, however, the onus is on Japan to reach a consensus at home on a coherent Arctic policy and formulate what Japanese policymakers believe to be an agreeable fiscal and legal framework conducive to investment.

CONCLUDING REMARKS

Based on current information, the Arctic has vast resource potential. But tapping these resources will not be easy. Consideration of these resources as (eventually) commercially viable is relatively recent, owing in no small part to the sustained high oil price environment in recent years as well as declining conventional reserves worldwide and the emphasis on developing unconventional resources. Ultimately, much work needs to be done before the Arctic’s unproven or technically recoverable resources can be transformed into a proven reserves base. But Japan’s growing recognition of the Arctic as a potential resource supply frontier and the government’s cognizance of the need for a coherent Arctic policy are encouraging developments. If history is any indication, Japan is capable of playing a dual role in resource development as co-investor and customer. This is highly favorable for Arctic nations seeking the partners and market outlets needed to support Arctic resource development on their lands and in their territorial waters. Russia will undoubtedly be Japan’s first port of call when evincing interest in Arctic resource development and potential energy supplies.

However, the possibility of Japan soliciting cooperation with other potential buyers and investors such as China and Korea cannot be ruled out. A unified “buyer’s forum” would give Asian energy buyers and investors a stronger voice in Arctic affairs, and consequently, ensure they have a bigger impact on Arctic oil and gas developments.

Note

1. The area north of the Arctic Circle is apportioned among eight countries: Canada, Denmark (Greenland), Finland, Iceland, Norway, Russia, Sweden, and the United States. Under current international practice, countries have exclusive rights to seabed resources up to 200 miles beyond their coast, an area called an Exclusive Economic Zone (EEZ). Beyond the EEZ, assessments of “natural prolongation” of the continental shelf may influence countries’ seabed boundaries. See EIA 2012.

References

- Associated Press. 2013. “Arctic Council Grants China, Japan Observer Status.” May 15. Accessed October 9, 2013. <http://www.cbc.ca/news/canada/north/arctic-council-grants-china-japan-observer-status-1.1375121>
- FGE (FACTS Global Energy). 2013. *Gas Databook 2013*.
- Grashenkov, A. 2011. “Russia-Japan: The Kuril Islands Conflict and Russia’s Defense Arsenal in the Far East.” *Global Research*, February 13, 2011. Accessed October 15, 2013. <http://crisisboom.com/2011/02/13/russia-japan-kuril-islands/>
- Hiscock, G. 2013. “China Eyes Russian Options in Energy, Transport.” *CNN*, May 16, 2013. Accessed October 8, 2013. <http://edition.cnn.com/2013/05/16/business/china-arctic/index.html>
- Hosoe, T. 2013. “Japan Focus.” Session 8, FGE Pacific Petroleum Insiders (PPI) Briefing September 5-6, 2013. Singapore.
- Ocean Policy Research Foundation (OPRF). 2012. “Developing a Japan Policy Toward the Arctic Ocean.” Paper presented at the Arctic Conference Japan, March 2012. Accessed October 8, 2013. <http://www.nccj.or.jp/wordpress/wp-content/uploads/2013/02/Developing-a-Japan-Policy-towards-the-Arctic-Ocean-OPRF.pdf>
- Tonami, A. and Watters, S. 2012. “Japan’s Arctic Policy: The Sum of Many Parts.” *Arctic Yearbook 2012*: 93-102.
- U.S. Energy Information Administration (USEIA). 2012. “Arctic Oil and Natural Gas Resources.” January 20. Accessed October 11, 2013. <http://www.eia.gov/todayinenergy/detail.cfm?id=4650>
- U.S. Energy Information Administration (USEIA). 2012. “Arctic Oil and Natural Gas Resources.” January 2012.

Korean perspective

Seong-Min Lee

In order to comprehend the Korean perspective on Arctic energy development, one needs to understand the position of Korea on oil and gas supplies. There is no regional trunk line to transfer these commodities among the Far East nations: Korea, Japan and China. Both Korea and Japan are poor countries in energy resource. Thus, they each have to operate their own stringent demand/supply policy by trading outside the region. Moreover, both countries are especially remote from available energy sources and thus have been dependent on the Middle Eastern and Southeast Asian markets. Both countries are subject to the so-called “East Asian premium” in energy prices. Therefore, the main principle for Korea to procure hydrocarbon energy is to secure a supply in a timely and cost-effective manner.

The development of energy resources outside Korea by domestic companies has been encouraged by the government since 2008. National companies such as Korea National Oil Corp. (KNOC) and Korea Gas Corp. (KOGAS), as well as a couple of private companies, have concentrated on the exploration and development business.

Korea has been increasing its level of reliance on gas while decreasing reliance on oil with the objective of consumption diversification for primary energy as shown in Figure II-10 (a). This trend coincides with expectations in the National Energy Basic Plan (NEBP) released in 2008, which is the primary plan for Korea’s energy policy. In this report, the energy mix was forecast as illustrated in Figure II-10 (b).

The NEBP is revised and published every five years; it is expected to be released again in 2013. However, it has not been announced yet because of the drastic changes in energy resources, the international energy market likely caused by emerging unconventional energy resources and the catastrophic incident at the Fukushima nuclear plant in Japan. In such circumstances, the Korean government announced an interim plan for long-term natural gas demand/supply in April 2013. According to this plan, the share of natural gas will remain unchanged or be slightly reduced, as shown in Figure II-11. This is assumed to be attributable to a reduction in power generation using LNG, whereas nuclear and coal power generation are to be expanded.

The next key issue the NEBP has to consider is the share of nuclear power generation and renewable energy. Currently, renewable energy is expected to grow from the level of 11% in the previous plan, while the share of nuclear generation may be reduced due to the Fukushima incident. In the previous NEBP, nuclear generation was emphasized, but it is likely to

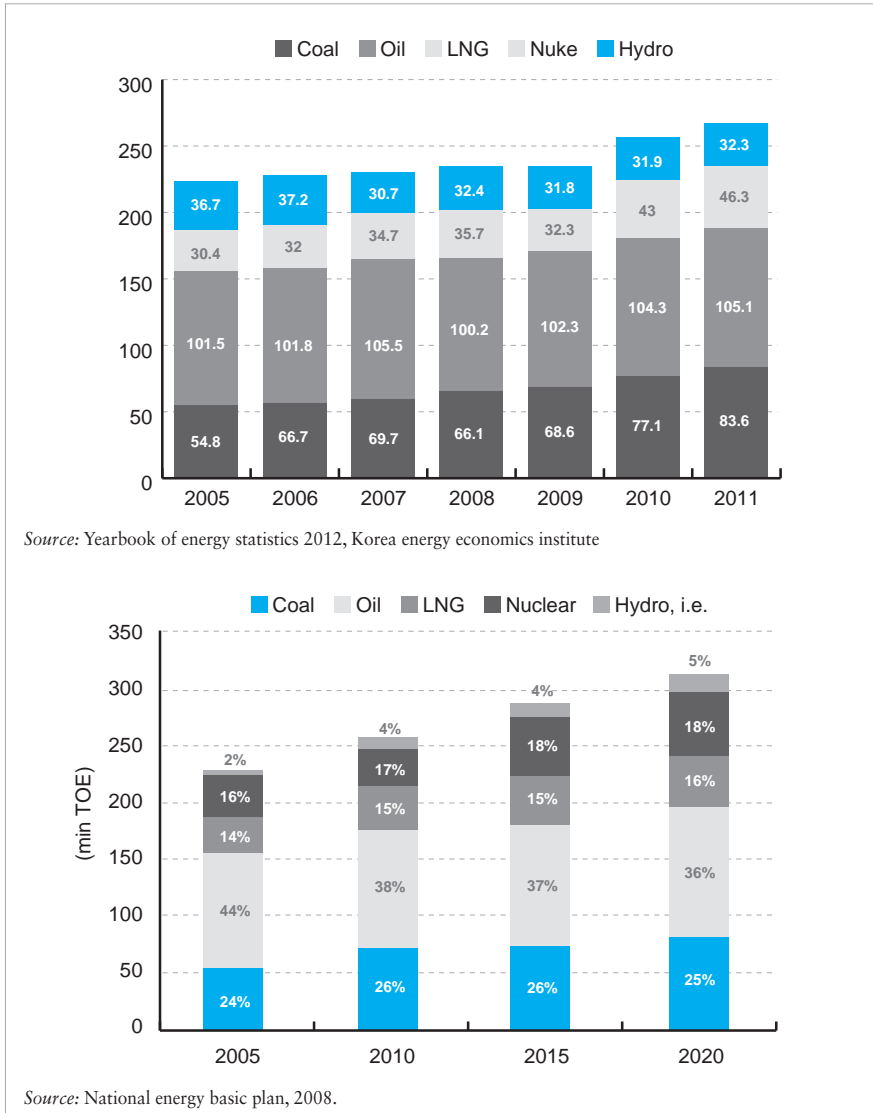


Figure II-10 (a) Korean primary energy market¹ and (b) Expected primary energy share²

be lower in the new plan.

Even though there is still controversy regarding the reduced role of natural gas in the interim plan, the forecast is that there will be a shortage from 2025 if the plan is implemented. The long-term volume deficiency can be addressed by Arctic resources with a long-term commitment to development or by competing unconventional sources such as shale gas and coal bed methane. Optimistically, if there is a finalized government policy that stresses a higher share of natural gas in the primary energy mix, the deficiency will increase and Arctic energy may become more attractive to Korea.

It is well known³ that KOGAS acquired a 20% share in the Umiak gas field in the Mackenzie River Delta from the Canadian company MGM Energy in 2011. This is the first Korean investment in a polar resource; it is now in the appraisal stage with production planned for 2020. KOGAS is also studying Arctic projects elsewhere, including all the on- and offshore areas of Alaska, Yamal, and Greenland. At the moment, however, the Arctic projects, including the Umiak field, are generally recognized as less attractive in terms of costs and uncertainty than onshore projects in non-extreme regions. The uncertainty comes from the possibility of a project falling behind schedule and doubts about year-round deliveries.

The uncertainty is mainly caused by the harsh environment,

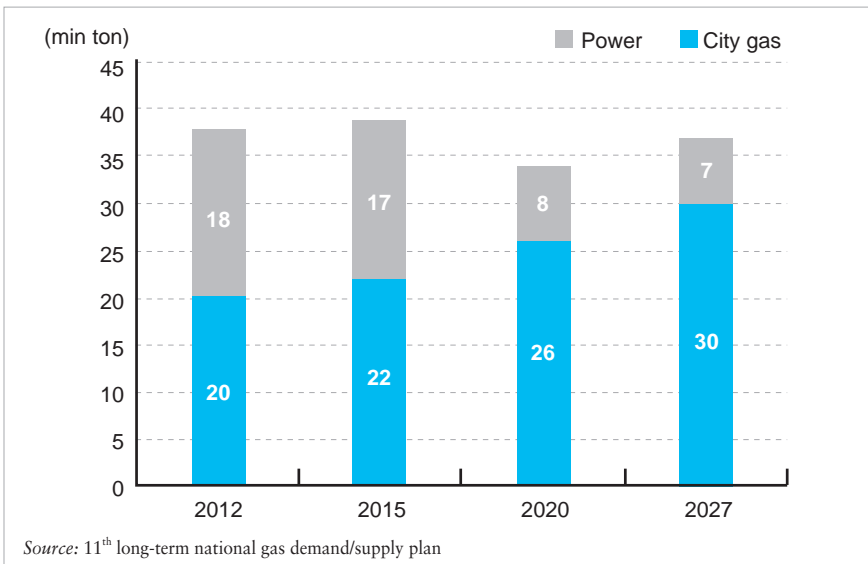


Figure II-11 Expected natural gas supply⁴

which could bring about many technical difficulties. The environment encompasses extreme weather, near-total darkness, potential ice hazards, and marshy tundra that could take a huge toll on equipment and personnel. Aside from this, the uncertainty can be triggered by many other reasons: unpreparedness of contingent spill contaminant/spill recovery plans, limited existing infrastructure prepared for cold weather and emergency response, competition with other resources such as shale gas, long project lead time, sovereignty claims, and country-specific environmental laws/regulations.

Nevertheless, one can agree that global cooperation has to be encouraged in various areas, as Professor Lawson Brigham pointed out in Part I. This may result in some kind of synergy. For example, fostering an Arctic-class ship industry may lead to pilot commercial shipping, followed by active trading between buyers and sellers throughout the Arctic Ocean, and the early establishment of relevant standards/codes, which in turn require global maritime cooperation.

ROLE OF KOREA IN ARCTIC ENERGY DEVELOPMENT

Korea can play a major role in the development of Arctic energy both as an industry partner and as an investor in and buyer of energy. Regarding the Northern Sea Route (NSR), Korea will endeavor to encourage its use by contributing to making icebreakers so as to enable commercial passage through the NSR. Korean shipyards can play a role in this area. It was recently reported⁵ that the Korean shipbuilder Daewoo Shipbuilding & Marine Engineering (DSME) won a bid for up to 16 ARC 7 ice-class tankers for the shipment of LNG from Russia's Yamal project.

Also, the Korean government and the commercial shipping company Hyundai Glovis are planning commercial navigation through the NSR this year. The company intends to launch a pilot commercial service on the NSR in the middle of October, with other Korean shippers set to follow suit.⁶ The first passage through the NSR by Hyundai Glovis will be made from Ust-Luga near the Baltic Sea of Russia to Sapo in Gwangyang, South Korea by the ice-class Norwegian carrier "Stena Polaris." It expects a 35-day navigation over a distance of 15,500 km, carrying 37,000 tons of naphtha.

KOGAS and other Korean oil and gas companies also can contribute to the development of Arctic resources as investors and buyers of energy. Aside from its own business, KOGAS is considering developing relationships

through its corporate social responsibility programs by encouraging learning and training for indigenous people and by promoting bilateral exchanges in various areas to understand cultural differences.

Korea won observer status on the Arctic Council at a meeting in Kiruna, Sweden last May. To boost its presence in the Arctic as a council observer, the Korean government is establishing a master plan for its Arctic strategy. This is being developed on the premise of sustainable development while considering climate change and safe utilization. It will release details of the plan at the end of 2013. It might make sense for the Arctic to be treated together with the Antarctic in a macroscopic sphere of polar science and engineering. This framework can support not only systematic approaches to overcome the technical difficulties mentioned earlier, but also new multidisciplinary solutions for traditional objectives such as biodiversity conservation and Arctic Ocean and Arctic marine ecosystem protection.

The Ministry of Oceans and Fisheries of Korea⁷ will do its best to promote the public welfare of mankind by emphasizing three goals of its Arctic policy: building partnerships with other countries, stepping up research in the Arctic, and creating new business opportunities.

COOPERATION WITH RUSSIA ON ARCTIC ENERGY DEVELOPMENT

Korea has a bilateral dialogue with Russia on Arctic energy development that addresses the merits of spatial location and long-lasting business relationships for pipeline gas (PNG) negotiations.

Over the last decades, a feasibility study was conducted and many commercial discussions on the introduction of PNG from eastern Russia have taken place. KOGAS strategically considered that the PNG project would be advantageous to LNG in terms of cost and stable supply. However, this effort has not yet succeeded due to the risks from North Korea and its economic issues. It does not seem likely to proceed for the time being due to the shale gas revolution. Other Arctic sources of oil and gas may provide an alternative.

The principal constraint on this option is likely to be the emergence of unconventional resources such as shale gas. In 2012, KOGAS contracted⁸

for 3.5 mtpa of shale gas with Sabine Pass LNG (Cheniere Energy) starting from 2017. The price of the gas on the Henry Hub spot market in mid-April, 2012 was below USD \$2US/MMBtu,⁹ while some prominent consulting companies such as Deloitte¹⁰ and Mackenzie¹¹ forecasted that the mid- to long-term price would be from USD \$4 to \$8/MMBtu. It seems to be quite a reasonable price compared to current LNG prices in the Middle East.

By virtue of the shale gas revolution and changes in the worldwide natural gas market, LNG trading is gaining a momentum compared to PNG. Russia also seems to be shifting to LNG projects from their traditional PNG. This is a big turning point in the Russian posture toward the natural gas business. In Eastern Siberia, for example, the Russians have already decided to export natural gas as LNG to East Asia and have constructed a liquefaction plant in Vladivostok. The required volume for KOGAS, over the long term, will probably be LNG, no matter where it originates.

This trend is not detrimental to Korea from a technical point of view. Since both Korea and Japan are traditionally LNG-utilizing countries, their gas industry infrastructure is also LNG-oriented. Thus, LNG projects are technically favorable in terms of gas interchangeability for gas burners and appliances and gas quality for emissions and infrastructure health. Nevertheless, Korea is still considering Russian PNG for long-term stability, even with the positive outlook for LNG projects.

In summary, bilateral communication with Russia is on-going for Arctic energy development. Arctic resources can be regarded as a long-term source of energy for Korea. However, the commercial availability of these resources is strongly dependent on the price of competing energy such as shale gas, oil, and so on. Thus, while longer seasons of Arctic navigation are becoming more likely, we need to enhance navigation technology to pass safely through the Arctic and to encourage innovation in resource development technology for harsh Arctic environments.

ACKNOWLEDGEMENTS

The author would like to thank Dr. Oh-Yig Kwon from DSME, and my colleagues Il-Oh Kang, Jeong-Min Han, Youn-Jeong Kim and Sueong-Ki Jo for their useful comments and information on this commentary.

Notes

1. Korea Economics Institute, Energy Statistics Yearbook 2012, 2012.
2. Korean Ministry of Knowledge and Economics, National Energy Basic Plan, 2008.
3. Market Wire (Marketwire.com), December 15, 2010.
4. Korean Ministry of Trade, Industry and Energy, 11th Long-Term National Natural Gas Demand/Supply Plan, 2013.
5. Shipbuilding Tribune (Shipbuildingtribune.com), July 4, 2013.
6. Asia News Network (asianewsnet.net), July 30, 2013.
7. National Arctic Roadmap, Korean government, in preparation (to be released in October 2013)
8. The Korea Herald (koreaherald.com), December 26, 2012.
9. Henry Hub Natural Gas Spot Price Chart, 2013.http://ycharts.com/indicators/natural_gas_spot_price
10. Deloitte press release (deloitte.com), July 26, 2011.
11. Wood Mackenzie press release (woodmacresearch.com), July 8, 2010.

PART III

POTENTIAL ARCTIC FISHERIES

Natural science perspective

Herald Loeng

INTRODUCTION

A high proportion of shallow continental shelves (Figure III-1), dramatic seasonal changes, low temperatures, extensive ice cover, and a large supply of freshwater from rivers and melting ice: this combination of extreme conditions makes the Arctic a unique marine ecosystem. This ecosystem hosts a large number of specialist species not found elsewhere. While these organisms have adapted to the Arctic environment over time, they continue to be challenged by extreme interannual variations.

Climate variability affects ecological processes in a multitude of well-documented ways, varying across a broad range of temporal and spatial scales. Empirical evidence shows the effects of climate variability on the dynamics of marine ecosystems; these effects carry with them potentially

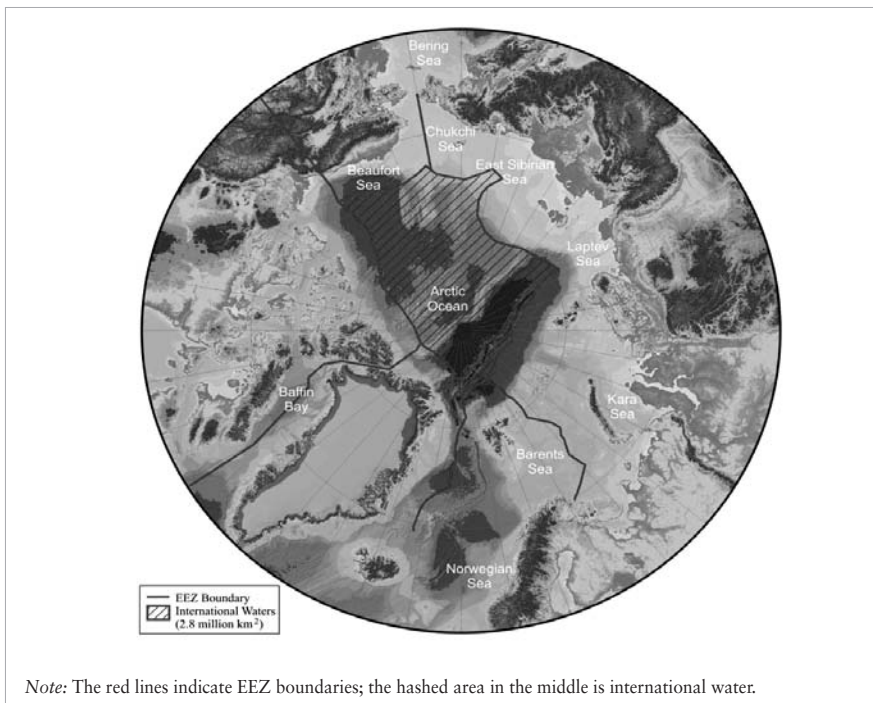


Figure III-1 Arctic Ocean and surrounding shelf seas

important implications for commercial fisheries.

The abundance and distribution of fish and shellfish stocks associated with long-term temperature changes provide one example. Fish can be affected directly through physiology, including metabolic and reproductive processes, and indirectly as their biological (predators, prey, species interactions) and abiotic environments (habitat type and structure) change. Added to these processes are ecological responses to climatic variation, which may be immediate or lagged, linear or nonlinear, and result from interactions between climate and other sources of variability (such as the amplification of climate effects due to fishing).

Significant progress has been made in identifying mechanisms by which climate change can affect fish population dynamics through efforts to understand how climate change will impact shifts in the distribution of fish species and through the development of climate models to predict the future effects of climate change on species distribution. Several cases show how increased temperatures can cause fish to migrate northward in the North, Norwegian, Barents and Bering Seas. The recent migration of mackerel into Icelandic waters may be a consequence of increasing ocean temperature.

Predicting the responses of commercial species to further climate change is of great interest to scientists, governments, and fishers. While acknowledging the present limitations in understanding, several scientists have synthesized existing information to develop conceptual models of how climate change will impact marine ecosystems. One question that weighs heavily in such efforts is whether it is possible to evaluate the potential for commercially important fish stocks to migrate from subarctic areas into the central Arctic Ocean or Arctic continental shelf seas.

Species such as Arcto-Norwegian cod and capelin that already live close to the Arctic Ocean are more likely to expand or move into the high Arctic than other species. Considerable uncertainty remains as to whether or not these species will be able to colonize the Arctic successfully. 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. Several species exhibit seasonal spawning or feeding migrations. If the quality or quantity of habitat changes, these migrations may fail. Qualitative assessments have identified several factors that will govern the potential expansion and movement of commercial fish and shellfish species into the

Arctic. 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.

The potential consequences of climate change for marine fish stocks may include large-scale geographical redistribution as well as alterations to the trophic flows and food webs. It is therefore important to understand the processes that influence the spatial distribution of fish stocks.

Our current understanding of the effects of these interactive forces is summarized in Hollowed, Planque and Loeng (2013). At this time, we can identify a number of issues that require further investigation in this context.

MAXIMUM SUSTAINABLE YIELD

There are few fishable resources in the Arctic Ocean today; immigration of species from further south in the near future is not likely. Several factors account for this situation. First, the Arctic Ocean has hitherto low primary production due to the almost permanent ice cover. Where there is no primary production, there will be no basis for a food web. Second, the Arctic Ocean is a deep ocean, preventing bottom-dwelling fish from entering, so the large stocks of demersal fish found in the surrounding shelf areas will not enter the Arctic Ocean, even if production should increase following the thawing of ice. Should plankton production increase in the future, some stocks of pelagic fish might enter the Arctic Ocean during a feeding migration in the ice-free season. Candidates on the Atlantic side include the big pelagic stocks in the Norwegian Sea; the Atlantic herring (*Clupea harengus*), the blue whiting (*Micromestitius poutassou*), and the stock of capelin (*Mallotus villosus*) in the Barents Sea. Other possible candidates among fishable resources for entry into the Arctic Ocean during feeding migrations are the beaked redfish (*Sebastes mentella*) and the Greenland halibut (*Reinhardtius hippoglossoides*), both deep-water species that live partly near the sea floor and partly lead a deep pelagic life. But even if these or other stocks 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.

In a situation where future temperatures in the sub-Arctic areas rise to a level at which the stocks living there today would have 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 lifecycle would have to change, giving rise to a new lifecycle with new spawning areas, nursery areas, wintering areas, feeding areas and migration routes of adult fish as well as 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 lifecycle in a new environment.

MANAGEMENT AND CONTROL

In a situation where resources have moved into the Arctic Ocean, either during part of the year or permanently, fishing there could be profitable. In such a situation, the management regime in force today would have to be amended to include these areas. The first parts of the Arctic Ocean to become ice-free and support harvestable stocks of fish or crustaceans would likely be the peripheral areas adjacent to the shelf seas to the south. These areas are found 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), which could undertake management beyond the exclusive economic zones in the Norwegian and Barents seas, or by a new management regime established by the countries surrounding the Arctic Ocean.

SOME POINTS FOR FUTURE RESEARCH AND DISCUSSION

1. How will the Arctic marine climate change? Will the Atlantic inflow increase or decrease, and how will warming from the atmosphere impact the temperature of the shallow shelf seas and the deep Arctic Ocean? Changes in the physical environment are highly uncertain, but critical for the kind of marine ecosystem that will develop in the Arctic. Improved modeling of the ocean and sea ice in global circulation models is necessary. For example, how will the thermohaline circulation change? What will be the consequences of changes in the thermohaline circulation for the position and strength of ocean fronts, ocean current patterns, and vertical stratification? The development of reliable regional models for the Arctic is essential in determining impacts on the physics and biology of Arctic marine ecosystems. Increased emphasis on coupling biological models with physical models is needed to improve predictive capabilities.
2. How will the productivity of Arctic ecosystems change? It is anticipated that climate change will result in higher phytoplankton production in the Arctic due to the loss of seasonal sea ice (<http://www.cbc.ca/news/technology/story/2012/06/07/sci-phytoplankton-blooms-arctic.html>). It is clear that we will have a longer production season in ice-covered areas, as described by Wassman (2011). But will the total primary production increase? Stronger stratification will reduce the vertical mixing and transport of nutrients from deeper layers to the surface layer where the primary production takes place.
3. What species are most likely to migrate successfully into the Arctic, establishing self-sustaining populations? Bottom topography will limit fish migration to the Arctic Ocean to pelagic species. Demersal stocks such as northeast Arctic cod and haddock will be unable to migrate to the deep Arctic Ocean. Climatic conditions and sea ice distribution are factors that also will influence future fish migrations. Other factors are food conditions and distance to spawning grounds. The timing of reproduction for many species is related to that of the behavior of their prey. How the timing and location of the production or spawning of most species may change in response to climate change is unclear. So is the potential match or mismatch

between predators and their prey. This factor could impact the whole Arctic ecosystem.

4. How are successful migrations likely to alter Arctic marine ecosystems? The biota is affected indirectly by atmospheric climate change through effects on the surrounding environment and on the food web. While the response of a species to change in one particular variable often can be surmised (but generally not quantified), its response to a collection of direct and indirect effects occurring simultaneously is considerably more difficult to anticipate. The nonlinearity of many relevant processes adds further complications. We cannot predict the competition that may occur if and when new species are introduced into the ecosystem. Many Arctic specialists have a relatively narrow habitat and other niche requirements. Their responses to possible increases in competition from more opportunistic/generalist species in a warmer Arctic are unclear. The abundance and variability of gelatinous zooplankton such as jellyfish have not been determined for most Arctic regions. Gelatinous zooplankton are known to be important as both predators and prey, and they can represent a significant component of the biomass at times. But their actual role within the ecosystem is unclear.

References

- Hollowed, A. B., B. Planque, and H. Loeng. 2013. "Potential Movement of Fish and Shellfish Stocks from the Sub-Arctic to the Arctic, Ocean." *Fisheries Oceanography* 22: 355-370.
- Wassman, P. 2011. "Arctic Marine Ecosystems in an Era of Rapid Climate Change." *Progress in Oceanography* 90: 1-17.

Social science perspective: the future of Arctic fisheries governance – a restless sea

David L. VanderZwaag*

INTRODUCTION

Harald Loeng's perspective is especially useful as a "myth buster." A considerable number of nongovernmental organizations (NGOs) and academics have jumped quickly to the conclusion that sub-Arctic fish stocks are swarming to the higher Arctic and that immediate establishment of a regional fisheries management organization (RFMO) is necessary to ward off the hordes of commercial fishers waiting in the wings. While recognizing the numerous uncertainties surrounding the prediction of future fish stock distributions in light of climate change impacts on the Arctic marine environment, Loeng's perspective offers a counter dose of scientific realism. Loeng highlights the various factors hindering the substantial movement of sub-Arctic fish stocks into the Arctic Ocean in the near future. Those factors include the cold water pool in the Bering and Chukchi Seas, the general low primary production of Arctic waters, and the prevalence of areas of deep ocean.

He notes the possibility that some pelagic fish stocks will enter the Arctic Ocean during feeding migrations in the ice-free season. Those stocks include Atlantic herring, blue whiting, capelin and two deep-water species, beaked redfish and Greenland halibut. However, he does not foresee a high probability of commercial fishing due to far greater accessibility to such stocks in more southerly waters.

Given his overall scepticism regarding future commercial fisheries in the Arctic Ocean, Loeng devotes minimal attention to future management scenarios. He suggests the areas of the Arctic Ocean will most likely experience commercially harvestable fish or crustaceans within the 200 nautical mile zones of the five coastal states where national governance regimes would apply. If commercial fishing in the Arctic Ocean beyond

* The author wishes to acknowledge the research support of the Social Sciences and Humanities Research Council of Canada (SSHRC) under the project, Tracking and Envisioning the Future of Arctic Ocean Governance.

national jurisdiction were to develop in the future, he notes that the existing North East Atlantic Fisheries Commission (NEAFC) already covers a significant portion of the area, and concludes that a new agreement might have to be forged and an equivalent commission formed to cover the broader ocean area.

Launching from Loeng's limited-governance discussion, my comments provide additional detail on the future governance of Arctic fisheries with a focus on the North Pacific Arctic and Central Arctic Ocean (CAO). A nautical image largely capturing the fishery governance seascape is that of a "restless sea."

RESTLESS SEA

Five unsettled governance dimensions stand out: the multiplicity of governance options offered by academics, NGOs and others; limited attention to CAO issues on the part of the Arctic Council; limited setting of governance coordinates by the five Arctic coastal states; the churning waters of Arctic marine scientific research, and ongoing debates within the United Nations over future governance of marine biodiversity beyond national jurisdiction.

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. Suggestions include: establishment of a regional fisheries management organization; possible expansion of the fisheries jurisdiction of NEAFC; creation of a regional ocean management organization; adoption of an Arctic Ocean framework convention applicable to the Arctic marine environment both within and beyond national jurisdiction; a regional *sui generis* approach whereby the five Arctic Coastal States (Arctic 5) would divide the "CAO pie" into national sections, and a declaration of governance principles, including a precautionary approach to new resource developments.

Limited Addressing of CAO Issues by the Arctic Council

The Arctic Council has not paid much attention to issues of fisheries management issues. Only recently has the Council paid attention to looming CAO living marine resource governance concerns. The Arctic Ocean Review (AOR) report, prepared by the Protection of the Arctic Marine Environment (PAME) Working Group and submitted to the May 2013 ministerial meeting in Kiruna, Sweden, included a chapter on living marine resources that suggested various possible future management options. These options include: expanding the existing United States' precautionary moratorium on commercial fisheries located in its Arctic exclusive economic zone (EEZ) to the broader CAO; establishing a treaty-based fisheries research council, and forging a less formal scientific committee.

The AOR-negotiated recommendation on fisheries resources beyond national jurisdiction is very general and noncommittal. Recommendation 10 simply calls for such fisheries resources to be “managed based on cooperation in accordance with international law to ensure long-term sustainability of fish stocks and ecosystems” (AOR, p. 94). The lack of greater clarity and specificity in the text apparently stems from concerns by Norway regarding the appropriateness of the Arctic Council versus the Arctic 5 as the proper forum for addressing fisheries issues in the Arctic Ocean.

Limited Setting of Governance Coordinates by the Arctic 5

The representatives of the five Arctic coastal states did address CAO governance tangentially at their meeting in Ilulissat, Greenland in May 2008. Through the Ilulissat Declaration, they indicated that the law of the sea provides a solid foundation for responsible management by the Arctic 5 and other users of the Arctic Ocean, and they opined that there is no need to develop a new comprehensive international legal regime to govern the Arctic Ocean. Under a law of the sea approach, all states enjoy various freedoms, including those of fishing and navigation, but various responsibilities would also apply, including duties to cooperate in conserving and managing fish stocks on the high seas.

Building on meetings of the Arctic 5 officials in Oslo in 2010 and a meeting of fisheries science experts in Anchorage in 2011, officials from Canada, Denmark, Norway, the Russian Federation and the United States met again from April 29 to May 1, 2013, in Washington, D.C. to discuss

possible future fisheries in the CAO. The Chairman's Statement from the meeting, while expressing the general understanding that commercial fishing in the high seas area of the CAO is unlikely to occur in the near future. It also noted a recognition of the desirability of addressing the possibility of future commercial fishing in the area. Key points relating to management that emerged from the discussions included: the present lack of need to establish any additional RFMO(s) for the area; the desirability of developing interim measures whereby commercial fishing in the high seas area should only take place pursuant to one or more regional or sub-regional fisheries management organizations or arrangements that are or may be established; the need to improve scientific understanding, and the appropriateness of the Arctic 5 taking the initiative on this matter.

The Washington meeting certainly leaves a "restless sea" in its wake. The Chairman's Statement recognized the need to engage with Arctic residents, particularly indigenous peoples, and acknowledged the advisability of including non-Arctic states in talks at some point in the future. Norway offered to host a further scientific workshop in October 2013 and Denmark offered to convene the next meeting of the Arctic 5 officials to continue policy discussions before the end of 2013. How interim measures might best be facilitated has not been sorted out, with various avenues possible, such as through a UN sustainable fisheries resolution, a declaration by the Arctic 5, or a multilateral agreement.

Churning Waters of Arctic Marine Scientific Research

Scientific research into changing Arctic fisheries appears to be quite fragmented and is evolving continually. 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. A new Convention on the Conservation and Management of High Seas Fisheries Resources in the North Pacific Ocean opened for signature in April 2012 and includes a commitment by parties to cooperate in enhancing scientific research on fisheries and associated ecosystems, although the scientific committee is not to duplicate the activities of other scientific organizations and arrangements that cover the new agreement's conservation area.

The role of the Arctic Council in facilitating and coordinating scientific research across the circumpolar Arctic might be described as a work in progress. Ministers of the Arctic Council at their May 2013 meeting in Kiruna agreed upon the great importance of cooperation in scientific research and decided to establish a task force to work towards an arrangement on improved scientific research cooperation among the eight Arctic states.

The initiative of the Arctic 5 to address possible future fisheries in the CAO is a further churning aspect. While consensus on the need to improve scientific understanding of the Arctic high seas areas was reached at the Washington, D.C. meeting of officials in 2013, precisely how to advance stronger scientific cooperation has yet to be determined.

Ongoing Debates within the UN

Debates within the UN over future directions for governance of marine biodiversity in areas beyond national jurisdiction have been ongoing for almost a decade. 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 Law of the Sea Convention and focused on marine biodiversity beyond national jurisdiction. Such an agreement might serve various functions, including a clarification of governance principles; fleshing out environmental impact assessment responsibilities and procedures, and providing a global mechanism for establishing marine protected areas in the high seas.

The main avenue for facilitating international discourse on these issues has been through the Ad Hoc Open-ended Informal Working Group to study issues relating to the conservation and sustainable use of marine biological diversity in areas beyond national jurisdiction. However, the Working Group has not been able to bridge the deep divide in national perspectives even after five meetings held between 2006 and 2012. A sixth meeting held in New York on August 19-23, 2013, called for a further of three meetings to develop recommendations on the scope, parameters and feasibility of an international instrument under the convention.

The unresolved UN debates represent a further “restless sea” reality for the Arctic Ocean. It remains to be seen whether new global commitments

to high seas governance will be forthcoming and, if so, what impact they would have on the Arctic.

CONCLUSION

While the “restless sea” image certainly captures the essence of present fisheries governance in the Arctic Ocean, two other nautical images round out the law and policy picture. The phrase “just leaving port” seems quite apt for a number of reasons. Arctic states have yet to develop a network of marine protected areas in the Arctic. The Arctic Council’s Conservation of Arctic Flora and Fauna (CAFF) Working Group has failed to deliver on the networking front, and the PAME Working Group has only placed the possible establishment of a regional network on the Arctic agenda in its most recent Workplan 2013-2015. Ascertaining the interests and views of indigenous peoples’ organizations and non-Arctic states in future Arctic Ocean fisheries has hardly begun, and avenues for future dialogue have yet to be defined. The implications of ecosystem-based management (EBM) in the Arctic have yet to be fully worked out, with a PAME-led Group of Experts on the Ecosystem Approach to Management continuing discussions on this topic. The AOR report recommended the periodic convening of Arctic Council-wide meetings on ecosystem-based management to share knowledge and experiences regarding management and science across Large Marine Ecosystems.

A “sea of challenges” is a further descriptor. Numerous transboundary fisheries-related challenges have yet to be sorted out. These challenges include: delineating the Canada-U.S. ocean boundary in the Beaufort Sea; working towards consistent national fisheries management approaches within Arctic EEZs, and ensuring effective fisheries governance under existing bilateral and regional agreements. For example, the North Atlantic Salmon Conservation Organization (NASCO) continues to struggle over the harvesting of Atlantic salmon off the coast of West Greenland. While scientists have consistently urged a precautionary halt to harvesting of a mixed stock that includes endangered North American salmon, NASCO has continued to authorize an annual take by Greenland for local consumption estimated to be about 20 tons. In 2012, Greenland’s harvest was estimated to be 34 tons, with a further 10 tons likely unreported. Greenland’s recent decision to allow landings for factory processing, including freezing, has

raised concerns over possible “quota creep.”

How Arctic fisheries governance at the national, regional and perhaps even global levels evolves in the future will likely depend on two main drivers. The impacts of climate change and globalization promise to propagate an ongoing “restless sea.”

References

- Hassan, Daud. 2009. “Climate Change and the Current Regimes of Arctic Fisheries Resources Management: An Evaluation.” *Journal of Maritime Law and Commerce* 40 (4): 511. Baltimore: Jefferson Law Book Company.
- Huebert, Rob, and Brooks B. Yeager. 2008. “A New Sea: The Need for a Regional Agreement on the Arctic Marine Environment.” WWF International Arctic Programme.
- Jeffers, Jennifer. 2010. “Climate Change and the Arctic: Adapting to Changes in Fisheries Stocks and Governance Regimes.” *Ecology Law Quarterly* 37 (3): 917-077(2010). Berkeley: UC Berkeley School of Law.
- Johnston, Douglas M. 2003. “The Future of the Arctic Ocean: Competing Domains in International Public Policy.” In *Ocean Yearbook* 17, edited by Elisabeth Mann Borgese, Aldo Chircop, Moira L. McConnell, 596-624. Chicago: University of Chicago Press.
- Molenaar, Erik J. 2009. “Climate Change and Arctic Fisheries.” In *Climate Governance in the Arctic*, edited by Timo Koivurova, E. Carina, H. Keskitalo and Nigel Bankes, 145-169. Berlin: Springer.
- Rayfuse, Rosemary. 2007. “Melting Moments: The Future of Polar Oceans Governance in a Warming World.” *Review of European Community and International Environmental Law* 16: 196-216. Oxford: Blackwell Publishing.
- PAME. 2013. The Arctic Ocean Review Project. Final Report (Phase II 2011-2013), Kiruna (May 2013).
- VanderZwaag, David L. 2011. “The Arctic Council at 15 Years: Edging Forward in a Sea of Challenges.” *German Yearbook of International Law* 54 (2011): 281-314.
- VanderZwaag, David L. 2009. “Climate Change and the Future of Arctic Governance: A Slushy Seascape and Hard Questions.” In *Climate Governance in the Arctic (Environment & Policy)* 50, edited by Koivurova, Keskitalo and Bankes, 403-427. Berlin and Heidelberg: Springer.

Conservation perspective

Henry P. Huntington

Harald Loeng's perspective does a nice job of laying out current scientific understanding about the fisheries biology of the Arctic Ocean and the prospects for substantial growth of existing Arctic fish populations or the northern shift in distribution of fishes currently found farther south. He acknowledges a degree of uncertainty in any such projections and notes that fishery management may have to adapt if fishable stocks are found in Arctic waters. This last point deserves further elaboration.

A key challenge in fisheries management is dealing with uncertainty. Fish stocks are variable in size and distribution, and estimates about both parameters often have wide margins of error. But fisheries management is fundamentally about managing human activities, and here there is less uncertainty. Humans have fished everywhere that fishermen have thought they might find fish.

In the absence of regulation, overfishing is the typical outcome, not an exception. Where sound fisheries management does exist, it has largely been implemented in response to crises, rather than as a means of creating sustainable outcomes from the start.

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 central Arctic Ocean. Beyond the EEZs of the Arctic coastal countries, these waters currently are not subject to any fisheries management, with the exception of a small sector north of Europe that falls under the auspices of the North East Atlantic Fisheries Commission (NEAFC). (Within the five Arctic coastal states' EEZs, fisheries are subject to existing national regimes, a topic not considered here.)

Some argue that the lack of a fisheries management regime for the high seas in the central Arctic Ocean 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. This argument neglects some critical points.

First, forecasts of future fish abundance are speculative. Forecasting is an inexact science, and more so when projections involve multiple factors, from sea ice and water temperature to primary productivity to determining

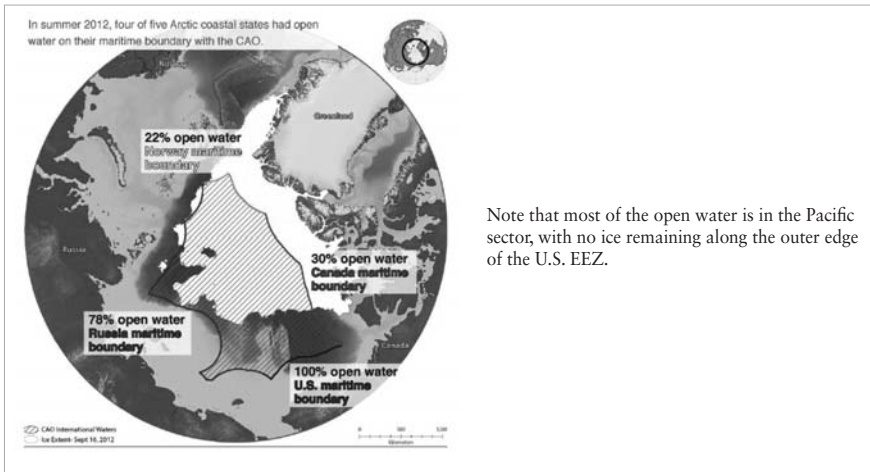


Figure III-2 Ice extent in the Arctic Ocean in September 2012, in relation to the high seas area of the central Arctic Ocean

which fish will be where and in what numbers. Loeng’s perspective focuses primarily on the Atlantic sector of the Arctic, with references to Atlantic fishes and a future in which open water “probably would occur” first within the EEZs of coastal states. In the Pacific sector, however, the future is here: open water has extended well into the high seas area each summer since 2007, including over 40% of the central Arctic Ocean in 2012 (Figure III-2). Furthermore, the Pacific sector is shallower than the Atlantic sector, providing more areas that may be attractive both to fish and to fishermen.

Second, the most common fish in the Arctic Ocean is the Arctic cod (*Boreogadus saida*, sometimes also called polar cod, and thus often confused with *Arctogadus glacialis*, which is also sometimes called polar cod or Arctic cod). *B. saida* can be found in large aggregations, and has been seen in the central Arctic Ocean beneath Russian ice stations. Arctic cod have been harvested since at least the early 1950s, with a peak catch of over 300,000 tonnes in 1971, and a recent catch of 19,600 tonnes in Russian waters of the Barents Sea in 2011. Most of the 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.

Third, Arctic cod are central to the Arctic Ocean food web, and their removal would have wide-ranging implications for the ecosystem. Polar bears, ringed seals, beluga whales, seabirds, and other species that depend,

directly or indirectly, on Arctic cod are found in the central Arctic Ocean as well as within Arctic EEZs. Those species also migrate from coastal areas to the high seas and back. Thus, impacts in the high seas may affect marine mammals and seabirds found close to the coast. In Alaska, Russia, and Canada, these same stocks of marine mammals and seabirds are hunted by Arctic residents. This means that the impacts of central Arctic Ocean fisheries could include diminished human well-being in the Arctic, alongside any possible economic benefits from a fishery.

Fourth, the newly open waters of the Arctic summer are well within reach of distant-water fishing fleets, being about two-thirds the distance from major Pacific ports as is the Antarctic, where fishermen from those ports already operate. Loeng states that fishermen are unlikely to go all the way to the Arctic high seas if they can catch more fish within the EEZ, 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 the international waters. Currently, there is nothing to stop them from doing so.

Fifth, there is much room between having no fish and having large fish stocks, or between no fishing and sustainable fishing. The prospect of stocks that could support a large, sustainable fishery in the central Arctic Ocean may indeed be low. But fish are in the area, and stocks that are found mainly in one or more EEZs may occasionally move past the 200-mile limit into the high seas. As noted earlier, central Arctic waters include extensive areas of fishable depths to the north of the Chukchi Sea. Schools of fish that, for example, left the U.S. or Russian EEZ in the Chukchi Sea would be susceptible to a hit-and-run fishery within the international waters of the central Arctic Ocean. Such a fishery would undermine national fisheries management efforts, falling far short of any definition of sustainability, but still offering a quick profit. The international waters of the Bering Sea still show the effects of such an approach to fishing in the 1980s.

Sixth, 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 central Arctic Ocean. While these discussions acknowledge that expanding an existing, or creating a new, regional fisheries management organization is premature, the five countries agree that no fishing should occur until a management system is in place. Effectively, this would mean that the area would be closed to fishing until

it is opened up by further international action, in contrast to the current status in which it is effectively open until it is closed. 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 an interest in what takes place in the international waters of the Arctic.

Seventh, another key point in the discussions about the central Arctic Ocean involves the state of scientific understanding of the biology and ecology of the area, for fish but also for other species in the food web. Norway is hosting a scientific meeting in October 2013 to assess the current level of scientific understanding about the central Arctic Ocean and to identify topics for which further study is important and practicable. This is a welcome step for an area undergoing rapid biophysical change, most visibly the loss of summer sea ice and increasing global interest in its resources and the potential shipping routes that transit the Arctic Ocean. Here, too, the Pacific Rim nations can contribute through their existing and future research efforts in the Arctic.

To conclude, avoiding overfishing means regulating fisheries. Preventing overfishing in the first place means creating a management regime before fishing starts. Establishing such a regime for the central Arctic Ocean would help achieve that rare thing: effective management before a crisis. The agreement currently under discussion would not create a management regime, but it would make the development of fisheries dependent upon the establishment of such a regime. If there are no fish worth catching in these waters, little harm is done. However, if commercially attractive fish stocks do reach the region, having a management regime in place will be a victory for responsible fisheries management, rewarding a willingness to prepare for uncertainty.

PART IV

BUILDING RESILIENT COMMUNITIES IN THE ARCTIC

Inuit perspective

Duane Smith

EXECUTIVE SUMMARY

The Arctic is vast. It has an unforgiving climate that is changing rapidly and unpredictably, with implications for the health and well-being of Inuit as well as the environment and wildlife they depend upon. Rapid environmental change in the Arctic is driven by climate change, growing access to resources, and a new era of geopolitics that is focussing more and more on the Arctic and its wealth of natural resources. These changes and the increased global interest in the Arctic are providing new development opportunities, including easier access to oil and gas, minerals, and fisheries as well as challenges for Inuit communities. More far-reaching change is forecasted for the region over the years and decades to come. The pervasiveness of Arctic change and the anticipation of even greater change are major concerns for people and decisions-makers, as they challenge established political practices intended to maintain or improve current conditions based on an understanding of the past.

Emerging opportunities for large scale resource development and economic growth have the potential to bring economic diversification, skills, training and education. The challenge is to ensure that the unique Inuit culture informs this development and that Inuit benefit from these new opportunities and Arctic riches. The ability of Inuit and other Arctic peoples to adapt to these changes is dependent on the resiliency of their communities. The situation requires new approaches that conceptualize and address Arctic changes and inform policy on how to prepare for and respond to them.

WHAT IS RESILIENCE?

Resilience is a property of social-ecological systems that centers on the capacity of a system to cope with disturbance and recover in such a way as to maintain its core function and identity, whilst also maintaining the ability to learn from and adapt to changing conditions, and when necessary to transform itself. A resilient Arctic system is able to absorb disruptions

in the form of both abrupt disturbance events and more gradual forces of change. Furthermore, a resilient Arctic system is capable of persisting within a broad range of conditions and adjusting in a relatively smooth manner to varying circumstances. When a system is no longer able to adapt, it is likely to experience a transformation (Arctic Council 2013).

ARCTIC CHANGE - CHALLENGES AND OPPORTUNITIES

The Arctic and its peoples are experiencing changes that will have impacts as far reaching as those brought about by first contact. In 1576, an English explorer, Martin Frobisher, led an expedition in search of the Northwest Passage to China. Although he did not find the



passage, the expedition did encounter the Inuit of Baffin Island. The lives of Inuit were fundamentally changed from this point. By the early 1960s, they had been relocated to new communities (High Arctic exiles) to support the Canadian sovereignty in the High Arctic.

Today these communities have met with a range of success. While some are embracing the changes in the Arctic and adapting, others are struggling with poverty, food insecurity, educational issues, and health challenges. What are the factors that make some individuals and communities more resilient to change than others? This has been the subject of many research projects. Some say strong ties to the land and culture through traditional Inuit knowledge and teachings provide the strength to meet the social, cultural and economic challenges Arctic change has brought to Inuit communities. Others have identified poverty and education as fundamental factors in preventing Inuit and other Arctic indigenous peoples from meeting changes and participating fully in new opportunities.

Community resilience is one of the most essential components needed to build and support sustainable, thriving Arctic communities. Resilience refers to “the capacity to withstand change for some time but also, past a certain point, to transform while maintaining or regaining the ability

to provide essential functions, services, amenities or qualities.” Resilient communities are able to absorb, adapt to, or bounce back from climate change impacts as well as other crises, such as the downturn of major industries, severe accidents, natural disasters and pandemics. Research at the Center for Northern Studies defined five main characteristics that contribute to an Arctic community’s ability to build and maintain resilience:

1. Flexibility and adaptability,
2. Ability to quickly and effectively harness local resources and expertise,
3. Local ownership of preparation, planning, and response when faced with a threat or incident,
4. Ability to access and draw upon local knowledge, and
5. Existence of trust and cooperation between public and private sector actors and community members.

A number of challenges, however, can work against the resilience of Arctic communities. Rapid sociocultural and socioeconomic changes, remoteness, a lack of economic diversity, and the direct and often immediate impacts of climate change are some of the elements that can, either alone or in combination, make building community resilience a daunting goal for Arctic peoples. Troubling many Inuit throughout Canada’s Arctic experience are disparities in health outcomes compared to non-Inuit Canadians. These include: “higher-than-average suicide and addiction rates; increased incidences of infectious diseases; and higher incidences of chronic diseases, such as diabetes and respiratory illness.”

How might we support and enhance community resilience in the Arctic? Fundamentally, resilience is best established from the bottom-up through the engagement, interaction and initiatives of individuals and organizations within communities. Locally driven resilience-building initiatives are the most effective because they tend to be culturally appropriate and address the communities’ priorities. These may include initiatives from self-governance and co-management of resources to on-the-land education programs for youth and hunter support programs to provide country food for communities. Economic vitality and stable, predictable and long-term public and private funding mechanisms are also critical elements. And partnerships are pivotal, as they will help to ensure accessible and long-term funding sources, and work to build trust across sectors. These conditions

can be met by building authentic, productive, interdisciplinary, community-based relationships. These partnerships should include Inuit community voices, the public and private sector, academic and third-sector perspectives, as well as respect for established Inuit governance structures. Arctic communities need to leverage their strengths. These include such things as social capital and innovative and adaptive practices. Strong kinship and community, for instance, are features of many Arctic communities; they constitute a deep pool of social capital. In addition, Arctic peoples are already showing themselves to be adaptive and innovative in the face of change. For example, modern technologies such as Global Positioning Systems used in combination with traditional ecological knowledge are helping Arctic peoples to adjust the way they hunt. Also, Arctic peoples are integrating traditional economic and subsistence practices, such as hunting and foraging, with a market- or wage-based economy. This is helping to ensure food security, offset the high cost of living in the North, and develop lucrative tourism opportunities.

Ensuring the well-being and resilience of Arctic peoples and their communities will be impossible, however, without a clear and ongoing understanding of the effects of climate change and the social, cultural, economic and political challenges of climate change bring to the Arctic communities. Linking community well-being to community resilience is an important step toward ensuring that northerners and their communities are able to address properly the various impacts of Arctic change. We need to remind ourselves that many Arctic peoples are not only *from* a particular place, but also *of* that place. That is, their identities, well-being, livelihoods, histories, and emotional-spiritual connections are emergent from the lands on which they live. These lands and the rich cultural heritage that they support are and will continue to be subject to change. The resilience and well-being of those forced to confront this change is essential if Arctic peoples and their communities are to thrive.

Who are Inuit?

For 5,000 years, the people and culture known throughout the world as Inuit have occupied the vast territory stretching from the shores of the Chukchi Peninsula of Russia, east across Alaska and Canada to the southeastern coast of Greenland. It is in this region, based on our ability to use the physical environment and living resources of this geographic

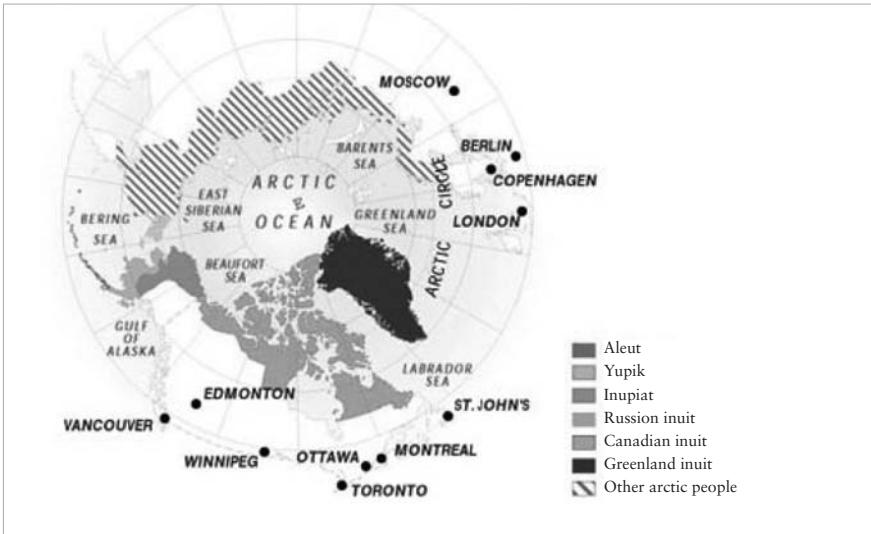


Figure IV-1 Inuit and circumpolar peoples

area known as the Arctic, that our culture developed and our history has unfolded.

As Inuit, we divide ourselves into two closely related groups based on language, environmental factors and certain cultural features. The first group is the Yupik, who occupy the coastal southwestern Alaska, Nunivak and St. Lawrence Islands, and a small sector of the southeastern Chukchi Peninsula. There are approximately 25,000 Yupik living in Alaska and 1,300 in Russia. Although the Yupik language has the same origin as ours, it is not understood by Inuit. Besides language, there are many other cultural features that distinguish Yupik from Inupiat and Inuit.

The second group includes the Inupiat of north Alaska and eastern Russia, Inuit of Canada, and Inuit of Greenland. Of these 155,000 Inuit, 2,000 live in Russia, 50,000 in Alaska, 45,000 in Canada and 55,000 in Greenland. Although certain differences in culture and language are to be expected over such a vast expanse of Arctic territory, one of the truly amazing aspects of our culture is the extent of similarity from one subgroup to another as you travel from the eastern shore of Greenland west across what is now Canada and Alaska to the shores of Siberia.

Inuit Circumpolar Council

The 155,000 Inuit live in the Arctic spread across Greenland, Canada, Alaska (United States) and Chukotka (Russia). The Inuit Circumpolar Council (ICC) advocates for Inuit rights internationally.

Growing political awareness among Inuit made their leadership realize they must speak out with a strong, united voice to protect their national and transnational interests. To that end, in 1977, Inuit delegates gathered in a conference in Barrow, Alaska to discuss the formation of an ongoing internationally representative organization to promote and develop programs that advocated on behalf of Inuit from the four countries (Canada, Greenland/Denmark, Chukotka/Russia, and Alaska/U.S.). This was the origin of the Inuit Circumpolar Council.

Eben Hopson recognized that the settlement of the land claims Inuit have with the various governments was of the utmost importance:

“Working with our people in Greenland and Canada, the Saami have been active in the organization of the World Council of Indigenous Peoples through which the settlement of land claims has become a world-wide movement... We must elevate our Inuit Arctic claims to the status of an international effort to secure equal justice all across the North American Arctic.”

Climate Change as the Main Driver of Arctic Change

Climate change will have consequences far beyond this region, including a global rise in sea levels and probably more extreme weather across much of the Northern Hemisphere. These current and future consequences of climate change require urgent responses. Arctic and non-Arctic countries share responsibility for protecting this region, in particular by limiting their greenhouse gas emissions. Climate change is a global concern, and its impact on Canada’s North has been especially severe. According to the U.S. National Snow and Ice Data Center (NSIDC), during the summer of 2012, Arctic sea ice shrank to the lowest extent ever recorded. Ultimately, climate change in Canada’s North is not only affecting how some northerners spend time on the land, it is rapidly changing the very places and landscapes themselves.

Current changes in weather patterns are impacting the health and

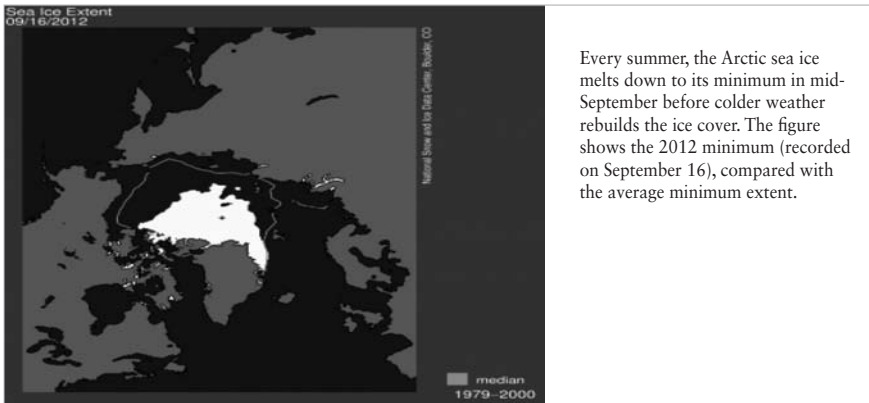


Figure IV-2 The 2012 Arctic sea ice extent

well-being of community residents in a variety of ways. These include: increased risk of food-borne and waterborne diseases; increased frequency and distribution of vector-borne diseases; increased mortality and injury due to extreme weather events and heat waves; increased respiratory and cardiovascular diseases due to changes in air quality and increased allergens in the air, and increased susceptibility to mental and emotional health challenges.

The warming Arctic brings with it a range of changes that impact the extent of sea ice and with this the ability to increase shipping in Arctic waters. With increased shipping comes the ability to explore and develop renewable and non-renewable resources such as fisheries, minerals, and oil and gas resources that were at one time too difficult or expensive to develop. The U.S. Geological Survey has estimated that about 30% of the world's undiscovered reserves of natural gas, and 13% of its undiscovered oil, lie in the Arctic. The region also contains coal, iron, uranium, gold, copper, rare earth minerals, gemstones and much more, including, of course, fish.

For the emerging Asian markets located in the newest Arctic Council observers (e.g., Singapore, China, India, Japan and South Korea), the opportunity to exploit these riches seems compelling. Also, the hope is that the Northeast Passage above Russia, also known as the Northern Sea Route (NSR), as well as the Northwest Passage from the Atlantic over the top of North America will become navigable for several months each summer. The NSR cuts the voyage from Shanghai to Hamburg by 6,400 km (4,000

miles) compared with the southern route through the Strait of Malacca and the Suez Canal. It will be even shorter when it is possible to break the ice across the North Pole. However, this opportunity also brings challenges. Increased economic activity brings environmental issues such as potential contamination (which is on top of the long-range transport already being experienced), potential spills from offshore and near-shore oil and gas development, and other associated changes.

Changes in the biophysical environment interact with rapid social changes that are affecting all inhabitants in the Arctic. Humans have often successfully adapted to changes in the past and, especially in the Arctic, have developed elaborate ways to ensure resilience of livelihoods in a highly dynamic environment. However, the rate and magnitude of exogenous and endogenous changes, due in part to increased connectivity with the outside world, have been unprecedented. One consequence of the pace and scale of changes has been a challenge to the adaptive capacities of Arctic indigenous communities. Nevertheless, indigenous peoples across the Arctic are also gaining new rights as they are recognized increasingly in national and international policies, offering new opportunities for self-determination and adaptation. Another impact has been the emergence of significant governance challenges resulting from the need to support resilience across the Arctic and from a changing geopolitical situation.



Figure IV-3 The Chinese MV “Xue Long” (Snow Dragon) crossed the Arctic in the summer of 2012 Arctic shipping

Some changes in the Arctic are now inevitable, others will be avoidable, and yet others are needed to ensure the long-term viability of Arctic social and ecological systems. Understanding the thresholds for those changes we wish to avoid and ways to facilitate crossing the thresholds for changes we see as beneficial is at the heart of why we need to understand and assess resilience in the Arctic.

In March 2013, the ICC hosted a workshop on Circumpolar Inuit Response to Arctic Shipping. This workshop brought together Inuit hunters, leaders and representatives of organizations from across Inuit Nunaat, our homeland (that includes the Arctic areas of Canada, Alaska, Chukotka, and Greenland). It emerged from the Arctic Council's Arctic Marine Shipping Assessment (AMSA), which articulated many recommendations we Inuit wanted to understand and respond to.

The gathered Inuit not only shared their views with each other, but also listened to the views of Arctic shipping experts who provided valuable insights as to what Inuit should be aware of as we face decisions about our sea ice and our hunting practices and as we interact and negotiate with those who want access to Inuit Nunaat. While some of the views expressed came from opposing frames of reference, they all pointed to one central conclusion: Inuit must take firm control of their own destiny, while at the same time working collaboratively and harmoniously with those who seek to interact with them. This is the Inuit way.

The workshop confirmed that shipping in the Arctic touches upon many other issues that impact Inuit and the Arctic region. In fact, no other issue does this to the same degree. It is not sufficient simply to point to the reality of climate change and leave it at that. Arctic shipping cannot be discussed, for example, without first understanding issues of Arctic sovereignty. Who owns the Arctic? Who has rights to traverse the Arctic? Where do the boundaries of each Arctic state end? And what role can Inuit play in addressing these matters? Proceedings of this workshop are available on the ICC website.

LOOKING BACK TO MOVE FORWARD

Traditional Knowledge and Cultural Strength

An important aspect of a resilience assessment is to engage with available

knowledge about how societies have responded to past changes in their environment. Indigenous peoples' traditional knowledge is increasingly recognized as important for such an understanding and is also increasingly included in the Arctic Council assessment processes. In an oral history of Unalakleet, Alaska, Inupiaq Elder Charles O'Degnan refers to his people's traditions thus: "The thing in a subsistence way of life, what I can say is that if our ancestors were not the stewards of these resources, we wouldn't have any resources now."

Integrating traditional knowledge with Western scientific traditions is not a straight forward process, as the two see the world very differently. In short, traditional knowledge generally views all elements of matter as interconnected and not easily understood in isolation. Such knowledge is gathered and studied over a long period of time in individual localities; it is rooted in a social context that sees the world in terms of social and spiritual relations among all life forms. Traditional-knowledge explanations of environmental phenomena are often spiritual and based on cumulative, collective experience.

Traditional knowledge is transmitted orally, and it is often difficult to convey ideas and concepts to those who do not share the tradition and the experience. However, there is a growing body of epistemological material from indigenous scholars and published literature that places local experiences in a broader context. This makes it relevant to view traditional knowledge as a knowledge paradigm of its own, in parallel with Western scientific discourses.

Traditional knowledge preserves important experiences and indigenous history in the collective memory. It maintains a long-term communal understanding of the landscape, the flora and fauna, the human relationship to the environment, and cultural dynamics, all key determinants of indigenous resilience. Traditional knowledge clarifies how communities are organized and how they responded to past environmental states, there by informing the present.

The former Norwegian Minister of Foreign Affairs Jonas Gahr Store stated, "His (Amundsen's) success in this endeavor was largely due to the time he had spent with the Canadian Inuit some years before learning how to survive in such a harsh climate."

The role of IPY research and ArcticNet

Inuit have been engaging in Arctic research for millennia, and it is their traditional knowledge of Arctic processes and change that lends incredible value to efforts to understand the changes acting upon the Arctic today.

The International Polar Year (IPY) was a large scientific program focused on the Arctic and the Antarctic from March 2007 to March 2009. The IPY was organized through the International Council for Science (ICSU) and the World Meteorological Organization (WMO). It was actually the fourth polar year, following those in 1882-3, 1932-3, and 1957-8. Inuit were partners in designing and undertaking significant research projects and integrating traditional knowledge, or two ways of knowing, into the research project. One example of this was the Circumpolar Flaw Lead System Study, where the ICC in partnership with communities led a research team that worked to bring the traditional knowledge of the region together with nine other science teams.

ArcticNet is a Network of Centres of Excellence in Canada that brings together scientists and managers in the natural, human health, and social sciences with their partners from Inuit organizations, northern communities, federal and provincial agencies and the private sector. The objective of ArcticNet is to study the impacts of climate change and modernization in the coastal Canadian Arctic. More than 145 ArcticNet researchers from 30 Canadian universities, and eight federal and 11 provincial agencies and departments collaborate with research teams in Denmark, Finland, France, Greenland, Japan, Norway, Poland, Russia, Spain, Sweden, the United Kingdom and the U.S.

Inuit want to build a 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.

Community-Based Monitoring

ICC Canada has worked to build community-based monitoring into the work program of the Sustained Arctic Observing Network (SAON). Arctic communities are actively involved in observing social and environmental change. Recently, an atlas was designed in partnership with the ICC and launched to showcase the many community-based monitoring (CBM)

projects and initiatives across the circumpolar world.

Governance in the Arctic

The rapid pace of change and growing importance of the Arctic require that we enhance our capacity to deliver on Inuit priorities on the international scene. Facing the challenges and seizing the opportunities that we face often require finding ways to work with others through bilateral relations with our neighbours in the Arctic, through regional mechanisms such as the Arctic Council, and through other multilateral institutions.

Under the leadership of Leona Aglukkaq, the Minister of the Arctic Council and then the Minister of health, Canada assumed the chairmanship of the Arctic Council in May 2013 and will hold that important international position until May 2015. The ICC will continue to play a leading indigenous peoples' role in the council as a Permanent Participant and is committed to working with the Minister and the Canadian government in implementing initiatives that will support the priorities of Canada.

The U.S. is Canada's premier partner in the Arctic, and the Canadian federal government's goal is to develop a more strategic engagement on the Arctic issues. This includes working together on issues related to the Beaufort Sea, Arctic science, aboriginal and Northern issues, and a common agenda that is being pursued during the Canadian chairmanship of the Arctic Council. Canada is also working with Russia, Norway, Denmark, Sweden, Finland and Iceland to advance such shared interests as trade and transportation, environmental protection, natural resource development, the role of indigenous peoples, ocean management, climate change adaptation and scientific cooperation.

However, the key foundation for any collaboration will be acceptance of and respect for the perspectives and knowledge of the Arctic peoples and Arctic states' sovereignty. As well, there must be recognition that the Arctic states remain best placed to exercise leadership in the management of the region.

Seven of the eight Arctic Council member states have sizeable indigenous communities living in their Arctic areas (only Iceland does not). Organizations of Arctic indigenous peoples can obtain the status of Permanent Participant in the Arctic Council, but only if they represent a single indigenous people resident in more than one Arctic state or more

than one Arctic indigenous people resident in a single Arctic state. The number of Permanent Participants should at any time be less than the number of members. The category of Permanent Participants was created to provide for active participation and full consultation with the Arctic indigenous representatives within the Council. This principle applies to all meetings and activities of the Council.

Permanent Participants may address the meetings and raise points of order that require an immediate decision by the chairman. They need to be consulted beforehand on the agendas of ministerial meetings, and they may propose supplementary agenda items. The Permanent Participants must be consulted beforehand when calling the biannual meetings of Senior Arctic Officials. Finally, they may propose cooperative activities, such as projects. All this makes the position of Arctic indigenous peoples within the Arctic Council unique compared to the (often marginal) role of such peoples in other international governmental forums. However, decision making in the council remains in the hands of the eight member states, on the basis of consensus.

The three founding indigenous members of the Arctic Council in 1996 were the ICC, the Russian Association of Indigenous Peoples of the North (RAIPON), and the Saami Council. By 2010, three new Arctic indigenous communities had Permanent Participant status. These groups are represented by the Aleut International Association, the Arctic Athabaskan Council, and Gwich'in Council International. These indigenous organisations vary widely in their organisational capacities and the size of the population they represent. To illustrate, RAIPON represents about 250,000 indigenous people of various (mostly Siberian) tribes; the ICC represents about 150,000 Inuit. On the other hand, the Gwich'in Council and the Aleut Association each represent only a few thousand people each.

However prominent the role of indigenous peoples is, Permanent Participant status does not give them any legal recognition as peoples. The Ottawa Declaration, the Arctic Council's founding document, explicitly states (in a footnote): "The use of the term 'peoples' in this declaration shall not be construed as having any implications as regard the rights which may attach to the term under international law."

The states that make up the Council call the Arctic region home. Canada's chairmanship will put Northerners first. The theme of Canada's chairmanship is "development for the people of the North" with three sub-themes focusing on responsible Arctic resource development, safe Arctic

shipping, and sustainable circumpolar communities, announced by Leona Aglukkaq on January 21, 2013 in a speech in Tromsø, Norway.

Strengthening the Arctic Council

Since its inception, the Council has undertaken important work to address the unique challenges and opportunities facing the Arctic region. As these challenges evolve, so must the Council. Canada will work collaboratively with its Arctic Council partners to strengthen the Council. The aim is to enhance the capacity of the Permanent Participant organizations, improve the Council's coordination, and maximize efficiency.

Responsible Arctic Resource Development

The Arctic Council is working to ensure that Arctic development takes place responsibly. Businesses in the Arctic will play a strong role in building a sustainable and economically vibrant future for the region. Establishing a Circumpolar Business Forum will foster circumpolar economic development and provide opportunities for businesses to engage with the Council. As economic activity in the region increases, Arctic states are cooperating to protect the marine environment and the livelihoods of Northern peoples.

In May 2013, the Arctic states signed an Agreement on Cooperation on Marine Oil Pollution, Preparedness and Response in the Arctic. The Council has also begun work on oil-pollution prevention. This work will continue during Canada's chairmanship. Effective action to prevent oil pollution is critical to ensuring the protection of the Arctic marine environment.

Safe Arctic Shipping

Opportunities for tourism are growing in the Arctic. By establishing guidelines for sustainable tourism and cruise ship operations, the Council will encourage the benefits that tourism will bring to communities, while reducing the risks associated with increased activity.

The Council states will also continue to work together closely to encourage the IMO's efforts to develop a mandatory Polar Code for the Arctic Ocean.

Sustainable Circumpolar Communities

Canada has a clear vision for the Arctic in which self-reliant individuals live in healthy, vibrant communities, manage their own affairs, and shape their own destinies.

The Arctic Council recognizes and celebrates the importance of traditional ways of life for Northern communities and will work to increase regional and global awareness of these ways of life. The Council has long understood the importance and value of traditional and local knowledge. This knowledge has enabled Arctic residents to survive in the harsh Arctic environment for millennia. The Council will develop recommendations for incorporating traditional and local knowledge into its work.

The Arctic is facing rapid changes in its climate and physical environment, with widespread effects for Northern communities and ecosystems. Short-lived climate pollutants such as black carbon and methane contribute to the Arctic climate change. Addressing short-lived climate pollutants offers the potential for improving health as well as climate benefits as part of a comprehensive strategy to address climate change.

Across the circumpolar region, communities are adapting to these changes. The Council will facilitate the sharing of communities' knowledge and best practices. By promoting mental well-being, the Council will increase the ability of residents to thrive and adapt to the many changes affecting the Arctic. The Council will continue to pursue cooperation among Arctic and non-Arctic states to support the conservation of migratory birds that communities depend upon.

THE ARCTIC RESILIENCE REPORT

The Arctic Resilience Report (ARR) is an Arctic Council project that analyzes the resilience of these closely coupled social-ecological systems in the Arctic. The ICC drafted a chapter in the interim report on traditional knowledge and is a member of the project steering committee. The following are the key messages from the Arctic Resilience Interim Report.

- The Arctic is subject to major and rapid changes in social and economic systems, ecosystems and environmental processes. These

interact in ways that have profound implications for the well-being of indigenous and non-indigenous peoples.

- A resilience framework provides an integrative approach for assessing linked social and ecological changes across scales, identifying the risk of threshold effects, and building capacity to respond.
- Abrupt changes have been observed in the environment across the Arctic. Such changes risk crossing environmental thresholds, which can have long-term consequences that affect options for future development.
- Arctic change has global effects, with potential impacts on societies, ecosystems and options for development across the world.
- Options for responding to change may be compromised by past decisions and interventions, particularly those that have eroded traditional safeguards of resilience.
- Rapid Arctic change is likely to produce surprises, so strategies for adaptation and, if necessary, transformation, must be responsive, flexible and appropriate for a broad range of conditions.
- Governing in the Arctic will require difficult choices that must grapple with different and sometimes conflicting priorities. The resilience approach helps capture the complex interrelated processes that need to be better understood for effective decision making.
- Participatory processes can more effectively ensure that diverse voices are represented and that all relevant forms of knowledge are included in decisions.

THE FUTURE IS BRIGHT – INUIT INTEND TO THRIVE, NOT JUST SURVIVE

Inuit are open to mutually beneficial collaborations, partnerships, and alliances to address the challenges and to take advantage of the opportunities associated with rapid Arctic change. To this end, there are some unique opportunities. ICC Canada will support the government of Canada during its chairmanship of the Arctic Council, and will host the quadrennial ICC General Assembly in July 2014 in Inuvik, Northwest Territories. The general assembly is an opportunity to write the map going forward for a sustainable Arctic.

References

Arctic Council. 2013. *Arctic Resilience Interim Report*. Stockholm: Stockholm Environment Institute and Arctic Resilience Center.

Greenland perspective

Sara Olsvig

In this perspective, I will develop five main points. First, change is inevitable, resilience is crucial. Second, with rights come responsibilities. Third, resilient local communities forge their resilience on a political level. Fourth, we have shared interests internationally, and thus shared responsibilities. Fifth, increased cross-border research is crucial – also on an east-west axis.

THE POLITICAL STATUS OF GREENLAND

Let me begin, however, with a brief introduction to the political system of Greenland and the political agreement between Greenland and Denmark. I should point out in this connection that I do not represent the government of Greenland. I am a member of the nation's parliament and hold one of Greenland's two seats in the Danish Parliament. I represent the party Inuit Ataqatigiit, which is in opposition to the current Greenlandic government following the general election in March 2013.

The Inuit and other Peoples and Nations across the Arctic are often organized on the basis of different forms of self-government or home rule within the Arctic nation states. Since the introduction of Home Rule in 1979, Greenland has held a semi-autonomous status within the Realm of Denmark. Greenland has its own 31-member parliament, the Inatsisartut, which is the legislative power, while the government of Greenland, the Naalakkersuisut, is the governing power. The former home rule agreement and current self-government agreement are the results of several years of negotiations with Denmark. The Act on Greenland Self-Government,¹ which entered into force in 2009, gives Greenland authority over all legislative domains except the constitution, nationality, the supreme court, and foreign, security and defense policy as well as the exchange rate and monetary policy.

Under the Act on Greenland Self-Government, the people of Greenland are recognized as a People according to international law; they can call a referendum at any time and choose to become independent of Denmark.

The Act includes a financial agreement between Greenland and

Denmark covering the division of income from resource extraction. Greenland continues to receive a block grant from Denmark until income from resource extraction reaches the same level as the block grant. At that point, renegotiations will take place between the countries.

The Act on Greenland Self-Government sets out a framework, on which there is general political consensus, for the development of Greenland's resource sector. A referendum held in relation to this Act in 2008 resulted in 75% of the electorate saying "yes" to the self-government agreement, thus giving Greenland's government a strong mandate for political development based on provisions contained in the Act.

In my opinion, the strong tradition of diplomatic and pragmatic negotiations between Greenland and Denmark regarding the political construction of the Realm of Denmark (including the Faroe Islands as well as Denmark and Greenland) has ensured a strong political environment in Greenland. Participation and investment in our own political status at a high level has given Greenland political resilience. It is very difficult to imagine that Greenland would not continue to strive for more political independence from Denmark.

CHANGE IS INEVITABLE, RESILIENCE IS CRUCIAL

Whether we speak of climate change or of political change, the peoples of the Arctic are faced with new challenges and opportunities brought about by both external and internal developments. When dealing with these challenges, the continuation and further development of resilient communities must be a key priority across the entire Arctic region. For this reason, education, capacity building and a strong welfare system with free and improved access to health care and schooling, have been key priorities for successive Greenlandic governments in their ambition to build strong societies and generations.

Greenland, an island in the Arctic with an area of more than 2 million square kilometers and a population of only about 57,000, has a constant need for development of infrastructure, means of communication, and mobility. Fish and shrimp remain Greenland's main export commodity. But for many decades, other resources have been explored with the aim of establishing new sources of income. Both the politicians and the public in Greenland realize that there is a need for the development of new industries

in order to maintain our welfare system and, in time, minimize the block grant from Denmark.

In common with many other Inuit nations of the Arctic, Greenland went through a colonial period that generated a wide range of post-colonial issues. As with other Inuit, high suicide rates and social problems are still part of the everyday lives of far too many families and communities along the coast of Greenland. We have been successful in maintaining a welfare system similar to the systems in Denmark and other Nordic countries during our Home Rule era, and we have been successful also in expanding our educational system and level of education. But we still struggle with high social and economic inequality.

Post-colonialism, identity, power and language are always underlying issues in Greenland's political debates. But they have reemerged in recent years, especially in the run-up to the latest general election in March 2013. The rhetoric used during the election campaigns revealed that Greenland as a society has not succeeded in making sure that identity and social and cultural conditions reflect the political self-determination Greenland has achieved. Unfortunately, this has brought with it a new movement with underlying anger and discriminatory outbreaks toward all that can be related to the former colonial power, making real reconciliation hard to achieve. In my opinion, an internal process within the country to define the identity of Greenlanders in the cultural and ethnic melting pot Greenland has become must be the first step forward.

This phenomenon is not unique to Greenland. Many indigenous peoples around the world struggle with parallel social and cultural challenges resulting from colonization followed by tremendous societal and cultural changes. The resilience we see in Greenland's politics is thus a strong resilience that evolved in order for us to survive as a nation and as people. If we are to truly create resilient communities and secure our own identity and culture, we must continue along this path. But at the same time, we must find ways to build bridges between the post-colonial era and the present, between the political achievements of our predecessors and the aspirations of our youth.

If we are to meet these challenges, I believe there is a need for a strong democratic system and a high level of democratic awareness. Transparency and a high level of trust in the governing bodies and politicians are crucial if we are to maintain and expand our self-reliance. There is a need for strong democratic processes to forge citizen participation in all processes of

decision making. This includes decisions regarding resource development projects and principles, industrial development, and agreements with businesses and international actors.

Change is inevitable and resilience is crucial. Resilience must be understood and built holistically. Opportunities for industrial development must be grasped; we must strive to build strong Arctic economies. But these economies must be based on local capacities and on strong partnerships between local communities, governments, and foreign investors and businesses. Here, all actors have responsibilities. The international community led by the UN increasingly defines these responsibilities in the form of new developments within human rights and businesses,² principles of corporate social responsibility and guidelines for businesses,³ and clarifications of states' responsibility to protect and businesses' responsibility to respect, as in the "UN Protect, Respect and Remedy" Framework.⁴

THE FUTURE OF THE ARCTIC MUST BE DETERMINED BY THE PEOPLES OF THE ARCTIC

For decades, the global community has had its eye on the Arctic. Recently, climate change has been the main issue, giving rise to new challenges and opportunities that will inevitably change the Arctic as a region as well as Arctic peoples and nations.

The most important point in this respect is that the future of the Arctic must be determined by the peoples of the Arctic. With this comes a duty to develop the Arctic responsibly. Here, a human rights approach is fundamental. The right to self-determination is a key provision of the UN Declaration on the Rights of Indigenous Peoples (UNDRIP).⁵ Under that right, the Inuit have the right to freely and collectively determine political, social, economic and cultural developments. This right was recently confirmed in the Alta Outcome Document,⁶ which was agreed upon by the indigenous peoples from all regions of the world at the Alta Conference in June 2013. The Alta Outcome Document is the preparatory document for indigenous peoples for presentation at the UN High-Level Plenary Meeting, also known as the World Conference on Indigenous Peoples, to be held in September 2014. In the Alta Outcome Document, indigenous peoples state that: "We affirm that the inherent and inalienable right of

self-determination is preeminent and is a prerequisite for the realization of all rights. We Indigenous Peoples, have the right of self-determination and permanent sovereignty over our lands, territories, resources, air, ice, oceans and waters, mountains and forests.”

In the Inuit Circumpolar Council’s “Declaration on Resource Development Principles”⁷ it is noted that “Our rights as indigenous peoples, including our right to self-determination, may be exercised in a practical way through governance structures that combine both Inuit and non-Inuit constituents. No matter what level or form of self-determination the Inuit of any particular region have achieved, resource development in Inuit Nunaat must proceed only with the free, prior, and informed consent of the Inuit of that region.” This not only reaffirms the right to self-determination, but also points out that one of the core rights of indigenous peoples, enshrined in the UNDRIP, is the right of giving free, prior, and informed consent. This is a process right under which the chronology of free information prior to decision making is a core element. It is also a right of self-determination, giving indigenous peoples the right to be the decision makers in respect to the development of their lands, territories and resources.

The rights and principles are clear; the more difficult part is their implementation. In self-governing nations such as Greenland, we continuously work to improve our legislation to ensure that we have legislative frame works that meet human rights principles and that the public has free access to information and participation in decision making. It is not easy. Neither is it easy to keep abreast of the constant new challenges in finding optimum solutions for developing new industries and economic growth, where foreign investors are welcomed in a manner that protects our own interests, while industry and investors are provided with an incentive to choose our country and our resources.

Arctic peoples have over the decades participated actively in the development and promotion of indigenous peoples’ rights. Governing ourselves should be based on the same principles we expect others to follow.

SHARED INTERNATIONAL INTERESTS – SHARED INTERNATIONAL RESPONSIBILITIES

As non-state actors, the Inuit peoples of the Arctic often face complex

situations in regard to taking part in the international community's Arctic activities.

The main Arctic governmental forum is the Arctic Council. Here, the eight Arctic member states are the voting members, while six indigenous peoples' organizations participate at all levels of the Council as Permanent Participants. But as we have seen recently, the Arctic Council is expanding internationally, allowing more observer states access to its core work on the one hand, while on the other hand, limiting the participation of small Arctic nations, such as Greenland. During the Swedish chairmanship, running from 2011 to the ministerial meeting held in Kiruna, Sweden in May 2013, Greenland's officials experienced a new reluctance to include Greenland as a self-governing country at the negotiating table. This resulted in the government of Greenland protesting against this new exclusive character. Greenland decided to boycott the ministerial meeting in Kiruna. The boycott extended to putting on hold all of Greenland's participation in the council's working groups, task forces and other activities. Greenland, with Denmark by its side, then negotiated with the new chairmanship to find a solution to this issue. The Danish Prime Minister has stated that Greenland, the Faroe Islands and Denmark must participate in the Arctic Council on an equal footing. But the question is whether this will be accepted by the rest of the Council's member states, as the Greenland/Faroe Islands/Denmark construction is not the only multi-player construction within one state in the Arctic.

In August 2013, a solution emerged. Greenland decided to take part once again in the Council's work. The Canadian chairmanship issued a letter to the heads of delegations of the Arctic Council stating that the form and participation of meetings of the Senior Arctic Officials would remain the same, while on a more symbolic account only state flags and state names would be visible at council meetings.

In my opinion, this solution has not solved the problem. The issue was and still is delicate. The Arctic Council must consider the role of the Arctic's self-governing nations. Self-government is here to stay, and the Council can only benefit from being inclusive of the peoples and nations that reside in the Arctic and call it home.

Another point fundamental to Arctic governance issues is that all eight Arctic states are governed from capitals located south of the Arctic. In the case of Greenland, we have our own capital, Nuuk, and our own government and parliament, though as previously mentioned areas such

as foreign policy, security and defense are still Danish responsibilities. This does not mean that Greenland does not “do” foreign policy. De facto, Greenland does engage in foreign policy, defense and security issues and will do so increasingly as we continue to implement the Act on Greenland Self-Government and develop existing and new industries with foreign policy and security policy implications. One example involves negotiations concerning fish and shrimp with international players in the export of these resources. Also, subsurface resources and large scale industry development require negotiations concerning international agreements in which Greenland wishes to participate. Such negotiations naturally will have foreign policy, defense and security implications.

A more recent example is the decision of the Greenland Parliament on October 24, 2013 to lift the 25-year-old zero-tolerance ban on mining and export of uranium and other radioactive minerals. I am among those who were against lifting the zero-tolerance policy, and I have strongly opposed the government of Greenland’s lack of public hearings and citizen participation in the decision-making process. The issue resulted in large demonstrations against uranium mining, some say the largest demonstrations in three decades. If we are to build a strong democratic nation, a national referendum would have been the right way to do it. But the government chose otherwise, using the majority they held in parliament where the vote ended 15 for and 14 against.

Thus, Greenland is now officially a pro-uranium mining and export country. Further work on the security and defense policy implications of this decision now will be evaluated by both the Danish state and Greenland’s government. The two governments have announced that they will agree to disagree on how the responsibilities around Greenland’s possible uranium mining are to be divided between Greenland and Denmark. In practice, both governments will have to find ways to collaborate, as the international society will need clear answers regarding which administration is responsible for the management of uranium mining and exports. Many questions remain unanswered.

As a member of both Greenland’s Parliament and the Parliament of Denmark, it is clear to me that under the new self-government agreements, the internal administrative and bureaucratic structures within the state must also be revised along with the self-governing nation’s relations to international forums, where the state is traditionally the main member and actor.

If we are to reach a point where Greenland, for example, represents the state fully in a forum such as the Arctic Council, internal capacity building must take place. And Greenland, as a nation, must be fully capable of participating in the practices of international high-level forums. In other words, the responsibility for recognizing and facilitating our rights to self-determination and self-representation is as much ours as it is that of other sovereign nations and the global community.

COMMUNITY RESILIENCE FORGES POLITICAL RESILIENCE

I strongly agree with the Center for Northern Studies' five main characteristics of the Arctic communities' ability to build and maintain resilience, as highlighted by Duane Smith. In this section, I will add perspectives based on the five characteristics presented and describe examples of the interplay between these characteristics and the international agenda:

1. "Flexibility and adaptability." This must include international experience and ability to access and participate in international forums. As non-states, many indigenous peoples' nations struggle to be part of the international community, especially in member state organizations and forums. The Arctic Council is a good example of how indigenous peoples have maintained and developed participation in the role of Permanent Participants. However, it must be remembered that the Permanent Participants do not participate on a full and equal basis with the member states. Their participation is effective because they have built diplomatic skills and know the international agenda.
2. "Ability to quickly and effectively harness local resources and expertise." In order to make sure that local expertise and resources provide economic benefits for local communities, the communities themselves must ensure that there are solid agreements with the recipients of these resources. In Greenland, living and non-living resources are primarily exploited with the aim of commercial use, either locally (e.g., whale meat and other forms of wild meat) or for export (e.g., primarily fish, shrimp and, in the future, possibly

also minerals and oil and gas). They, thereby, contribute to strongly needed economic development. Subsistence hunting is still part of our culture, but our hunters and fishermen also need to make a living from their way of life. Thus, the economic success of sealing, whaling and fisheries is completely dependent on the ability of our local communities to work with international export mechanisms,⁸ and international sustainability agreements and conventions. This forges a high level of knowledge of international systems, not just at the political level, but all the way through the system to the individual hunter or fisherman. An example of how this can also raise complex international issues is the case of the International Whaling Commission (IWC) whose unwillingness to adopt a new whaling quota for Greenland has resulted in Greenland deciding on its own quota. The surrounding international community, including Denmark, sees this as demonstrating a lack of respect for the convention, although the quota Greenland applied for by Greenland is in accordance with the recommendation of the IWC's own Scientific Committee. Greenland and Denmark are now openly debating whether to leave the IWC.⁹

3. "Local ownership over preparation, planning, and response when faced with a threat or incident." In addition to this, the development of an open Arctic with cross-border access to cooperation when an accident happens is crucial. The Arctic Council's new legally binding agreements on search and rescue and oil spill preparation and response are steps in the right direction, but we need to make these agreements stronger in order for them to work in practice when an incident occurs. It is not just large incidents that are difficult to manage without international cooperation; smaller incidents such as search and rescue operations and environmental accidents will often require responses from neighboring countries.
4. "Ability to access and draw upon local knowledge." One challenge is to link local knowledge to conventional science regimes. Here I strongly agree with Smith's comments on traditional knowledge and cultural strength. In order to fully implement local and traditional knowledge in management regimes, we need to make sure that scientists grasp such knowledge and develop ways to integrate it into their scientific research. Communication and capacity building go both ways, and all sides must make an effort to accommodate each

other's perspectives and limitations. Community-based management systems are good examples of how to improve integration between local and traditional knowledge and conventional scientific methods. In order to expand fully the interplay between local and traditional knowledge and conventional science, cross border-cooperation is needed. Far too often we see cooperation only going north-south. The Arctic must also learn east-west cooperation.

5. "Existence of trust and cooperation between public and private sector actors and community members." Strong, transparent and inclusive democratic processes are crucial. Both foreign states and businesses that engage with local communities must include a human rights perspective in their activities. Arctic states in general also must have a human rights approach to the development of the Arctic. This is crucial in ensuring that trust, anti-corruption and transparency are all both established and maintained. This can only be achieved with openness and dialogue and by being informed of international and national rules, principles and guidelines as they evolve.

INCREASED CROSS-BOUNDARY RESEARCH IS CRUCIAL – ALSO GOING EAST-WEST

A final issue I would like to raise in this commentary is the need for increased research and, in particular, research that is not limited by national boundaries. Research and fact-based knowledge must be core elements in the decision-making processes. Free access to knowledge both for policy makers and for members of the public is vital in building democratic processes.

One challenge that governments, businesses and international forums must face is that of sharing knowledge in a transparent and open manner. Here, researchers play a key role as knowledge holders and disseminators. The interplay among researchers, authorities, and residents of the Arctic must be increased.

Arctic research collaboration has a tendency to go from north to south. We must increase research collaboration and research forums that cross east-west borders. Arctic residents know the Arctic, and we must do better at sharing this knowledge amongst ourselves.

As Smith also observes, there is great potential to enhance capacity

building, education, and skills training in the Arctic as industrial and economic development emerges. For so many decades the Arctic has been the research field of outside researchers; the focus must now be on building strong research communities in the Arctic. For the Arctic peoples to benefit from research conducted in the Arctic, this research must be anchored locally, and both local communities and researchers must be involved.

As Smith notes, the recent International Polar Year is a good example of how the Inuit can play an active role in designing research projects. This kind of openness from the research community in involving the Inuit, in addition to the inclusion of local and traditional knowledge, is crucial.

Some have suggested initiating an International Polar Decade or an ongoing International Polar Initiative to follow up on the International Polar Years.¹⁰ I strongly support this idea. The continuation of a focused international polar research collaboration would be a way to continue the initiatives of an International Polar Year and to provide an ongoing forum for Arctic peoples and researchers to exhibit the Arctic research, integrate local and traditional knowledge into the efforts of the research community, and develop a more mobile and cross-border Arctic research community.

Much research has yet to be conducted. Climate change and opportunities for resource development have attracted large numbers of researchers to the North. Future research objectives should include an increased emphasis on the social sciences, social and cultural development in the Arctic, and, not least, health, including mental health. What happens to the small communities and their peoples as increasing numbers of large-scale industrial projects are established in the Arctic? What happens as large numbers of foreign workers take residence near or in small Arctic communities? What are the cultural and social impacts of the diversification of industries and economic foundations? All these developments must be monitored and researched.

It is the ability to be socially, culturally and politically resilient that will determine the future of Arctic nations and communities.

SUMMARY

To sum up, change in the Arctic is inevitable and will impact local communities in a range of ways. With changes come the responsibilities to protect the environment and nature and to protect and develop the

societies of the Arctic. Resilience in all its aspects is therefore crucial. It is also crucial that the Arctic nations and peoples know their position in the international community so that they can participate, raise their voices and engage in international activities at all levels. At the same time, the international community must recognize the rights of self-governing nations and indigenous peoples. We have shared interests and thus shared responsibilities. The political changes occurring in the Arctic bring with them new challenges for the research sector; the interplay among researchers, authorities, and Arctic peoples are crucial.

Note

1. The Act on Greenland Self-Government. http://www.stm.dk/_p_13090.html
2. See the UN Working Group on the issue of human rights and transnational corporations and other business enterprises: <http://www.ohchr.org/EN/Issues/Business/Pages/WGHRandtransnationalcorporationsandotherbusiness.aspx>
3. See the UN Global Compact: <http://www.unglobalcompact.org/> and the guidelines for businesses on the UN Declaration on the Rights of Indigenous Peoples: http://www.unglobalcompact.org/docs/issues_doc/human_rights/UNDRIP_Business_Reference_Guide.pdf
4. See the work of the UN Special Representative on Business and Human Rights: <http://www.business-humanrights.org/SpecialRepPortal/Home>
5. The United Nations Declaration on the Rights of Indigenous Peoples (2007). http://www.un.org/esa/socdev/unpfii/documents/DRIPS_en.pdf
6. See the Alta Outcome Document (2013): <http://wcip2014.org/1530>
7. Inuit Circumpolar Council: A Circumpolar Inuit Declaration on Resource Development Principles in Inuit Nunaat (2011). http://inuitcircumpolar.com/files/uploads/icc-files/Declaration_on_Resource_Development_A3_FINAL.pdf
8. An example here is the case of the EU seal product ban and its “Inuit exemption,” which allows only the Inuit to export seal products to Europe. In Greenland, the political system has decided to abide by this exemption and has developed a labeling system that lives up to the EU resolution. Other Inuit have another approach to the issue and lately, Canadian Inuit have demonstrated their opposition to the seal product ban with the “No Seal, No Deal” campaign.
9. My opinion on this case is that the IWC has become more of an anti-whaling commission than an actual whaling commission. In the case of the Greenland quota, the IWC is clearly acting in a non-pragmatic way, making decisions that

are not based in fact. The question is whether this would have happened if the subject was not whales, but pigs. For me, the whole case is an expression of cultural imperialism, where indigenous peoples' right to develop and live from their own resources is unfortunately not taken into account.

10. See the conference statement of the Conference of Parliamentarians of the Arctic Region (2012): <http://www.arcticparl.org/files/conference-statement%2C-final-draft1-2.pdf>

PART V

THE EVOLUTION OF ARCTIC OCEAN GOVERNANCE

4. The Evolution of Arctic Ocean Governance: Challenges and Opportunities

Oran R. Young

WHAT IS THE ISSUE?

The transformative changes now occurring in the Arctic have led many observers to forecast that the future of this dynamic region will be marked by increasingly severe conflicts. They foresee a scramble for control of the Arctic's natural resources (e.g., oil, gas, hardrock minerals) and commercial shipping routes made accessible by the dramatic recession and thinning of sea ice in the Arctic Basin. The result, they predict, will be growing frictions among powerful states and corporations desiring to take advantage of these assets, a remilitarization of the Arctic, the emergence of an Arctic "Great Game," and ultimately the occurrence of armed clashes brought on by the vagaries of intensifying conflict in a heavily armed setting (Borgerson 2008; Howard 2009; Sale and Potapov 2010).

By almost any measure, however, the Arctic is today a "zone of peace," to use a phrase made famous by Mikhail Gorbachev in his October 1987 Murmansk speech regarding the future of the Far North (Gorbachev 1987). By most accounts, the Arctic is on track to remain a peaceful region during the foreseeable future (Collins et al. 2013). There are few severe conflicts in the region; those conflicts that have arisen are being handled through peaceful means. The Arctic coastal states have pledged to address issues arising in the Arctic under the provisions of the law of the sea, as set forth in the 1982 UN Convention on the Law of the Sea (UNCLOS) and other related international agreements (Ilulissat Declaration 2008).¹ For the most part, non-Arctic states have agreed to proceed on the same basis. Even the current buildup of military capabilities in the Arctic pales by comparison with the militarization of the region during the Cold War era (Osherenko and Young 1989; Wezeman 2012). To a large extent, the placement of military assets in the Arctic today is driven by considerations that have little

to do with concerns about prospects for conflicts in the Far North.²

What accounts for the persistence of peaceful conditions in the Arctic, despite the dire warnings of many pundits? Clearly, a number of factors need to be taken into account in constructing a satisfactory answer to this question (Berkman and Vylegzhaniin 2012). Most of the Arctic's coastal and marine resources (including offshore oil and gas reserves) lie in areas located within the undisputed jurisdiction of the five Arctic coastal states—Canada, Denmark/Greenland, Norway, Russia, and the United States—often referred to as the Arctic 5 or A5. Major outside actors (e.g., China, the European Union) are interested in the Arctic's resources, but they have reasons of their own not to act in ways that would interfere with the jurisdictional authority of the coastal states, raising more general questions about the existing rules governing maritime spaces in the process. Peaceful conditions featuring well-defined and stable rules of the game are in the interests of multinational corporations taking steps to pursue existing stakes in the Arctic or hoping to operate in the region in the future. It probably helps as well that the super heated forecasts of several years back regarding an Arctic “gold rush” have cooled significantly over the last year or two as realism has set in regarding the difficulties of operating under conditions likely to prevail in the Arctic for some time to come, and developments elsewhere (e.g., the shale gas revolution) have altered calculations regarding the attractiveness of tapping the Arctic's energy resources (Mikkola and Käpylä 2013).

In this chapter, I examine the proposition that the emergence of an increasingly effective Arctic Ocean governance system is one factor that plays an important role in the maintenance of peace in the Arctic. The Arctic is not the “Wild West” with regard to matters of governance (Corell 2008). The end of the Cold War triggered a burst of initiatives aimed at promoting international cooperation in the Arctic region. Perhaps the most prominent case in point centers on the creation in 1991 of the Arctic Environmental Protection Strategy (Young 1998) leading in 1996 to the establishment of the Arctic Council (Koivurova and VanderZwaag 2007). But a number of other initiatives, which I analyze in some detail in this chapter, have contributed to this development, leading to the evolution in the Arctic of what students of international affairs have come to think of as a regime complex (Young 2012a). This complex and the cooperative practices associated with it, I argue, have contributed substantially to the development of a regional governance system for the maritime Arctic that

has emerged as a force for peace in this dynamic region.

In developing this argument, I proceed as follows. Section 2 provides a brief introduction to some key concepts needed to organize thinking about governance and governance systems. Section 3 addresses the constitutive foundation for Arctic Ocean governance and identifies the three major elements of the regime complex that is emerging to address specific issues of governance in this area. Sections 4-6 then take up and analyze each of these elements in turn. Section 7 focuses on two underlying conceptual and normative concerns that are likely to make an important difference to the continued development of the Arctic Ocean governance system during the coming years.

HOW SHOULD WE THINK ABOUT GOVERNANCE?

Governance is a social function centered on steering societies toward socially desirable outcomes and away from socially undesirable outcomes (Young 2013a). At the international level, avoiding mutually harmful arms races and spirals of competitive tariffs constitute prominent examples. We normally think of governments as the appropriate mechanisms for addressing challenges of governance. But it is important, especially in thinking about governance in international society, to recognize both that the presence of a government is not sufficient to ensure that the needs for governance will be addressed and that it is not necessary to meeting challenges of governance in some settings.

Governments regularly fail to perform the social function of governance effectively due to some combination of a lack of capacity, the effects of rigidities arising from institutional arthritis, the impacts of widespread corruption, and the behavior of repressive regimes. The resultant governance failures in the realm of public affairs are counterparts to the familiar market failures occurring in the realm of economic affairs. Even more important for purposes of this analysis, the presence of a government in the ordinary sense is not always necessary for the achievement of success in performing the function of governance. There are many examples in small-scale societies of arrangements that are successful in avoiding the tragedy of the commons and in sorting out problems associated with the side effects of self-interested behavior on the part of individuals (Ostrom et al. 2002). As the case of the successful effort to reduce the production and

consumption of ozone-depleting substances makes clear, such arrangements can flourish in large-scale settings as well (Parson 2003). In addressing issues like the maintenance of peace and the promotion of sustainability in the Arctic treated as an international region, the focus of attention falls on what we have come to think of as the pursuit of governance without government (Rosenau and Czempiel 1992).

Governance systems are collections of rights, rules, and decision-making procedures that define social practices, assign roles to the participants in these practices, and guide interactions among the occupants of these roles (Young 1999). Some of these arrangements are constitutive in nature in the sense that they establish general practices applicable to a wide range of substantive issues. A prominent example central to this discussion of Arctic Ocean governance is the constitutive system set forth in the 1982 UNCLOS (United Nations 1983). More focused arrangements, normally referred to as regimes, build on these constitutive foundations (Krasner 1983). Individual regimes usually address issues arising in spatially defined areas (e.g. Antarctica, the North Sea, the Svalbard Archipelago), functionally defined issue domains (e.g., transboundary air pollution, the conservation of whales, the harvesting of fur seals), or some combination of the two (e.g., the conservation of polar bears in the Arctic).

A regime complex is a set of distinct governance elements or components that are related to one another in functional or spatial terms but that are non-hierarchical in the sense that none of the individual elements that make up the complex is subordinate to the others (Raustiala and Victor 2004; Keohane and Victor 2011; Orsini, Morin, and Young 2013). What we know as the Antarctic Treaty System is a case in point (Berkman et al. 2011). This system comprises, in the first instance, the 1959 Antarctic Treaty itself together with the 1972 Convention on the Conservation on Antarctic Seals, the 1980 Convention on the Conservation of Antarctic Marine Living Resources, the 1991 Environmental Protocol to the Antarctic Treaty, and various Agreed Measures adopted at Antarctic Treaty Consultative Meetings. Other arrangements that play significant roles in this complex include the International Convention on the Regulation of Whaling, the Agreement on the Conservation of Albatrosses and Petrels, the Montreal Protocol on the Protection of the Ozone Layer, and the non-governmental International Association of Antarctic Tour Operators.

Regimes and regime complexes are dynamic; they change continually

once they are initially established. New components are added as additional governance challenges arise, often affecting the internal dynamics of a regime or the interactions among the elements of a regime complex. The effectiveness of these arrangements also varies over the course of time (Young 2010). Some regimes or regime complexes go from strength to strength, becoming steadily more effective with the passage of time. Others exhibit a pattern of punctuated equilibrium, resisting progressive development on an incremental basis but occasionally undergoing major adjustments to address new problems or challenges. Still others experience arrested development in the sense that they run into a wall of resistance that severely limits their ability to perform the function of governance successfully. There are even cases in which regimes collapse and disappear, regardless of their effectiveness in earlier times. The analysis of the determinants of regime dynamics is not only a major focus of attention on the part of students of international regimes; it is also a topic of obvious importance with regard to this examination of the evolution of Arctic Ocean governance.

WHAT ARE THE PRINCIPAL COMPONENTS OF THE ARCTIC OCEAN GOVERNANCE SYSTEM?

The constitutive foundation for Arctic Ocean governance is the overarching framework of the law of the sea articulated in its most comprehensive form in the UNCLOS. Opened for signature in 1982 and in force since 1994, UNCLOS provides general principles applicable to most marine issues as well as a set of procedural mechanisms for applying these principles to specific situations (e.g. the International Tribunal on the Law of the Sea, the Commission on the Limits of the Continental Shelf). With the exception of the U.S., all the Arctic states and most other members of international society have ratified UNCLOS, signifying acceptance of its role as the constitutive foundation for issues relating to marine affairs. The U.S. accepts the provisions of UNCLOS, with the exception of Part XI dealing with deep seabed mining, as constituting customary international law and therefore acknowledges the law of the sea as applicable to its own activities in the realm of marine affairs.

Other than Article 234 on the regulation of maritime activities taking place in ice-covered waters, UNCLOS does not contain provisions that

are specific to the Arctic. Rather, it sets forth a system of rights, rules, and decision-making procedures applicable to marine affairs on a global basis (Stokke 2007). This system is state-centric in the sense that UNCLOS treats sovereign states as the subjects of the law of the sea, accords a variety of rights to states (e.g., the right to regulate the use of resources located within their Exclusive Economic Zones or EEZs, the right to flag commercial vessels), and establishes mechanisms for them to use in resolving differences relating to marine affairs (e.g., delimiting the boundaries of EEZs in the cases of opposite or adjacent states). The Arctic coastal states have stated explicitly that they regard the prevailing law of the sea as the constitutive basis for handling matters of governance relating to the Arctic Ocean and its marginal seas (Ilulisaat Declaration 2008); other states, including major powers such as China and Japan, have indicated that they accept this arrangement.

Given the speed of change in the Arctic in recent years and the prospect that change will trigger a rapid growth in efforts to exploit the region's natural resources and make use of its potential shipping routes, a number of observers have called for the negotiation of a legally binding Arctic Treaty to ensure that these activities develop in a peaceful and sustainable manner (Huebert and Yaeger 2006; Rayfuse 2007; Koivurova and Molenaar 2009). Such a treaty would take the provisions of UNCLOS as a point of departure and build a more focused and integrated regime on this foundation, addressing a range of Arctic-specific issues. However, there is little prospect of such a treaty being negotiated, much less entering into force, during the foreseeable future (Young 2011b). The Arctic states, and especially the A5, have stated flatly and repeatedly that they are opposed to any such initiative. Efforts to develop an Arctic Treaty would encounter knotty problems, even if the A5 were not set against it. Among other things, issues would arise regarding criteria for membership, the treatment of sensitive issues like the status of the Northwest Passage and the Northern Sea Route (NSR), the rights and responsibilities of non-Arctic states, and the status of indigenous or aboriginal peoples. Inevitably, negotiations would be protracted; the U.S. would be unlikely to ratify such a treaty, even if others were willing to participate.

What is emerging today is a regime complex for Arctic Ocean governance that is pan-Arctic in scope and encompasses three principal elements in addition to the constitutive foundation.³ One element consists of a growing collection of international arrangements dealing with

functionally defined issues and including, on a case-by-case basis, those actors needed to address these issues successfully. The second element of the complex consists of the Arctic Council and its various working groups and task forces. Some years ago, it appeared that the A5 would take steps to establish a separate mechanism among themselves to address matters of Arctic Ocean governance. But this prospect has receded into the background; the A5 now acknowledges the Arctic Council as the principal forum for addressing marine as well as terrestrial concerns of interest to the Arctic states (Kankaanpää and Young 2012; Arctic Council Secretariat 2013). Although it is conceivable that interest in establishing a separate mechanism for addressing Arctic marine issues will reemerge in the future, such a development seems unlikely at this stage. The third and so far least developed element of the Arctic Ocean regime complex deals with global forces affecting the future of the Arctic and centers on the need to establish some mechanism to facilitate constructive engagement at the policy level between the Arctic states and interested non-Arctic states and other actors regarding Arctic Ocean governance. The Arctic Council has a provision allowing non-Arctic states to attend meetings and engage in some council activities as observers (Koivurova and Gracyck 2012). But for reasons to be discussed later, this arrangement does not provide a basis for addressing important matters involving interactions between the Arctic and international society as a whole (Young 2013b).

Compared to a comprehensive Arctic Treaty, this complex is somewhat fragmented, but it has the cardinal virtue of being both politically feasible under current conditions and adaptable in the face of changing circumstances. It is thus useful to examine each of the elements of this system in some detail, considering opportunities for growth within each element and touching on issues relating to interactions among them. The next three sections explore issues relating to each element in turn.

WHAT IS THE STATUS OF ISSUE-SPECIFIC ARRANGEMENTS IN THE ARCTIC?

There is a substantial history of efforts to devise international regimes addressing the Arctic issues that are functionally defined and often spatially delimited in nature (Young and Osherenko 1993). Among the most successful of these arrangements are: the regime governing the harvesting

of northern fur seals in the Bering Sea and Gulf of Alaska established initially in the 1911 North Pacific Sealing Convention among Great Britain (on behalf of Canada), Japan, Russia, and the U.S.; the regime for the Svalbard Archipelago set forth in the 1920 Treaty of Spitsbergen concluded as an element of the peace settlement following World War I, and the arrangement dealing with the management of polar bears created in the 1973 Agreement on the Conservation of Polar Bears. Although the fur seal regime collapsed in the 1980s under the weight of changes in both biophysical and socioeconomic conditions in the Bering Sea region (NRC 1996), it remained in force for a number of decades and is widely regarded as one of the first and most successful international regimes dealing with the conservation of wildlife (Lyster 1985). The regime for Svalbard, which grants sovereignty over the archipelago to Norway coupled with a number of substantial restrictions designed to protect the interests of other countries, remains in force and now has 40 signatories, including a wide range of non-Arctic states (Ulfstein 1995). The polar bear conservation agreement, which calls for coordinated efforts on the part of the A5 acting as the range states for polar bears, does not have a lot of regulatory content, but it was established during the midst of the Cold War and continues to operate today as a useful framework for collaborating across international boundaries on research and management practices relating to this iconic species (Fikkan, Osherenko, and Arikainen 1993).

Given this history, it should not come as a surprise that interested parties have continued to address governance concerns relating to the maritime Arctic through arrangements that are defined largely in functional terms and that include as members those parties whose participation is needed to deal with the particular issues at stake. For purposes of this analysis of the evolution of the Arctic Ocean governance system, it makes sense to group these arrangements into four distinct categories: (i) Arctic-specific arrangements that include non-Arctic participants, (ii) functional arrangements covering areas both within and outside the Arctic, (iii) regional arrangements centered outside the Arctic that nevertheless include parts of the Arctic within their catchment areas, and (iv) global arrangements of particular importance to the Arctic.

Arctic-specific arrangements that include non-Arctic participants cover a range of concerns, such as the management of fish stocks in the central Bering Sea, the regulation of commercial shipping in ice-covered waters, and the coordination of scientific research dealing with Arctic issues (Young

2012a). The Central Bering Sea Pollock Agreement, whose signatories include Japan, Korea, Poland, and Taiwan, as well as Russia and the U.S., was negotiated in 1994 as a freestanding regional fisheries management organization to protect pollock stocks located beyond the limits of coastal state jurisdiction in the central Bering Sea. Although the stocks in question have been slow to recover following depletion due to unregulated fishing prior to 1994, this regime has succeeded in banning fishing for pollock on the part of those hoping to take advantage of recovering stocks. In 2002, the International Maritime Organization (IMO) adopted a set of Guidelines for Ships Operating in Ice-covered Waters (Jensen 2007). Revised in 2009, this non-mandatory regime seemed adequate to address key issues relating to commercial shipping in the Arctic prior to the recent surge of interest in commercial shipping arising from increased accessibility associated with the decline of sea ice. Today, it is clear that there is a need for a more substantial mandatory regime to govern the design, construction, and operation of commercial ships operating in the Arctic. The IMO Guidelines are of interest at this stage largely as a point of departure for efforts to devise a legally binding Polar Code covering commercial shipping in the Arctic as well as the Antarctic (discussed more fully below). For its part, the International Arctic Science Committee (IASC) is an organization founded in 1990 to coordinate scientific research on the Arctic issues and to facilitate access to marine and terrestrial areas in the Arctic on the part of scientists. The IASC is, strictly speaking, a non-governmental organization; its members are national academies of science of 21 countries, including 13 located in non-Arctic states. Among other things, the IASC provides input to the deliberations of the Arctic Council on a range of matters, including climate change, contaminants in the Arctic, and matters relating to biodiversity.

The most prominent functional arrangements whose areas of operation encompass both Arctic and non-Arctic spaces involve fisheries management and wildlife conservation. The North Atlantic Salmon Conservation Organization, for example, covers the traditional range of wild North Atlantic salmon, an area extending as far south as New England on the western side of the Atlantic and Portugal/Spain on the eastern side. Since North Atlantic salmon are now wild caught mainly in Greenlandic waters, the work of this international arrangement focuses on protecting salmon from the side effects of other human activities. Arrangements featuring wildlife conservation typically address concerns relating to migratory

species, such as seals, whales, and birds. The harvesting of whales in Arctic waters on the part of Inuit, for example, is subject to the provisions of the International Convention on the Regulation of Whaling dealing with “aboriginal subsistence whaling.” A bone of contention from time to time, this management regime now seems to provide a system for harvesting on the part of indigenous peoples in the Arctic that is broadly acceptable to the major stakeholders.⁴ With regard to the management of birds that migrate into the Arctic in the spring and return south in the fall, a complex mosaic of bilateral and trilateral arrangements has evolved. In the case of the Western Arctic, for example, there are agreements involving Russia and the U.S., Japan and the U.S., and Canada, Mexico, and the U.S. The result is a somewhat messy system that is sometimes hard to apply to the activities of subsistence harvesters located in remote communities in Alaska and Chukotka. Nonetheless, there is a general agreement that this complex fabric of arrangements has played a role of some importance in protecting migratory birds.

Prominent examples of functional arrangements centered in other areas whose geographical scope encompasses portions of the Arctic include regional fisheries management organizations (e.g., the North East Atlantic Fisheries Commission, the Northwest Atlantic Fisheries Organization) and regional arrangements addressing problems of marine pollution (e.g., the OSPAR convention on dumping of pollutants at sea and land-based marine pollution). The OSPAR Convention, to take a specific example, includes many European members and covers the waters between Greenland and Norway extending into the Arctic Basin. Some of those concerned about environmental protection in the Arctic have argued that there are opportunities to use these arrangements in addressing various needs for governance in the Arctic arising today. To a limited extent, these arguments make sense. The North East Atlantic Fisheries Commission, for example, may well prove helpful in managing fish stocks (e.g., Atlantic mackerel) moving beyond the EEZ of Norway in the Norwegian Sea, perhaps as a consequence of the effects of climate change. Nevertheless, there are obvious limits on the roles that these arrangements can play in tackling Arctic Ocean governance in more general terms.

Global regimes of particular importance to the Arctic include the arrangements established under the 1987 Montreal Protocol on the Protection of the Ozone Layer, the 1992 Convention on Biological Diversity, the 1992 Framework Convention on Climate Change, the 2001

Convention on Persistent Organic Pollutants, and the newly completed (but not yet in force) Minamata Convention on Mercury. Because the Arctic is a sink for long-lived pollutants traveling northward via airborne and waterborne channels, health problems arising from human activities in the mid-latitudes constitute a serious concern in the Arctic. Both the convention on persistent organic pollutants and the new mercury convention make specific reference to the consequences of contaminants in the Arctic in articulating their rationales. An interesting feature of the biodiversity regime involves the identification of ecologically or biologically significant areas (known as EBSAs) deserving a special measure of protection. Efforts are now underway to establish protective arrangements for EBSAs in the maritime Arctic, though it is likely that these efforts will provoke opposition on the part of those pursuing activities like commercial shipping or offshore oil and gas development.

As this account makes clear, there is no shortage of functional arrangements that have developed to address specific issues relevant to Arctic Ocean governance. A closer examination would reveal a wide range of concerns relating to the performance of these regimes. The pollock stocks of the Central Bering Sea remain depleted. The extent to which any human harvesting of whales is permissible is hotly debated on ethical if not on biological grounds. Persistent organic pollutants remain a severe health hazard in many Arctic communities. Concerns relating to marine pollution in the Arctic are rising as plans for offshore oil and gas development move forward. Even so, it is undeniable that human activities taking place in the Arctic or affecting the Arctic have given rise to a rich tapestry of functional regimes, and that some of these regimes have made a real difference in governing human-environment interactions.

Given the changes occurring in the maritime Arctic today, the highest priorities for progressive development of functional arrangements in this region involve the completion of a mandatory Polar Code and the development of a regulatory regime dealing specifically with ship-based tourism. The Polar Code, covering the design, construction and operation of commercial vessels plying polar waters and intended to replace the 2002/2009 IMO Guidelines, has been under negotiation over the last three to four years (Deggim 2012; Deggim 2013).⁵ The urgency of reaching agreement on the provisions of the code is related to forecasts regarding the pace of development of commercial shipping in the Arctic, a matter that is subject to a wide range of projections even among knowledgeable

observers. The most contentious issues appear to involve conflicts between commercial and environmental interests. Ship owners/operators, who compare the costs of Arctic routes with other options such as the Suez Canal Route and who are uncertain about the profitability of commercial shipping in the Arctic, are naturally anxious to avoid costly environmental regulations. Conservationists are equally concerned about the need to protect the region's sensitive ecosystems in the face of rising commercial operations. Some have proposed separating some of the environmental concerns from the Polar Code itself in the interests of accelerating the completion of negotiations on this matter. But this strategy, which assumes that once in place the code will evolve to incorporate stronger environmental provisions, does not seem fully convincing. What is needed is active engagement on the part of one or more states willing to act as "pushers" regarding the terms of the code. At this juncture, it appears that the parties are close to agreement on the terms of the Polar Code and that it will enter into force within the next two to three years, a timeline that may well be compatible with the actual growth of commercial shipping in the Arctic.

The case of ship-based tourism is another matter. This form of tourism, which attracts a wealthy clientele, has emerged as a growth industry in recent years. There exists already a non-governmental body known as the Arctic Expedition Cruise Operators, but this organization focuses mainly on the area around northern Norway and the Svalbard Archipelago and is, in any case, a minimal effort compared with its Antarctic counterpart, the International Association of Antarctic Tour Operators. The essential concern at this stage is to regulate the activities of large cruise ships that are not ice-strengthened but that nonetheless enjoy freedom to operate in a largely unregulated fashion under the provisions of the law of the sea. Key issues involve preventing or minimizing the loss of life in the event of accidents and dealing with questions of liability for the loss of life and damages to ecosystems. These are matters of considerable urgency. The key Arctic states, together with those states in which cruise ships are registered, should insist on the establishment of an effective counterpart to the International Association of Antarctic Tour Operators or intervene more directly to establish an intergovernmental regime addressing these concerns.

WHAT ROLES CAN THE ARCTIC COUNCIL PLAY?

Created under the terms of the 1996 Ottawa Declaration, the Arctic Council is "... 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" (Ottawa Declaration, 1996). The members of the council are the eight Arctic states – Canada, Russia, the U.S. and the five Nordic countries – often referred to as the Arctic 8 or A8. A unique feature of the council is that it accords indigenous peoples' organizations the special status of Permanent Participants. The Ottawa Declaration is not a legally binding instrument; the council has neither the legal status of an intergovernmental organization nor the authority to make binding decisions on matters of policy. Six working groups (e.g., the Arctic Monitoring and Assessment Programme, the Working Group on the Conservation of Arctic Flora and Fauna) have carried out much of the substantive work of the council. While the scope of the council's remit is broad, the Ottawa Declaration states explicitly that the council "should not deal with matters related to military security."

Tension between the A5 and the A8 has clouded the role of the Arctic Council regarding maritime issues from time to time. At the Ilulissat meeting in May 2008, the A5, acting as an informal gathering of coastal states, articulated an approach to Arctic Ocean governance without consulting either the other members of the Council (Finland, Iceland, and Sweden) or the Permanent Participants. A second meeting of this group held in Canada in 2010 caused increased concern among groups interested in Arctic governance. But this divisive initiative soon collapsed. The Nuuk Declaration issued at the end of the Danish chairmanship in 2011 reaffirms the primacy of the Arctic Council regarding marine as well as terrestrial issues. Recent initiatives of the council pertaining to search and rescue and marine oil spill preparedness and response (to be discussed later) have served to focus particular attention on issues of governance relating to maritime issues. Clearly, the Arctic states have realized the importance in terms of their own interests of avoiding friction among themselves, especially in the light of the need to address matters involving the growing interest of non-Arctic states in matters of Arctic governance.

The Arctic Council has proven more effective than many of those

present at its creation in 1996 anticipated (Axworthy, Koivurova, and Hasanat 2012; Kankaanpää and Young 2012). But this is not because the council has acquired the capacity to make authoritative decisions about matters of Arctic policy. Several factors account for this development. The council, largely through the efforts of its working groups, has made a significant difference through processes involving issue framing and agenda setting. For example, the council has highlighted the onset of climate change, the impact of contaminants on human health, and the multidimensional character of human development in the Arctic. The transformative changes occurring in the Arctic in recent years have enhanced the influence of these efforts. The fact that climate change is progressing more rapidly in the Arctic than anywhere else, for example, has drawn attention to this region among those concerned with the impacts of climate change on socio-ecological systems (UNEP Yearbook 2013). Under the circumstances, a project such as the Arctic Climate Impact Assessment, clearly significant in its own right, has acquired a high level of visibility in the outside world as well as within the Arctic (ACIA 2004). The establishment of a permanent secretariat for the Arctic Council, located in Tromsø, Norway has added significantly to its ability to take on functions that are more ambitious than those identified in the Ottawa Declaration.

Increasingly, the members of the A8 have found the Arctic Council to be useful as a vehicle for addressing matters that lend themselves to treatment at the regional level. The 2011 Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic is a prominent case in point; another is the 2013 Agreement on Cooperation in Marine Oil Spill Preparedness and Response in the Arctic. In each case, the Arctic states not only expect to be those most affected by the problem; they also expect to be in the best position to take effective steps to address the problem. Formally, these agreements are not actions of the council itself; they are agreements negotiated within the forum provided by the council and signed by representatives of the Arctic states attending Arctic Council ministerial meetings. But the pattern is clear. These agreements address policy issues of particular and understandable concern to the Arctic states because they will suffer the negative impacts, as in the case of the effects of oil pollution in Arctic marine systems, or because they will be called upon to assume the lion's share of the responsibility for addressing the issue, as in the case of search and rescue.⁶ The case for action on the part of the A8 to coordinate their efforts to address issues of this sort is therefore both easy

to understand and entirely legitimate.

Are there additional issues whose attributes make them suitable for treatment under the auspices of the Arctic Council (Molenaar 2012)? Possibilities include cooperative efforts to control drug trafficking and other forms of smuggling in the High North, to regulate bio-prospecting in the Arctic, and to thwart potential activities of terrorists in the region.⁷ Perhaps the most prominent candidate for this treatment involves the possibility that climate change will bring about changes that open up opportunities for commercial fishing in the Arctic Basin. Despite the acknowledged biophysical effects of climate change, there are good reasons to doubt whether fish stocks of interest to commercial fishers will develop in the region during the foreseeable future (Hollowed, Planque, and Loeng 2013; *The Economist* 2013). Still, there is a case to be made for establishing a regulatory arrangement in anticipation of the development of commercially significant stocks; the proposal to impose a moratorium on fishing in the region until more is known about the existence and nature of these stocks makes sense from a precautionary perspective. Nonetheless, this case differs in several respects from the cases of search and rescue and oil spill preparedness and response. Non-Arctic states have rights under the law of the sea to fish in waters beyond the boundaries of EEZs. Just as there is a need to include non-Arctic states in the management regime for the pollock stocks of the central Bering Sea, the interests of non-Arctic states in potential fisheries of the Arctic Basin cannot be ignored. One way to make progress under the circumstances would be to treat the Arctic Basin as a semi-enclosed sea under the terms of Article 123 of UNCLOS. This strategy could provide a basis for establishing a regulatory arrangement dominated by the Arctic states but include provisions designed to take into account the legitimate interests of relevant non-Arctic states. Nevertheless, it makes sense to conclude that the Arctic Council is the right venue for efforts to address this issue. Curiously, several of the coastal states are now pushing for an agreement among the A5 rather than the A8 on this issue (Kramer 2013), a move that is understandable in some respects but likely to engender unnecessary complications in terms of the development of the Arctic Ocean regime complex.⁸

At the same time, there are issues of equal or greater importance that are not well-suited to action on the part of the Arctic Council. Consider short-lived climate pollutants (e.g., black carbon, hydrofluoro carbons or HFCs) as an example. The fact that these sources of climate change are

matters of concern to the Arctic states is understandable. Black carbon is now thought to account for as much as a third of the warming occurring in the Arctic (Quinn et al. 2011); HFCs may have a similar impact (Xu, forthcoming). But much of the black carbon reaching the Arctic originates outside the Arctic and even outside the jurisdiction of the Arctic states. With regard to HFCs used as replacements for ozone-depleting substances, China, India, and Brazil are key players. Unlike the cases of search and rescue and oil spill preparedness and response, therefore, the Arctic states cannot take effective steps to address issues of this sort through the council. It may be helpful to use the council in an effort to draw public attention to such issues, but there is a real danger that the result will be a demonstration of the weakness of the council and a diminution of its reputation for effectiveness.

A different and potentially promising role for the Arctic Council arises from the growing need to address issues relating to the Arctic Ocean in synoptic terms. General discussions of such matters often emphasize the value of thinking in terms of concepts like ecosystem-based management and marine spatial planning (McLeod and Leslie 2009). But it is important to be clear on the underlying issue at stake in this context. The various functional arrangements described in the preceding section are developing along separate tracks. Even the council itself has tended to deal with individual issues (e.g., search and rescue, oil spills, the effects of black carbon) in segregated terms. Yet it is clear that these arrangements interact with one another in a variety of ways; they will do so more and more as human activities in the Arctic expand and the regimes created to manage them become more numerous and complex. This is not necessarily a bad thing. Research on the interplay of distinct governance systems has shown that it is often possible to make adjustments that alleviate potential conflicts between or among them; there are even cases where interplay can lead to synergy (Oberthür and Gehring 2006). But there is nothing automatic about the achievement of harmony among multiple arrangements, especially as the relevant space becomes populated with a larger and larger number of discrete regimes (Oberthür and Stokke 2011).

As a body with a broad remit covering issues of environmental protection and sustainable development, the Arctic Council may be in a position to play a constructive role in addressing this challenge. But concretely, what steps could and should the council take in the near future to make progress regarding this matter? The first step is to map the full

range of functionally and spatially specific arrangements that apply to the Arctic and to undertake an assessment of the ways in which these arrangements currently interact with one another or can be expected to do so during the foreseeable future (AOR 2013). Will rules pertaining to the activities of those engaged in offshore oil and gas development be sufficient to ensure that these activities are not harmful to marine mammals in polar waters (e.g., whales, walrus, seals, and polar bears)? Should operators of cruise ships plying Arctic waters be expected to contribute to the cost of maintaining search and rescue operations covering areas of particular interest to tourists? Is the establishment of EBSA's under the auspices of the Convention on Biological Diversity likely to interfere with commercial shipping in the Arctic?

Once these issues are identified and prioritized, the Arctic Council could provide a forum for bringing the key players together and exploring ways to alleviate matters that call for early intervention. It may well be possible, for instance, to devise rules governing the siting and operation of offshore energy infrastructure to avoid or minimize harm to marine mammals without imposing excessive costs on energy companies. Similar observations are in order regarding the location of shipping lanes in a manner that minimizes harm to EBSAs or to Particularly Sensitive Sea Areas (PSSAs) that may be established in the Arctic under the auspices of the Convention on Biological Diversity and the IMO. In recent years, the council has made a start toward tackling such concerns through the work of the Arctic Ocean Review (AOR 2013) and the Arctic Resilience Report (ARR 2013). In some respects, these initiatives highlight the limitations of the council in dealing with issues of this sort. Yet, relative to expectations regarding the role of the council at the time of its inception in 1996, activities of this sort constitute evidence of real growth in the capacity of the council to play an important role in the evolution of Arctic Ocean governance.

IS A THIRD LEG OF THE ARCTIC OCEAN REGIME COMPLEX NEEDED?

The most significant development of recent years affecting Arctic governance is the tightening of links between the Arctic region and the overarching international system (Young 2012b; Young 2013b; Hough 2013). As a theater of operations for sophisticated weapons systems,

the Arctic was an area of considerable interest to those concerned with military security during the Cold War (Osherenko and Young 1989). With the end of the Cold War, however, the Arctic moved to the periphery of international relations, a fact that reduced interest in the region on the part of those concerned with high politics but that at the same time made it relatively easy for policymakers with a particular interest in the Arctic to launch cooperative initiatives largely free of the complications associated with matters of high politics. The Arctic Council itself is a product of these circumstances.

The transformative changes occurring in the region in recent years have brought the Arctic to the attention of both non-Arctic states and non-state actors (e.g., multinational corporations) interested in the economic potential of the region. One effect of this development is to tie the fate of the Arctic intimately to actions that are occurring outside the region and beyond the control of the Arctic states. China and India, for example, have emerged as leading emitters of greenhouse gases; China alone is responsible for about 28% of global carbon dioxide emissions. Various forces that the Arctic states are not able to control drive the world energy market. Even in cases like the shale gas revolution, where the U.S. is in the lead, the American government does not occupy the driver's seat. The rise of China, the American pivot toward Asia, and the growing role of Asian players in international commerce are reshaping geopolitical relations in ways that are likely to have profound implications for the Arctic but that are not subject to regional control. Insofar as Asian markets loom large as destinations for Arctic resources, non-Arctic forces will become critical drivers of Arctic development.

Under the circumstances, both leading non-Arctic states (e.g., China, Japan, Korea, the UK) and major non-state actors (e.g., multinational energy and mining corporations) have become interested in the Arctic at the policy level. They are no longer content to leave issues of governance in the region exclusively in the hands of the Arctic states. This makes it impossible simply to deny or ignore the growing interest in Arctic affairs on the part of a number of non-Arctic actors.

One way to respond to this development is to use the mechanism of (permanent) observership in the Arctic Council (Graczyk and Koivurova 2013).⁹ Under its rules of procedure, the council can accord the status of observer to non-Arctic states (as well as intergovernmental and non-governmental organizations). As the Arctic has become a focus of attention

on the part of those interested in natural resources and commercial navigation, numerous non-Arctic states, including major powers such as China, India, and Japan, have applied for the status of permanent observer. For their part, the A8, not to mention the Permanent Participants, have become increasingly sensitive to the implications of accepting a flood of new observers into the activities of the council. In 2011, they adopted new and rather restrictive rules of procedure regarding observers. Observers are expected to “recognize the Arctic States’ sovereignty, sovereign rights and jurisdiction in the Arctic,” accept severe constraints on the nature of their participation in the activities of the council, offer to provide financial support for the activities of the Permanent Participants, and agree to periodic reviews of their credentials (Arctic Council 2011).

Observers can play a role in some activities of the council; specific projects carried out by one or another of the working groups are prime examples. But this status does not provide a basis for serious engagement between Arctic and non-Arctic states regarding matters of policy. Despite these limitations, numerous non-Arctic states have persisted in applying for the status of permanent observer, and some members of the A8 have persisted in raising concerns about the consequences of opening up the council to representatives of major non-Arctic states. For several years, tensions relating to observership proved disruptive for all parties concerned. In a move to defuse this issue, the A8 agreed at the 2013 ministerial meeting in Sweden to accept China, India, Italy, Japan, Korea, and Singapore as Observer States (Kiruna Declaration 2013).¹⁰

This is an important step, and there is every reason for the new observers to make a concerted effort to engage with the council and its working groups on an active basis. Nonetheless, it is clear that the council, a regional body dominated by regional interests, does not offer a suitable venue for addressing issues (sometimes described as trans-regional issues) arising from the links between the Arctic as a region and international society as a whole (Guo 2012). The members of the council regard it as a forum designed to provide a means for the Arctic states to pursue cooperative measures regarding matters of interest largely to themselves. This makes good sense in cases like search and rescue and oil spill preparedness and response. But it does not provide a recipe for effectively addressing issues like regulating pollutants (e.g., persistent organic pollutants or black carbon) originating outside the region that make their way to the Arctic or governing a range of commercial activities in which

non-Arctic states and non-state actors are major players.

What is to be done regarding this matter? Here is where the idea of a third leg of the Arctic Ocean governance complex comes into focus. The Arctic Council is not in a position to deal with critical links between the Arctic and the global system. A careless effort to assert control in these terms could easily backfire, undermining the gains the council has made in recent years in addressing regional issues (Axworthy, Koivurova, and Hasanat 2012; Kankaanpää and Young 2012). For their part, there is no reason to expect major non-Arctic states and non-state actors to accept the authority of the Arctic Council to make policy decisions regarding matters of this sort. The solution to this problem may well lie in the creation of a mechanism allowing Arctic and non-Arctic actors to engage in a thoughtful and mutually beneficial dialogue about certain Arctic issues without competing with the council, now acknowledged by all as the primary forum for handling Arctic issues of a regional nature (Young 2013b).

What form should a third leg of the Arctic Ocean regime complex take? This question is beginning to come into focus in policy circles. As the April 2013 initiative of Iceland's President Grimsson to establish an "Arctic Circle" makes clear, concrete initiatives to flesh out this component of the Arctic Ocean regime complex are beginning to emerge (Arctic Circle 2013).¹¹ Other initiatives relating to this need for governance are likely to arise during the foreseeable future (Humrich 2013). It is appropriate at this stage, therefore, to offer some preliminary observations on ways to structure this element of the Arctic Ocean regime complex that may prove both politically feasible and functionally effective.

The remit of this mechanism would be to address issues of governance featuring clear links between the Arctic and the outside world. There is no need for such a mechanism to deal with an issue like search and rescue in the Arctic or, for that matter, with the activities of the armed forces of the Arctic states in the region. On the other hand, there is a need to engage in an open dialogue about Arctic issues featuring economic initiatives on the part of non-Arctic states, including steps these states could take to alleviate any environmentally disruptive impacts of development in the region. Consider Chinese interests in engaging in mining in Greenland and in the development of infrastructure in Iceland useable to support future maritime commerce, or Korean and Japanese interests in gaining access to the hydrocarbons of the Russian Far East, as illustrative cases. There is nothing inherently wrong with these interests, but they present issues that the Arctic

Council is not in a position to address constructively. Or consider the issue of controlling the deposition of black carbon in the Arctic as a major source of biophysical changes in the region. Given the fact that much of the black carbon originates outside the Arctic, there is much to be said for creating a body that could promote dialogue between the Arctic states and those non-Arctic states that are the sources of the problem.

The first principle governing such a consultative mechanism is that it should operate as a coalition of the willing. Since the goal would be to engage in a policy dialogue regarding matters of mutual concern, this body should welcome participation on the part of all those with significant stakes in the links between the Arctic and the outside world. In the first instance, this means representatives of major states. But since the emphasis would be on bringing key stakeholders to the table and since there would be no formal requirements for membership, it would make sense to use this mechanism as a venue in which major corporations, environmental organizations, coastal communities, and indigenous peoples' organizations could meet and interact in an informal environment.

The forum would not be endowed with the authority to make formal decisions, an arrangement that should alleviate concerns about rights to participate and rules of procedure to be used in arriving at collective choices. A critical function of the body would be to foster a sense of community among key players in both Arctic and non-Arctic states to allow for candid, off-the-record discussions of contentious or potentially contentious issues. There is no reason to suppose that this would produce simple solutions to difficult issues such as the impacts on indigenous peoples of the European Union's ban on the importation of seal products. But it should be possible to examine the implications of such issues in a manner that would be conducive to the search for constructive solutions and especially to anticipate the prospect of such issues arising in the future with the goal of heading them off before they become intractable. Whether or not such a process could have led to a less disruptive outcome in the case of the seal ban is difficult to say, but the goal would be to explore options for addressing such issues in a manner acceptable to all parties concerned.

It goes without saying that this consultative mechanism would need to be highly adaptable. Because the Arctic is experiencing transformative changes whose implications for governance cannot be anticipated with certainty, there is a need for a mechanism that can adjust rapidly to changing circumstances. Because the venue under consideration here would

be highly informal with regard to membership and rules of procedure, it should be able to shift ground easily in terms of participation, agenda formation, and mode of operation. In some respects, these conditions are indicative of the weakness of such a body; it would lack a fixed mandate and the authority to make formal decisions regarding issues on its agenda. But this may not be a problem given the existence of other elements of the Arctic Ocean governance system that are more formal in nature and that (at least in some cases) possess the authority to make binding decisions on specific matters of concern in the Arctic (e.g., the rules governing commercial shipping). The added value of this third leg of the Arctic regime complex would be to provide an informal setting in which individuals from both Arctic and non-Arctic states could engage in candid exchanges of views regarding issues featuring links between the Arctic and the outside world.

ARE THERE WAYS TO STRENGTHEN THE FOUNDATION OF THE ARCTIC OCEAN GOVERNANCE SYSTEM?

The preceding sections have identified cutting-edge concerns arising in each of the elements of the Arctic Ocean regime complex and suggested next steps in responding to them. But it is natural to ask whether there are foundational considerations that will affect the evolution of the Arctic Ocean governance system as a whole. If so, are there feasible steps that we can take to strengthen the foundation of this system and, in the process, promote an outcome in which the overall effectiveness of Arctic Ocean governance is enhanced? While an Arctic Ocean treaty is not a realistic option at this stage, it may well be possible to take steps to encourage the development of an analytical and normative matrix underpinning this governance system (Young 2011b). Two elements of this matrix deserve particular attention at this stage: (i) a common narrative or discourse to guide the evolution of the Arctic Ocean governance system and (ii) a set of operating principles to provide backing for efforts to strengthen specific components of the system.

Governance systems that are effective generally reflect underlying analytic narratives or discourses that participants use, consciously or unconsciously, to interpret seemingly disparate events pertaining to a

particular issue domain. An example well-known to those who think about international economic regimes is the role of the narrative of embedded liberalism as a foundational discourse for the international economic order arising in the aftermath of World War II (Ruggie 1983). I have argued elsewhere that the discourse of neorealism, which filters developments through the lens of power politics or geopolitics, does not provide a useful framework for understanding developments occurring in the Arctic today, despite its influence among journalists and policy pundits (Young 2012c). For the most part, the Arctic is a zone of peace; most informed analysts expect it to remain peaceful for the foreseeable future. On the other hand, the discourse of environmental protectionism, which filters observations about ongoing events through a lens emphasizing the protection of biophysical systems from the impacts of human actions, seems equally wide of the mark as a way of organizing thinking about current developments in the Arctic. Environmental concerns are important and are likely to make a difference regarding some issues, but any idea of closing the Arctic to influential actors interested in exploiting the region's natural resources and developing the Arctic's potential for commercial shipping is unlikely to make much headway.

What is needed is a distinctive Arctic discourse, one that acknowledges the influence and even the legitimacy of forces favoring economic development in the region, while at the same time placing a high priority on sustaining the distinctive human cultures of the Arctic and protecting the region's unique environmental assets. What this suggests is the usefulness of a discourse emphasizing sustainable development adapted to the conditions prevailing in the Arctic. The essential feature of such a discourse is the idea of the triple bottom line or, in other words, the requirement that human activities in the region fulfill economic, environmental, and sociocultural goals at the same time. There is nothing in this perspective that would justify a total ban on the extraction of natural resources or on the development of commercial shipping routes in the Arctic. But this discourse calls for strict limits on economic activities likely to prove destructive to major ecosystems or to undermine human communities in the Arctic. The idea of imposing a moratorium on commercial fishing in the Arctic Basin until more is known about the relevant stocks and ecosystems, for instance, makes sense from this perspective. So, too, does the idea that those engaged in energy development in the Arctic should be required to avoid disrupting traditional indigenous practices, as in the case of oil and

gas development on Russia's Yamal Peninsula, and to provide appropriate jobs for Arctic residents as in the cases of mining in northwestern Alaska and oil development on Alaska's North Slope and adjacent offshore areas.

A sustainable development discourse for the Arctic faces the same challenges that arise in efforts to bring this discourse to bear in other settings. Can we devise a metric for comparing gains and losses across the three pillars of sustainable development? In cases where actors disagree about the pros and cons of tradeoffs among the three pillars, are there acceptable ways to adjudicate these differences? Finding ways to address hard cases in this connection is essential. For example, should indigenous hunters be allowed to harvest whales, especially in cases where there is no reason to expect that hunting will threaten relevant stocks? Should operators of cruise ships be required to comply with stringent regulations emphasizing safety, as well as rules dealing with liability, in cases of accidents? Should energy companies be allowed to engage in offshore oil and gas development when there is no realistic way to preclude the prospect of severe harm to marine ecosystems arising from oil spills? There are no easy answers to questions of this sort; even those who subscribe to a common discourse of sustainable development may arrive at different answers in specific instances. Nevertheless, the discourse of sustainable development does provide a useful lens, making it clear that economic development is acceptable but that it must proceed in a manner responsive to both sociocultural and ecological concerns specific to the Arctic.

While governance systems feature explicit rules and decision-making procedures, it is often helpful to embed them in sets of broader operating principles. Such principles do not prescribe specific actions on the part of clearly identified actors, but they do provide normative guidance for the efforts of those seeking to address specific issues in a given issue area. A prominent example relating to climate change is the principle articulated in Article 2 of the UN Framework Convention on Climate Change, which calls upon all parties to prevent "dangerous anthropogenic interference with the climate system." Another example is the principle of common but differentiated responsibilities, which serves to justify the practice of assigning differentiated obligations to developed and developing states under the terms of international environmental agreements. Principles, unlike rules, do not spell out specific requirements and prohibitions with which subjects are expected to comply. Rather, they create general expectations that offer guidance regarding appropriate behavior in

reasonably well-defined issue areas (Young 2001).

Can we devise a set of operating principles that would be acceptable to all parties concerned with Arctic Ocean governance? Of course, there is no definitive answer to this question. Still, it may be helpful to offer some examples of possible principles of Arctic Ocean governance. Consider the following principles as candidates for inclusion in this set:

- The Arctic is a zone of peace in which the expectation is that all disputes will be settled through peaceful means.
- Arctic development should be based on the precepts of stewardship in an era of human domination of biophysical systems.
- Arctic development should proceed in a manner respectful of the preferences of recognized rightsholders, including the region's indigenous peoples.
- Adaptive governance is needed to maintain the resilience of Arctic systems in an era of rapid change.

Each of these principles is subject to further development, but their general thrust is clear. They seek to establish the premise that the Arctic is a dynamic region in which economic development is acceptable, but only when it is subject to well-defined limits required to avoid the ecological destruction we associate with the concept of “roving bandits” (Berkes et al. 2006) and to ensure that activities are carried out in a manner that respects the rights of local and especially indigenous peoples. In essence, the purpose of these principles is to define an alternative to the familiar pattern of core-periphery relations in which the Arctic is perceived as a resource frontier to be exploited for the production of raw materials of value to outsiders who have little concern for the long-term effects of this form of development on either the cultures or ecosystems of the region itself. Even in this age of heightened sensitivity regarding the impacts of extractive industries, distant decision makers involved in such activities are often poorly informed about remote regions like the Arctic and concerned about profit maximization to the exclusion of the requirements of stewardship in a region containing sociocultural and biophysical systems especially sensitive to exogenous shocks.

CONCLUDING OBSERVATIONS

The Arctic is in the midst of a transformation that is not only changing the biophysical and socioeconomic systems of the region itself (e.g., sea ice in the Arctic Basin) but also altering the perspectives of outsiders regarding the significance of the region. One result of this development is the emergence of new needs for governance. In this regard, the recent cooling of super heated projections regarding an Arctic “gold rush” is probably good news; it provides some relief from the pressures to engage in a competitive race to exploit the riches of the region regardless of the consequences. Nonetheless, it is timely to move forward now with the development of a suite of innovations relating to Arctic Ocean governance. There is little prospect of reaching agreement on the terms of a comprehensive and integrated Arctic treaty any time soon, but this does not mean that we should be pessimistic about the prospects for progressive development regarding Arctic Ocean governance. What is emerging is a regime complex founded on the constitutive provisions of UNCLOS and encompassing three substantial elements. In each element, there is progress to report, but more to be done. The cutting-edge issues relating to each element are distinctive. It is therefore important to be alert to the need to ensure that the evolution of the Arctic Ocean governance system proceeds in such a way that the whole is greater than the sum of the parts. One way to achieve this goal is to pay attention to the value of articulating a guiding narrative or discourse informing developments in the various components of the Arctic governance system and developing a set of operating principles that can strengthen the foundation of Arctic Ocean governance.

Notes

1. The “Vision for the Arctic,” released at the 2013 Arctic Council Ministerial Meeting, asserts as its first operating principle that “The further development of the Arctic region as a zone of peace and stability is at the heart of our efforts. We are confident that there is no problem that we cannot solve together through our cooperative relationships on the basis of existing international law and goodwill” (Arctic Council Secretariat 2013).
2. For Russia, for example, basing naval assets on the Kola Peninsula is a matter of geographical necessity rather than an indication of concern about conflict in the

Arctic.

3. A number of more limited, sub-regional arrangements (e.g. the regime for Svalbard) also play some role in Arctic Ocean governance.
4. One exception involves disagreement regarding the quotas provided to Greenland under the provisions relating to “aboriginal subsistence whaling.”
5. One complication arises from the fact that the Polar Code (unlike the 2002 Guidelines) is framed as a bipolar arrangement covering both Arctic and Antarctic waters.
6. A number of environmental groups have criticized the oil spill agreement mainly because it focuses on oil spill preparedness and response rather than on oil spill prevention. This is an understandable criticism. But it is unlikely that a substantial agreement covering prevention as well as preparedness and response would be feasible politically at this stage.
7. While the Ottawa Declaration states explicitly that the Arctic Council should not address matters of military security, there are recurrent proposals for the council to play a role in the initiation of an Arctic nuclear-weapon-free zone (Canadian Pugwash 2013).
8. The coastal states assert that they are the key players in functional terms and that they intend to open any agreement they negotiate regarding fisheries to participation on the part of others in due course. But given the political fallout arising from earlier initiatives on the part of the A5, it is hard to avoid the conclusion that this approach is ill-advised.
9. The previous distinction between permanent and ad hoc observers has become less relevant under the criteria regarding observership that the council adopted in Nuuk, Greenland in 2011.
10. Since France, Germany, Poland, Spain, the Netherlands, and the UK were already observers, 12 non-Arctic states are now officially Arctic Council observers.
11. The first meeting of this body took place during October 2013 in Reykjavik. Time will tell whether this initiative gains traction.

References

- ACIA. 2004. *Impacts of a Warming Arctic: Arctic Climate Impact and Assessment*. Cambridge: Cambridge University Press.
- Arctic Circle. 2013. <http://www.arcticcircle.org>

- Arctic Council. 2011. "Senior Arctic Officials Report to Ministers." Nuuk, Greenland, 12 May 2011. Available at: www.arctic-council.org
- Arctic Council Secretariat. 2013. "Vision for the Arctic." Kiruna, Sweden, May 15, 2013. Available at: www.arctic-council.org
- Arctic Ocean Review (AOR). 2013. Arctic Ocean Review: Final Report. Available at: www.aor.is/
- Arctic Resilience Report (ARR). 2013. "Arctic Resilience Interim Report." Available at: www.arctic-council.org/arr/
- Axworthy, Thomas, Timo Koivurova, and Waliul Hasanat. eds. 2012. *The Arctic Council: Its Place in the Future of Arctic Governance*. Toronto: Munk School of Global Affairs.
- Berkes, Fikret et al. 2006. "Globalization, Roving Bandits, and Marine Resources." *Science* 311: 1557-1558.
- Berkman, Paul A., Michael Lang, David Walton, and Oran Young. eds. 2011. *Science Diplomacy: Antarctica, Science and the Governance of International Spaces*. Washington, DC: Smithsonian Institution Scholarly Press.
- Berkman, Paul A. and Alexander Vylegzhanin. eds. 2012. *Environmental Security in the Arctic Ocean*. Dordrecht: Springer.
- Borgerson, Scott. 2008. "Arctic Meltdown: The Economic and Security Implications of Climate Change." *Foreign Affairs* 87: 63-77.
- Canadian Pugwash 2013. "Policy Imperatives for an Arctic Nuclear-Weapon-Free Zone." Report of a conference held at Ottawa University, October 26-27, 2012.
- Collins, James F., Michael Sfraga, Ross A. Virginia, and Kenneth S. Yalowitz. 2013. "A Euro-Atlantic Action Plan for Cooperation and Enhanced Arctic Security." Report on a conference held at the Carnegie Endowment in International Peace, Washington, DC, February 11-12.
- Corell, Hans. 2008. "The North is not the Wild West." *Globe and Mail*, April 28.
- Deggim, Heike. 2012. "Ensuring Safe, Secure and Reliable Shipping in the Arctic." In *Environmental Security in the Arctic Ocean*, edited by Paul A. Berkman and Alexander Vylegzhanin, 241-254. Dordrecht: Springer.
- Deggim, Heike. 2013. "Arctic Marine Shipping and Logistics." A commentary presented at the 2013 North Pacific Arctic Conference, Honolulu, August 21-23.
- Fikkan, Anna, Gail Osherenko, and Alexander Arikainen. 1993. "Polar Bears: The Importance of Simplicity." In *Polar Politics: Creating International Environmental Regimes*, edited by Oran R. Young and Gail Osherenko, 96-151. Ithaca: Cornell University Press.

- Gorbachev, Mikhail. 1987. Speech in Murmansk on the occasion of the presentation of the Order of Lenin and the Gold Star to the City of Murmansk, October 1. http://www.barentsinfo.fi/docs/Gorbachev_speech.pdf
- Graczyk, Piotr and Timo Koivurova. 2013. "A New Era in the Arctic Council's External Relations? Broader Consequences of the Nuuk Observer Rules for Arctic Governance." *Polar Record*. doi: 10.1017/S0032247412000824
- Guo, Peiqing. 2012. "An Analysis of New Criteria for Permanent Observer Status on the Arctic Council and the Road of Non-Arctic States to the Arctic." *KMI International Journal of Maritime Affairs and Fisheries* 4: 21-38.
- Hollowed, Anne, Benjamin Planque, and Harald Loeng. 2013. "Potential Movement of Commercial Fish and Shellfish Stocks from the Sub-Arctic to the Arctic Ocean." *Fisheries Oceanography*. doi:10.1111/fog.12027
- Hough, Peter. 2013. *International Politics of the Arctic: Coming in from the Cold*. New York: Routledge.
- Howard, Roger. 2009. *The Arctic Gold Rush: The New Race for Tomorrow's Natural Resources*. London: Continuum.
- Huebert, Rob and Brookes Yaeger. 2006. "A New Sea: The Need for a Regional Agreement on Management and Conservation of the Arctic Marine Environment." Oslo: WWF International Arctic.
- Humrich, Cristoph. 2013. "Fragmented International Governance of Arctic Offshore Oil: Governance Challenges and Institutional Improvement." *Global Environmental Politics* 13: 79-99.
- Ilulissat Declaration. 2008. "Declaration from the Arctic Ocean Conference, May 28, 2008." <http://www.arcticgovernance.org/the-illulissat-declaration.4872424.html>
- Jensen, Øystein. 2007. "The IMO Guidelines for Ships Operating in Arctic Ice-Covered Waters: From Voluntary to Mandatory Tool for Navigation Safety and Environmental Protection?" *Fridtjof Nansen Institute Report* 2007:2.
- Kankaanpää, Paula and Oran R. Young. 2012. "The Effectiveness of the Arctic Council." *Polar Research*. <http://dx.doi.org/10.3402/polar.v31i0.17176>
- Keohane, Robert O. and David G. Victor. 2011. "The Regime Complex for Climate Change." *Perspectives on Politics* 9: 7-23.
- Kiruna Declaration. 2013. Declaration on the Occasion of the Eighth Ministerial Meeting of the Arctic Council. Available at: www.oractic-council.org
- Koivurova, Timo and David VanderZwaag. 2007. "The Arctic Council at 10 Years: Retrospect and Prospect." *University of British Columbia Law Review* 40: 121-194.
- Koivurova, Timo and Erik J. Molenaar. 2009. *International Governance and*

- Regulation of the Marine Arctic: Overview and Gap Analysis*. Oslo: WWF International Arctic Programme.
- Kramer, Andrew. 2013. "Accord Would Regulate Fishery in Arctic Waters." *New York Times*, April 16, A9.
- Krasner, Stephen D. ed. 1983. *International Regimes*. Ithaca: Cornell University Press.
- Lyster, Simon. 1985. *International Wildlife Law: An Analysis of International Treaties Concerned with Conservation of Wildlife*. Cambridge: Cambridge University Press.
- McLeod, Karen and Heather Leslie. eds. 2009. *Ecosystem-Based Management for the Oceans*. Washington, DC: Island Press.
- Mikkola, Harri and Juha Käylä. 2013. "Arctic Economic Potential: The Need for a Comprehensive and Risk-Aware Understanding of Arctic Dynamics." FIIA Briefing Paper 127. The Finnish Institute of International Affairs.
- Molenaar, E. J. 2012. "Current and Prospective Roles of the Arctic Council Multilateral System within the Context of the Law of the Sea." Paper presented at the conference on The Arctic Council: Its Place in the Future of Arctic Governance, Toronto, January 17-18.
- National Research Council (NRC). 1996. *The Bering Sea Ecosystem*. Washington, DC: National Academy Press.
- Oberthü, Sebastian and Thomas Gehring, eds. 2006. *Institutional Interaction and Global Environmental Governance: Synergy and Conflict among International and EU policies*. Cambridge: MIT Press.
- Oberthü, Sebastian and Olav Schram Stokke. eds. 2011. *Managing Institutional Complexity: Regime Interplay and Global Environmental Change*. Cambridge: MIT Press.
- Orsini, Amandine, Jean-Frederic Morin, and Oran R. Young. 2013. "Regime Complexes: A Buzz, a Boom, or a Boost for Global Governance?" *Global Governance* 19: 27-39.
- Osherenko, Gail and Oran R. Young. 1989. *The Age of the Arctic: Hot Conflicts and Cold Realities*. Cambridge: Cambridge University Press.
- Ostrom, Elinor et al. eds. 2002. *The Drama of the Commons*. Washington, DC: National Academy Press.
- Ottawa Declaration. 1996. "Declaration on the Establishment of the Arctic Council." <http://www.arctic-council.org/index.php/en/about/documents/category/4-founding-documents>
- Parson, Edward A. 2003. *Protecting the Ozone Layer: Science and Strategy*. Oxford: Oxford University Press.

- Quinn, P.K. et al. 2011. "The Impact of Black Carbon on Arctic Climate." AMAP *Technical Report* No. 4. Available at <http://www.amap.no>
- Raustiala, Kal and David G. Victor. 2004. "The Regime Complex for Plant Genetic Resources." *International Organization* 55: 277-309.
- Rafuse, Rosemary. 2007. "Melting Moments: The Future of Polar Oceans in a Warming World." *Review of European Community and International Environmental Law* 16: 196-216.
- Ruggie, John G. 1983. "International Regimes, Transactions, and Change: Embedded Liberalism in the Postwar Economic Order." In *International Regime*, edited by Stephen D. Krasner, 195-231. Ithaca: Cornell University Press.
- Rosenau, James N. and Ernst-Otto Czempiel. eds. 1992. *Governance without Government: Order and Change in World Politics*. Cambridge: Cambridge University Press.
- Sale, Richard and Eugene Potapov. 2010. *The Scramble for the Arctic: Ownership, Exploitation and Conflict in the Far North*. London: Frances Lincoln.
- Stokke, Olav Schram. 2007. "A Legal Regime for the Arctic? Interplay with the Law of the Sea Convention." *Marine Policy* 31: 402-408.
- The Economist*. 2013. "The Arctic: Tequila Sunset." Vol. 406 (#8822): 76-77. February 9.
- Ulfstein, Geir. 1995. *The Svalbard Treaty*. Oslo: Scandinavian University Press.
- United Nations. 1983. *The Law of the Sea*. New York: United Nations.
- United Nations Environment Programme. 2013. *UNEP Yearbook 2013: Emerging Issues in Our Global Environment*. Nairobi: UNEP.
- Wezeman, Siemon T. 2012. "Military Capabilities in the Arctic." SIPRI Background Paper. Stockholm: Stockholm International Peace Research Institute.
- Xu, Yangyang, Durwood Zaelke, Guus J.H. Velders, and Veerabhadran Ramanathan. forthcoming. "The Role of HFCs in Mitigating 21st Century Climate Change." *Atmospheric Chemistry and Physics*.
- Young, Oran R. 1998. *Creating Regimes: Arctic Accords and International Governance*. Ithaca: Cornell University Press.
- Young, Oran R. 1999. *Governance in World Affairs*. Ithaca: Cornell University Press.
- Young, Oran R. 2001. "Environmental Ethics in International Society." In *Ethics and International Affairs*, edited by Jean-Marc Coicaud and Daniel Warner, 161-193. Tokyo: UN University Press.
- Young, Oran R. 2010. *Institutional Dynamics: Emergent Patterns in International*

Environmental Governance. Cambridge: MIT Press.

- Young, Oran R. 2011a. "The Future of the Arctic: Cauldron of Conflict or Zone of Peace?" *International Affairs* 87: 183-193.
- Young, Oran R. 2011b. "If an Arctic Treaty is not the Solution, What is the Alternative?" *Polar Record* 47: 327-334.
- Young, Oran R. 2012a. "Building an International Regime Complex for the Arctic: Current Status and Next Steps." *The Polar Journal*. <http://dx.doi.org/10.1080/2154896X.2012.735047>
- Young, Oran R. 2012b. "Arctic Politics in an Era of Global Change." *The Brown Journal of World Affairs* XIX: 165-178.
- Young, Oran R. 2012c. "Arctic Futures: The Power of Ideas." In *Environmental Security in the Arctic Ocean*, edited by Paul A. Berkman and Alexander N. Vylegzhanin, 123-136. Dordrecht: Springer.
- Young, Oran R. 2013a. *On Environmental Governance: Sustainability, Efficiency, and Equity*. Boulder: Paradigm Publishers.
- Young, Oran R. 2013b. "Listening to the Voices of Non-Arctic States in Arctic Ocean Governance." In *The Arctic in World Affairs: A North Pacific Dialogue on Arctic Marine Issues*, edited by Oran R. Young, Jong Deog Kim, and Yoon Hyung Kim, 279-303. Seoul: Korea Maritime Institute.
- Young, Oran R. and Gail Osherenko. eds. 1993. *Polar Politics: Creating International Environmental Regimes*. Ithaca: Cornell University Press.

Comments on Chapter 4: American perspective

Robert W. Corell

OVERVIEW

Oran R. Young's paper provides an excellent overview of the evolution of Arctic Ocean governance and the challenges and opportunities arising as a result of substantial climate and other environmental changes in the Arctic region together with changes resulting from globalization that affect socioeconomic conditions in the region. The major premise, noted early in the paper, which posits that "one factor that plays an important role in the maintenance of peace in the Arctic is the emergence of an increasingly effective Arctic Ocean governance system," is well documented and defended. The paper develops the proposition that not only is an increasingly effective Arctic Ocean governance system emerging but also, it is becoming more robust as the issues of access to natural resources, transportation routes within the Arctic, and the evolution of the Arctic Council as an increasingly effective intergovernmental body in which non-Arctic nations are benefitting from increased access to dialogue and the council progresses (e.g., in working groups, task groups and other sub-bodies). The paper develops these ideas well and gives the reader enhanced insights into the importance of these evolutionary changes within the council.

The discussion of these evolving changes within the Arctic Council (e.g., extending official observer status to Korea, China, Japan and others) is well done; placing them in the context of the recent development of the Arctic Circle is outstanding. The Arctic Circle documents state that it seeks to support, complement and extend the reach of the work of the council by facilitating a broad exchange of ideas and information among a range of global decision-makers from all sectors, including political and business leaders, indigenous representatives, nongovernmental and environmental representatives, policy and thought leaders, scientists, experts, activists, students and representatives of the media. The discussion of this topic in the paper is well done and of critical importance to an understanding of the evolution of Arctic Ocean governance and the challenges and opportunities that are increasingly evident.

Finally, the positing of candidate principles for Arctic Ocean governance provides a basis for important discussions during NPAC 2013. The paper

sets forth the following principles as candidates:

- The Arctic is a zone of peace in which the expectation is that all disputes will be settled through peaceful means.
- Arctic development should be based on the precepts of stewardship in an era of human domination of biophysical systems.
- Arctic development should proceed in a manner respectful of the preferences of recognized rights-holders, including the region's indigenous peoples.
- Adaptive governance is needed to maintain the resilience of Arctic systems in an era of rapid change.

The paper correctly observes that the Arctic is an increasingly dynamic region within which socioeconomic changes (e.g., increased interest in access and trade routes within the Arctic Ocean, natural resources development from fisheries to minerals, oil and gas, and altered land uses) are already underway and have profound implications for regional societal development. The paper suggests that these principles for governance could provide a framework for guiding development within expanded venues of Arctic Ocean governance.

Finally, the issues addressed in the paper rightly focused on the central importance of international governance, bi- and multilateral agreements, and international instruments and laws essential for future Arctic maritime operations and shipping issues, along with the importance of placing international governance in a context that incorporates socioeconomic factors, and how governance is an enabling part of the infrastructure of trans-Arctic shipping.

ADDED THOUGHTS AND COMMENTARY

While the paper focuses on the evolution of Arctic Ocean governance, challenges and opportunities, changes in the coastal regions of the Arctic raise governance issues of profound importance not only for the eight Arctic nations, but also for many other nations as well (i.e., those engaged in the NPAC conference series). An additional focus on changes in coastal civil infrastructure investments along the coastal margins of the Arctic and nearby regions is likely to raise governance issues that affect maritime

operations, particularly along the Northern Sea Route (NSR). As suggested in a recent report,¹ “The coast is a key interface in the Arctic environment. It is a locus of human activity, a rich band of biodiversity, critical habitat, and high productivity, and among the most dynamic components of the circumpolar landscape. The Arctic coastal interface is a sensitive and important zone of interaction between land and sea, a region that provides essential ecosystem services and supports indigenous human lifestyles; a zone of expanding infrastructure investment and growing security concerns.” A high proportion of Arctic residents, both indigenous and others, live on the coast, and many derive their livelihood from marine resources. Hence, national governance strategies, which often differ among the eight Arctic nations, will have profound implications for all countries with increased interest in access, maritime operations, and trade routes within the Arctic Ocean, as well as in the emerging natural resources development in fisheries, economically important minerals, and oil and gas.

As the paper implies, the emerging leadership in governance will control the pace and successes of evolving Arctic Ocean governance and the responses to its challenges and opportunities. This suggests that there is first a major need for region-wide, high-level strategic leadership, whether within and through the Arctic Council or other existing international institutions or by an individual nation taking on a leadership role. History is replete with examples where region-wide governance challenges were resolved through the leadership of an individual nation working with all interested and invested parties. Such might be appropriate in the Arctic.

It is difficult to project the way forward, but this paper offers a framework for discussions and focused dialogue. To expand on some of the governance issues implied by the paper, but not explicitly developed, we can identify two additional framing themes that may be useful for the 2013 NPAC discussions on the evolution of Arctic governance and the challenges and opportunities both for the oceanic regions of the Arctic and for the nearby coastal regions.

THEME ONE: GOVERNANCE INTERDEPENDENCES AMONG THE ENVIRONMENT, ENERGY, AND ECONOMICS

The framing of strategies for the evolution of Arctic governance will need

to focus on three inexorably interconnected elements essential to modern societies.

- **Environment and natural resources:** The natural environment and resources it contains provide the essential materials of socioeconomic development. In fact, everything that societies need for subsistence, growth and sustainability comes from the environment and its resources. Modes of governance, or lack thereof, affect the use of these essential resources, hence the issues of air and water availability and quality, climate change, and its influence over weather.

Partial listing of natural resources that are derived from the environment

- Forest resources (pertaining to plant and tree life)
- Aquatic / Marine resources
- Hydro geological resources (water bodies of all kinds)
- Animal resources (domesticated animals, or those that can be easily approached by humans)
- Microbial resources (organisms that aren't visible to the naked eye)
- Human resources (the population at large)
- Atmospheric resources (anything that humans cannot control - rainfall, sunlight, temperature, and the like)
- Crop resources (agricultural growth)
- Geological resources (naturally occurring formations - rocks, valleys, minerals, precious metals, and the like)
- Edaphic resources (anything related to the soil and its properties)
- Wildlife resources

Source: Sourabh Gupta, Samuels International Associates, Inc. (SIA)

The Earth's natural environment and its resources provide the essentials for human life and well-being; governance strategies control the ways in which it is used. However, these resources need energy to make them available for use, and an economic structure is essential to make them affordable. Finally, there must be adequate governance structures to guide their long-term use.

- **Energy sources and end uses:** Energy provides the vehicle to use the resources available to humankind, and it is the means for heating/cooling buildings, enabling transportation, cooking food, and providing the electrical power to fuel our industries and businesses and light our way in the darkness.² Energy is essential for human development, and energy systems are a crucial entry point for addressing the most pressing global challenges of the 21st century, including sustainable economic and social development, poverty eradication, adequate food production and food security, health

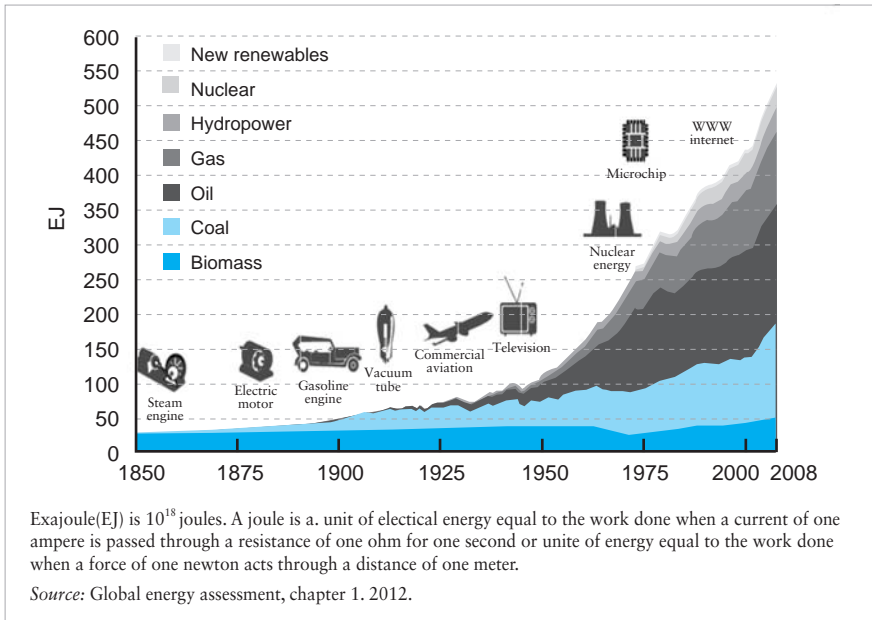


Figure V-1 History of world primary energy use by source

for all, climate protection, conservation of ecosystems, peace and security. Yet, more than a decade into the 21st century, current energy systems do not meet these challenges. A major transformation, fueled by governance strategies and policies, is required to address the challenges and to avoid a potentially major challenge for humankind or possibly even a catastrophic future. As the *Global Energy Assessment* notes, the transformative change in energy governance may not be internally generated within one or more nations due to institutional inertia, policy “lock-in,” incumbency, or the lack of capacity and agility of existing governance organizations to respond effectively to changing conditions. In such situations, clear and consistent external policy signals may be required to initiate and sustain the transformative change needed to meet the sustainability challenges of the 21st century. Energy is derived from a wide range of sources and provides varied means for its use, a historical perspective of which is provided in the diagram below. It is interesting to note that in 1850, virtually all energy was derived from biomass, a renewable energy source. The industrial revolution transformed the

sources so that about 75% now comes from non-renewable sources, including coal, oil, and natural gas.

In most cases, humankind's use of natural resources requires energy to make them available, and there is an obvious need for effective economic structures to make them affordable. Consequently, there is a need for governance structures to guide their long-term use, a fact that is of increasing importance in the Arctic given the expansion of oil, gas and mineral exploration and production in the region. The importance of the energy, economics and environment connections was noted in a recent policy statement on Energy Diplomacy in the 21st Century by then Secretary of State Hillary Rodham Clinton³ in which she stated that energy matters to America's foreign policy for three fundamental reasons. First, it rests at the core of geopolitics, because energy is an issue of wealth and power, which means it can be a source of both conflict and cooperation. Second, energy is essential to how we will power our economy and manage our environment in the 21st century. Third, energy is the key to economic development and political stability. This means that the governance issues discussed in Oran Young's paper will need to give increased credence to the interdependences among the environment, energy, and economics. Future governance developments in the Arctic will need to account for this inexorable interconnectedness, whether through the work of the Arctic Council or other governance institutions.

- Global economics and national economic policies: The Brundtland Report, *Our Common Future: Report of the World Commission on Environment and Development*,⁴ raised the issue of the interdependences among the environment, economics and energy. Christopher Spencer⁵ and others have noted the interdependences of the environment and related scientific, economic, and energy trends, suggesting that they are the global interconnected issues of the 21st century and central challenges for the United Nations. For example, the global energy system and national policies have now assessed inherent vulnerabilities and risks that pose societal, environmental, and economic challenges. However, governments often take governance actions to address these vulnerabilities, which in turn have economic consequences. For NPAC 2013, the global economic trend that is likely to have the most profound impact on the evolution of Arctic Ocean governance and its challenges and opportunities was

outlined in *Global Trends 2030: Alternative Worlds*,⁶ prepared by the U.S. National Intelligence Council to provide a framework for thinking about the future. This report concludes that:

1. The majority of world’s people will not be impoverished: The middle class will expand in most countries. Individuals will move into the middle class as they demand sociopolitical change and increase their consumption of consumer goods, which will have consequences for trade routes and commercial activities across the Arctic, as depicted in the graph below.
2. Demand for resources will increase: The global demand for natural resources will increase owing to an increase in global population from 7.1 billion today to about 8 billion by 2030. Demand for food is projected to rise by 50% and energy by 45% over the next 15-20 years. Nearly half the world’s population will live in areas with severe water stress. The main questions will involve more effective management, wider technology use, and improved governance mechanisms globally and, hence, in the Arctic.
3. A growing food, water, and energy nexus: Demand for food, water, and energy will grow by approximately 35%, 40%, and 50%, respectively, owing to an increase in the global population and the consumption patterns of an expanding middle class. Climate change will worsen the outlook for the availability of these critical resources, and it is likely that severe weather events, such as

Table V-1. Global trends 2030: An overview

Global trends 2030: An overview	
Megatrends	
Individual empowerment	Individual empowerment will accelerate owing to poverty reduction, growth of the global middle class, greater educational attainment, widespread use of new communications and manufacturing technologies, and health-care advances.
Diffusion of power	There will not be any hegemonic power. Power will shift to networks and coalitions in multipolar world.
Demographic patterns	The demographic are of instability will narrow. Economic growth might decline in “aging” countries. Sixty percent of the world’s population will live in urbanized areas; migration will increase.
Food, water, energy nexus	Demand for these resources will grow substantially owing to an increase in the global population. Tackling problems pertaining to one commodity will be linked to supply and demand for the others.

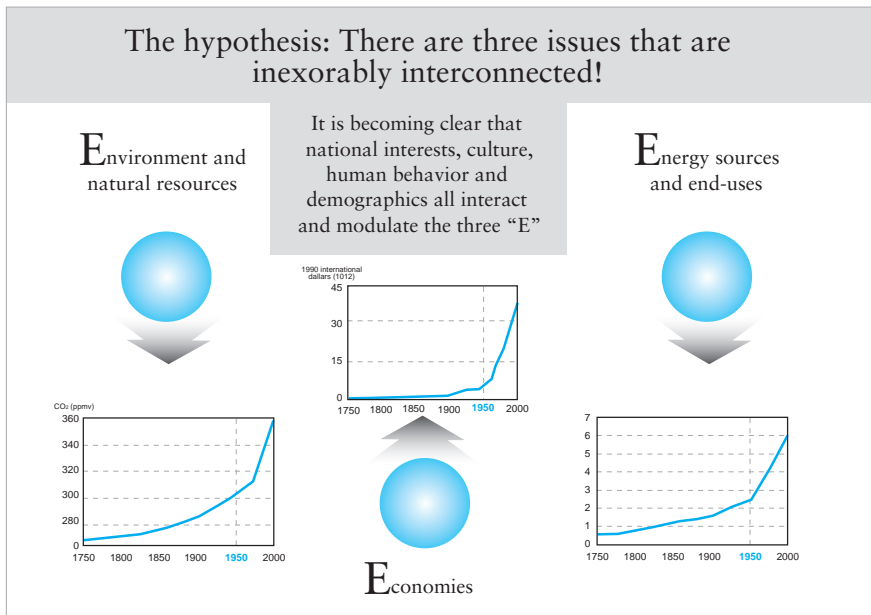


Figure V-2 The hypothesis: There are three issues that are inexorably interconnected

- hurricanes, severe storms and intense rainfall will increase, with wet areas getting wetter and dry and arid areas becoming drier.
5. Megatrends in economic and political influence: Asia will surpass North America and Europe in global power, but no hegemonic power will exist, and the power of other non-Western or middle-tier states will rise. This middle tier as a group will surpass Europe, Japan, and Russia. China’s economy will be 140% larger than Japan’s, and India’s will be 16 times larger than Pakistan’s. Many currently fragile states are likely to move onto solid ground, such as Iraq, Ethiopia, Sierra Leone, Liberia and Nigeria. Others, such as Afghanistan, Somalia, and the Democratic Republic of the Congo, will remain vulnerable. These shifts in economic and political influence will affect governance strategies across the Arctic region.

These megatrends are summarized in Table V-1 for the *Global Trends 2030 Report*.

Global macroeconomics and their interconnectedness with energy and the environment are complex and very difficult to model, much less to predict. The ideas presented here are set forth simply to stimulate

discussions and hopefully to establish a dialogue that will go beyond this conference. A graphic depicting these interacting interdependences is shown below.

THEME TWO: THE ROLE AND INCREASED IMPORTANCE OF NATURAL CAPITAL ACCOUNTS

The concepts of natural capital and natural capital accounts have been discussed for several decades. Yet progress in moving beyond conceptual thinking and experimentation toward implementation of natural capital accounting has been slow. Most economic strategies do not account for natural capital, dismissing it as “externalities.” Natural capital comprises Earth’s natural and environmental assets (soil, air, water, flora and fauna) and the ecosystem services flowing from them. Ecosystem goods and services from natural capital have been estimated to be worth trillions of U.S. dollars per year. They provide food, fibers, water, health, energy, climate security and other essential services for everyone. Neither these services nor the stock of natural capital that provides them are adequately valued compared to social and financial capital. Despite being fundamental to our wellbeing, their daily use remains almost undetected within our economic system. The financial sector at Rio+20 presented a declaration⁷ based on the proposition that current use and economic accounting for natural capital is not sustainable and should be implemented in future governance strategies for economic, environment, and energy policies as a complement to the Bretton Woods system of monetary management that established the rules for commercial and financial relations among the world’s major industrial states in the mid-20th century. Given the work on natural capital accounting at Rio+20 and the enactment of these accounting procedures within the European Union, the private sector and governments will increasingly be called upon to understand and account for our use of natural capital and recognize the true cost of economic growth and sustaining human well-being today and into the future.⁸

A major step toward achieving the vision for natural capital accounts occurred recently when the UN Statistical Commission of the System for Environmental and Economic Accounts (SEEA) adopted them. The SEEA provides an internationally agreed method, on a par with the current System of National Accounts (aggregate measures in the national accounts

often reported simply as gross domestic product or GDP), to account for material natural resources such as minerals, timber, and fisheries. The adoption of the Central Framework of the SEEA has eliminated a major barrier to widespread use of natural capital accounting. The challenge now is to build capacity in countries to implement the SEEA and to demonstrate its benefits to policy makers.

The interaction between Eurostat and national statistical offices of EU Member States was formalized in 2011 with the adoption of Regulation No 691 on European Environmental Economic Accounts.⁹ It requires member states to report data and accounts on air emissions, taxes related to the environment, and material flows from 2012.¹⁰ Eurostat is also constructing environmental accounts expressed in physical and monetary terms, and asset accounts, as a step toward developing a regional SEEA. The rationale for including these observations on natural capital accounts is that, over the decade ahead, the EU and other nations will be implementing accounts that will, of necessity, require governance arrangements to give them credence, including those discussed in the paper and in this session of NPAC 2013.

CONCLUDING OBSERVATIONS

Oran Young's paper for NPAC 2013 raises significant issues that will, of necessity, need to be incorporated into the evolution of Arctic ocean governance and the challenges and opportunities arising from the substantial changes that are the consequences of climate and other environmental changes as well as changes from globalization that impact socioeconomic conditions in the Arctic region. This commentary added two themes deemed important enough for discussion at the conference:

1. A framing of strategies deemed important to the evolution of Arctic governance and the challenges and opportunities, based on the proposition that governance systems will, of necessity, need to focus on three inexorably interconnected elements essential to modern societies: the environment and natural resources; energy sources and enduses, and global economics and national economic policies, within which is nested a projected substantial increase in the middle class globally, substantial increases in the demand for natural resources, and major shifts in economic and political influence.

2. The role and increased importance of natural capital accounts.

Young's paper and the observations of the commentators are likely to stimulate discussions on the evolution of Arctic Ocean governance and the challenges and opportunities that are arising from substantial changes occurring within and across the Arctic region both for the eight Arctic nations and for many other nations with a substantive interest in the Arctic.

Notes

1. State of the Arctic Coast 2010: A Scientific Review and Outlook (<http://ipa.arcticportal.org/files/sac/state%20of%20the%20arctic%20rept.pdf>)
2. See Global Energy Assessment for more detailed information and assessments of the future of global energy sources and uses: <http://www.globalenergyassessment.org>
3. <http://www.state.gov/secretary/rm/2012/10/199330.htm>
4. <http://www.un-documents.net/ocf-03.htm>
5. Christopher Spencer, former senior advisor, international organizations, Canadian Department of Foreign Affairs and International Trade, in an analysis in Global Issues of the Twenty-First Century and United Nations Challenges. <http://www.global-challenges.org/11environment-science.html>
6. <http://www.cfr.org/global-future-trends/nic-global-trends-2030-alternative-worlds/p29631>
7. <http://www.naturalcapitaldeclaration.org/the-declaration/>
8. Much of this is report in World Bank documents, such as: <http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTSDNET/0,contentMDK:23168586~pagePK:64885161~piPK:64884432~theSitePK:5929282,00.html>
9. http://eu2013.stat.gov.lt/uploads/documents/247_EEEA_status_25July.pdf
10. Leonardo Mazza and Patrick ten Brink, "Improving Measurement to Manage Through the 7th EAP: The Role of Indicators and Accounting," Institute for European Environmental Policy, 2013.

Comments on Chapter 4: Canadian perspective

Bernard Funston

OVERVIEW

A relatively small percentage of Arctic marine areas are high seas located beyond the sovereignty or sovereign rights of the six littoral Arctic states (Canada, Denmark, Iceland, Norway, Russia and the United States of America). To date, the level of activities in these areas is low in real and relative terms.

The Arctic Ocean and its bordering seas are affected by activities that occur directly in the Arctic marine and terrestrial environments. Most of these activities do not occur now in the central Arctic Ocean and are therefore within areas subject to the jurisdiction of one or more Arctic states. Such areas are regulated and managed by an Arctic state alone or in cooperation with one or more of the other Arctic states.

However, there is another important category of activities to consider, namely those that primarily take place outside the Arctic but have significant impacts on Arctic marine and terrestrial environments. Anthropogenic activities associated with climate change, transboundary pollutants, demand for new renewable and non-renewable resources and new shipping routes, as well as tourism, are a few examples in this category. In other words, the Arctic sea ice is not melting primarily because of activities taking place in the Arctic. Nor is the search for oil and gas and minerals being driven by demand in local markets in Arctic communities. Furthermore, fundamental changes in the Arctic marine environment will have consequences and impacts in non-Arctic regions.

Therefore, in speaking about “Arctic Ocean governance,” it is important to avoid confusion about which dimension of “governance” is really the object of discussion. This is particularly true when grappling with the challenge of engaging non-Arctic states on appropriate issues in relation to the Arctic. Involvement of non-Arctic states on matters falling within the sovereign jurisdiction of one or more of the Arctic states is fraught with the same sorts of issues as the reciprocal proposition, namely Arctic state involvement on matters falling within the sovereign jurisdiction of one or more non-Arctic states.

Oran Young’s paper seems to acknowledge these challenges and

therefore looks more toward issues relating to the “commons” or, in other words, matters that require cooperation across lines of jurisdiction.

Consequently, one might ask: “Are issues that arise outside the Arctic, but have serious impacts on it, better addressed in an Arctic forum that has mechanisms for inclusion of non-Arctic states, or is it more appropriate to create a non-Arctic forum that accommodates Arctic stakeholders?” This question seems to be at the heart of Young’s paper. Corollary questions relate to how best to structure whatever forum is chosen in order to generate effective policy discussions on these globally important Arctic issues of a trans-regional nature.

INTRODUCTION

As usual, Oran Young has prepared a paper on the evolution of Arctic Ocean governance that is well-researched, well-written, insightful and thought-provoking. It contains informative and helpful descriptions and analyses of the principal components of the Arctic governance system and of issue-specific arrangements.¹ This commentary is offered in the spirit of constructive dialogue in relation to the complex and important issues raised in his paper.

As was the case with his paper for NPAC 2012, this 2013 iteration attempts to lay the foundations for “creating an informal mechanism outside the Arctic Council to provide a venue for informal consultation between Arctic states and key non-Arctic states regarding issues that involve links between the region and the broader international system.”

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.”

This commentary briefly examines these propositions and others and concludes that the manner in which he framed the issues, and the recommendations for possible ways forward, while superficially attractive, are fraught with practical and political difficulties. China, Japan, India, South Korea, Singapore, Italy and, on a conditional basis, the EU, were only admitted to the Arctic Council in May 2013; it is premature to dismiss the utility of the council as a forum to engage the key non-Arctic states on policy issues of a trans-regional nature.

Young's paper also argues for a new common narrative or discourse based on sustainable development concepts, to add coherence and effectiveness to the Arctic Ocean governance system. He suggests that there is a need for a general set of principles to guide behavior. This commentary also briefly examines this proposition in the context of global political economy and suggests that such an approach would currently be ineffective in the absence of a similar discourse being adopted and implemented globally.

THE RECIPROCITY ISSUE

Young's papers in NPAC 2012 and 2013 seem to call for a greater role for non-Arctic states in governance and policy matters within Arctic marine areas, based on the rationale that these non-Arctic states have valid rights and interests in international law in high seas areas of the Arctic Ocean.

However, the reciprocal proposition seems to be less well developed in these papers, namely that Arctic states have rights and interests in relation to governance and policy matters in non-Arctic regions because activities in these non-Arctic regions appears to be driving some of the most significant changes taking place today in the Arctic marine environment.

In neither case are the challenges just the problems of the commons. Indeed, in the case of the Arctic, the major drivers of change appear to be by products of state-based economic and industrial activities associated with meeting the needs of the planet's burgeoning population.

Nonetheless, in my view, Young is correct on a fundamental issue: there is an urgent need for some sort of comprehensive forum among Arctic and non-Arctic states for coordinated policy discussions. His paper seems to identify as the main task for such a policy forum the better integration of the elements of the existing Arctic Ocean regime complex. However, he does not really go into detail as to what a greater role for non-Arctic states in the Arctic Ocean would entail. Nor does he touch upon two equally important reciprocal issues: (i) how could such a forum assist in the better integration of elements of international/global ocean (and terrestrial) regimes, and (ii) what role could Arctic states play in this regard?

DISCUSSION

What is the Issue and How Should We Think about Arctic Governance?

Oran Young begins his paper by asking two questions: What is the issue, and how should we think about Arctic governance? He characterizes the underlying issue as being whether the Arctic will continue to be a zone of peace or become a zone of conflict, as suggested by some commentators. I certainly agree with his conclusion that “the Arctic is on track to remain a peaceful region during the foreseeable future.”

On the matter of Arctic governance, the paper observes that “[g]overnance is a social function centered on steering societies toward socially desirable outcomes and away from socially undesirable outcomes.” He encourages us to think about “the pursuit of governance without government,” rather than just about state-centric systems. These matters are discussed later in this commentary.

Elements of the Arctic Regime Complex

A number of factors are identified in his paper as contributing to the persistence of peaceful conditions in the Arctic. One of the important factors in this regard, he suggests, “is the emergence of an increasingly effective Arctic Ocean governance system” referred to in the paper as a “regime complex.” This is described as having three principal components:

- “A growing collection of international arrangements²,”
- “The Arctic Council and its various working groups,” and
- “The rights and responsibilities of non-Arctic states regarding Arctic issues and the need to develop a forum to facilitate constructive engagement between the Arctic states and interested non-Arctic states.”

As stated above, this portion of his paper, and the examination of issue-specific arrangements that follow it, provides a very informative and helpful analysis.

RESERVATIONS

While agreeing with his conclusion that the Arctic will be a zone of peace for the foreseeable future, I have reservations about framing the central issue as Arctic peace or conflict. The most pressing current issue, in my view, 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.

Similarly, I am not comfortable with the notion that analyzing “the determinants of regime dynamics” in relation to “the evolution of Arctic Ocean governance” should be the major focus for “students of international regimes.” Arguably, the level of activity in the Arctic Ocean has been overstated, especially in areas of its high seas. The level of angst around gaps in the Arctic Ocean governance system is largely anticipatory and this can obscure and misdirect our energies at a time when we should be looking further afield.

In my view, the fundamental issue is the sustainability and practicality of the concept of “sustainable development” itself, when viewed in a global context. The Arctic is simply a new theatre in humanity’s global search for resources and support systems.

Consequently, to the extent that the changing Arctic invites us to ask “how we should think about Arctic governance,” I would answer “let’s think less about activities in the region itself and more about governance elsewhere, and about the non-Arctic drivers that are changing the Arctic in advance of development.” Young’s paper uses the analogy of the Arctic being a canary in a mine. Indeed, I have used this analogy myself. However on further reflection, the analogy might not be appropriate because again it encourages us to focus on a problem, like coal gas in a mine, which is originating and building from inside the region. A better analogy might be the Arctic as a global barometer. The pressure systems and impending storms are really creeping into the Arctic from outside the region.

Sustainable Development Discourse

Young’s paper provides a compelling argument for the need to establish an appropriate “common narrative or discourse to guide the evolution of Arctic Ocean governance system.” His interesting observations on “the narrative of embedded liberalism” and the discourse of “neo-realism” are a

prelude to recommending a discourse of sustainable development to guide our approach to the Arctic. However, he recognizes that the challenges facing a sustainable development discourse in relation to the Arctic seem to be “the same challenges that arise in efforts to use this discourse in other settings.”

In my view, these challenges are linked in many ways to the growth paradigm underlying most national economies in the world. Consumption is a key element of this growth model. Against a backdrop of ongoing economic growth, one might ask, “How well is the planet tolerating the economy at its current size?” The answer seems to be, “Not very well.” These issues are examined in depth by McIntyre, Murray and Funston in their 2012 paper “If not growth, then what?;”³ some of the main points put forward there are summarized below:

- Arguably, the level of economic growth in an economy is the benchmark statistic with which economic, and perhaps even political performance are measured. At the same time there are many indicators that Earth’s natural systems have a finite capability to withstand ever-greater economic activity.
- The focus on growth among economists and political leaders is broadly evident. Indeed, there is considerable focus on economic growth in almost every economy in the world. There does not seem to be much political tolerance for slow-, no-, or negative-growth national economies and there is precious little guiding thought on how to operate such economies successfully.
- The most recent accounting of world gross domestic product (GDP) indicates it stands at about USD \$72 trillion. Although some think this is large in relation to the planet’s ability to tolerate it, it is expected to grow substantially. There are a few key reasons for this. First, world population, which recently reached the seven billion mark, is expected to grow to 10.1 billion by the end of the century. Growth in world GDP is needed to provide for the coming additions to world population. Second, there is a general desire in the population for ever-greater consumption per capita. Growth in GDP per capita is required to achieve this. Finally, output from the world economy is distributed very unevenly across countries. Some are very poor, and their inhabitants would like to catch up to living standards in developed countries; this would require output per capita levels

similar to the richer countries. Growth in GDP is occurring in some countries to achieve this. These three pressures – more people, more consumption per capita, and catch-up among the poor – could make the world economy much larger than it is now. The IMF's GDP projections to 2015 indicate a compound annual growth rate of 4.5%, and its International Energy Outlook, 2011 bases its energy consumption projections to 2035 on a compound annual global growth rate of GDP of 3.4%.

- Few, if any, countries of the world have ever assessed their current level of consumption and decided it was enough. Rather, getting or retaining economic growth remains the main focus of almost every economy in the world. Economic growth seems to be fuelled by a deep-seated acceptance in many societies of the idea of indefinitely improving personal and social welfare, and in growing GDP to support this. Economic contraction, or negative growth as it is sometimes called, is generally regarded as undesirable. It tends to be associated with elevated levels of unemployment and declining standards of living, especially in countries with growing populations. In short, society seems to behave as if economic growth is available as alright to be pursued without question, and unreservedly.
- As an example of the stresses the planet faces McIntyre, Murray and Funston (2012) present the views of authoritative sources on five specific domains that are important to human welfare, and indeed, to human survival: the oceans, the fisheries, fresh water, food, and energy.
- The misalignment between growth expectations of economic models and the finite capacity of the planet to sustain such growth leads to a conclusion that the resources required to sustain human life are being degraded to a point that should warrant collective action. Economic growth scenarios seem to suggest that we face a growth-equity frontier that constrains humankind's choices and requires a fundamental shift in how humankind views economic success and productivity.
- The foregoing begs an important question. What happens to the size of the economy over the long term if it attempts to serve the three masters identified above: population growth, increases in standards of living for everyone, and catch-up for the poor? Conversely, what happens politically and socially if the economy can never be made

large enough to serve all three masters, and what should society focus on if this is the case?

- The Arctic appears to be next in line for development to feed the global human appetite for resources. Therefore, dealing with the associated international/global issues in the context of regional governance does not seem appropriate. Oran Young recognizes this in his paper, and this is perhaps, in part, why he rejects the Arctic Council as a body that can adequately address these larger international/global issues. Given this challenging context, what are the consequences for governance systems as humankind approaches the growth-equity frontier?

Governance and a Growth-Equity Frontier

As noted above, Young observes that “Governance is a social function centered on steering societies toward socially desirable outcomes and away from socially undesirable outcomes.”

Where are existing governance systems, in the aggregate, leading humankind? There appears to be a misalignment between human desires for ever-growing consumption in the face of the planet’s apparent finite capacity to tolerate economic activity. This leads to an important question. Can humankind develop adequate governance structures in time to deal with the misalignment between pursuit of economic growth and ecological welfare? This is surely the critical question for the 21st century. This question is also important because sustained economic growth is likely to lead to a broad range of significant challenges and choices for humankind (e.g., political, economic, social, technological and ecological choices) that will be difficult for existing governance mechanisms and individuals to handle.⁴

An Appropriate Forum for Discussing Trans-Regional Issues Associated with the Arctic

As climate change, trans-boundary contaminants, resource demands, expansion of international transportation routes, thermohaline 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. 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.

I am in complete agreement with Oran Young's proposition that one area for more progress in Arctic affairs is in relation to the "rights and responsibilities of non-Arctic states regarding Arctic issues and ...the need to develop a forum to facilitate constructive engagement between the Arctic states and interested non-Arctic states..." He grudgingly acknowledges that "[o]ne way to address this matter is through the mechanism of (permanent) observership in the Arctic Council."

However, Young expresses considerable doubt as to the ability of the council to be an effective forum for engaging non-Arctic states on trans-regional issues associated with the Arctic. He notes that the council is not established by a legally binding instrument and has neither the legal status of an intergovernmental organization nor the authority to make binding decisions on policy. He concedes that "The Arctic Council has proven more effective than many of those present at the creation in 1996 anticipated... [b]ut this is not because the council has acquired the authority to make decisions about matters of Arctic policy."

His paper states that AMAP and CAFF have carried out much of the work of the council but makes no mention of PAME, SDWG, EPPR or ACAP,⁵ the other Arctic Council working groups.

PAME, for example, was instrumental in the development of the Regional Program of Action, which uses "a step-wise approach for its development and implementation and is the regional extension of the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA)."⁶ PAME developed the Arctic Marine Strategic Plan (AMSP), which considers innovative approaches to integrated oceans management as a means to support effective governance for the Arctic marine environment through cooperative, coordinated and integrated approaches. PAME also conducted the Arctic Marine Shipping Assessment (2009), which is a seminal piece of work. Furthermore, PAME recently conducted the Arctic Ocean Review (AOR) project, which reported on global and regional measures in place for the conservation and sustainable use of the Arctic Ocean. The AOR report was presented to ministers in Kiruna, Sweden in May 2013, to provide guidance to Arctic states on strengthening governance in the Arctic through a cooperative, coordinated and integrated approach to the management

of the Arctic marine environment. Arctic Council Ministers approved its recommendations and requested appropriate follow-up actions, including regular reports on progress at subsequent ministerial meetings. Indeed, one of Young's suggestions is actually recommended in similar terms in the AOR final report: "The first step is to map the full range of functionally and spatially specific arrangements that apply to the Arctic and to undertake an assessment of the ways in which these arrangements currently interact with one another or can be expected to do so during the foreseeable future."

It is fair to say that the Arctic Council has indeed been inward looking for much of its existence. However, the issue of non-Arctic state involvement in the council was not avoided because of disinterest but primarily because of the complexity of the political and trans-regional issues involved. China, India, Japan, South Korea, Italy, Singapore and on a conditional basis, the EU, were all finally admitted to the council as observers in May 2013.

Nonetheless, Young concludes that "What is clear, however, is that the council, a regional body dominated by regional interests, does not offer a suitable venue for addressing issues arising from the links between the Arctic as a region and international society as a whole."

I would respectfully disagree. This is not at all clear. The evolution of the council has been dramatic since it was created in 1996. Its emergence as a true policy forum really only began after 2006, partly because the Arctic until that time was a peripheral, rather than mainstream, issue in many national capitals, including in the Arctic states. The emerging trans-national issues are arguably what moved the council from the periphery to the mainstream almost overnight.

China, for example, has been clear during its efforts to join the council as an observer that it wants to discuss trans-regional Arctic issues that are equally important to Arctic and non-Arctic states. It is not difficult to imagine ways that mechanisms could be quickly developed in the council to include trans-regional issues. A few suggestions were included in my 2012 commentary.⁷

Having all but rejected the Arctic Council as a suitable forum to engage the voices of non-Arctic states, Young proposes "an informal mechanism outside the Arctic Council to provide a venue for informal consultation between the Arctic states and key non-Arctic states regarding Arctic issues that involve links between the region and the broader international system." He also proposes some ways to structure this forum "that may prove both

politically feasible and functionally effective.”

The components of this proposed forum are as follows:

- It would “address needs for governance featuring clear links between the Arctic and the outside world.”
- It should “operate as a coalition of the willing.”
- It would “engage in policy dialogue regarding matters of mutual concern” it would “welcome participation on the part of all those with significant stakes in the links between the Arctic and the outside world...this means major states.”
- “...There would be no formal requirements for membership” so stakeholders such as “major corporations, environmental organizations, coastal communities, and indigenous peoples’ organizations” could also interact in this informal environment.
- It would not have “authority to make formal decisions,” and this would “alleviate concerns about rights to participate and rules of procedure.”
- It should “foster a sense of community among key players.”
- It could “allow for candid, off-the-record discussions of contentious or potentially contentious issues.”
- It would need to be “highly adaptable,” including on “terms of participation, agenda formation and mode of operation.”
- “...It would lack a fixed mandate.”

These components appear to be neither “politically feasible” nor “functionally effective.” Such an informal forum seems to suffer from all the deficiencies Young identifies in respect of the Arctic Council, and more. Is such an informal consultative mechanism likely to have the influence, authority, financial means or technical capability to initiate, monitor, enforce or otherwise carry out the necessary governance activities in respect to the Arctic Ocean or any of the key trans-regional issues? This seems highly unlikely.

Nor does such a new informal consultative forum appear particularly attractive from a state perspective, Arctic or non-Arctic. Earlier in his paper Young encouraged us to think about “the pursuit of governance without government.” He explained that “...it is important, especially in thinking about governance at the international level, to recognize that the

presence of a government is not only not sufficient to ensure that needs for governance will be addressed; it is also not necessary to meeting challenges of governance in some settings. Governments regularly fail to perform the social function of governance effectively...”

It is difficult to image how the informal consultative forum proposed in Young’s paper might work in practice. The lack of an agenda, procedures, membership rules and so on seem ill-suited to inter-state dialogue. To paraphrase an observation from his paper in a different context: there is nothing automatic about the achievement of harmony among multiple stakeholders, especially as the relevant space becomes populated with a larger and larger number of discrete interests and perspectives.

CONCLUSION

In conclusion, it is my view that the Arctic Council still holds the greatest promise as a forum to discuss trans-regional issues associated with the Arctic. It is premature to dismiss its potential given that key non-Arctic states were admitted as observers only in May 2013. Whichever forum might emerge as the front runner, however, further creative thinking will be required to find a structure and process that is “both politically feasible and functionally effective.” Such a forum is urgently needed and I believe this is the key message underlying Oran Young’s excellent paper.

Notes

1. See for example his discussion on pages 7-17.
2. See for example the recent Arctic Ocean Review final report tabled with Arctic Council Ministers in Kiruna, Sweden in May 2013. This Arctic Council project examined some of the international and regional instruments relating to management of activities in Arctic marine areas and proposed some opportunities for further collaboration.
3. McIntyre, Murray and Funston. 2012. “If not growth, then what?” in *International Journal of Business Governance and Ethics*, Vol. 7, No. 2, pp. 96-117.
4. *Ibid.*
5. The full names of these working groups are: Arctic Monitoring and Assessment

Program (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Protection of the Arctic Marine Environment (PAME); Sustainable Development Working Group (SDWG); Emergency Preparedness, Prevention and Response (EPPR); and Arctic Contaminants Action Program (ACAP).

6. See: <http://www.pame.is/>

7. Funston, Bernard W. 2013. "Commentary on Listening to the voices of Non-Arctic states in Arctic Ocean governance," pp. 315-27 in Oran R. Young, Jong Deog Kim, and Yoon Hyung Kim, eds., *The Arctic in World Affairs: A North Pacific Dialogue on Arctic Marine Issues*. Seoul: Korea Maritime Institute.

Comments on Chapter 4: Chinese perspective

Kai Sun

It has become a cliché to say that the Arctic is changing rapidly. The consequences of the rapid changes in the Arctic are huge. In order to respond to those changes effectively, the existing and future governance system in the Arctic must be flexible, adaptive, and able to meet present and future challenges. Oran Young's paper "The Evolution of Arctic Ocean Governance: Challenges and Opportunities" did a terrific job in defining and analyzing the issues, elaborating the bigger picture of the Arctic governance system, and also offering some insightful and innovative policy prescriptions for the future. In the following paragraphs, I will comment on the main points of Young's paper from a Chinese perspective.

UNDERSTANDING THE ISSUE: FROM "RACE IN THE ARCTIC" TO "ZONE UNDER RULE OF LAW"

Attention to the Arctic waned in world politics after the end of the Cold War or, to be exact, after the Murmansk speech by Mikhail Gorbachev in October 1987. In that speech, the Arctic was conceived of as a "zone of peace," which made few news headlines during the following years. Two decades later, the Arctic was "rediscovered" by the international society, catalyzed by the "flag planting case" in 2007 by Russian scientists. Newspapers, policy journals, and even academic monographs, such as the "Arctic Meltdown" (Borgerson 2008), "The Arctic Gold Rush" (Howard 2009), "The Scramble for the Arctic" (Sale and Potapov 2009), "Who Owns the Arctic?" (Byers 2010), and others, came out in short order. But more prudent scholars, such as Oran Young, observed that the Arctic is a "zone of peace" (Young 2011). There are several reasons behind this observation: most of the Arctic's resources lie within undisputed jurisdictional boundaries of the five Arctic coastal states; major outsiders abide by the rules governing the Arctic; well-defined rules exist for businesses to operate in the Arctic, and the Arctic gold rush has cooled and become more realistic in light of the harsh realities in this area.

The main changes in the Arctic can be summarized as the "three Ds": drivers, drama, and discourse. The changes in the Arctic are brought forth

by new drivers, including climate change and economic globalization, which are totally different from previous changes in scale, speed and consequences. The Arctic is no longer the scene of confrontation among a few major powers. It has become an arena for competition and cooperation with a large number of states and non-state actors contributing and playing unique roles. The discourses in the Arctic have also changed from confrontation to cooperation, from Arctic states to an Arctic society that is more inclusive of outsiders and many actors.

THE EMERGING ARCTIC GOVERNANCE SYSTEM: FROM LOCAL TO GLOBAL

There is no single and comprehensive Arctic treaty, but the Arctic is not a “governance vacuum.” A variety of functional regimes at different levels exist in this region. The most salient ones are the environmental regimes that have been cited frequently as examples of east-west cooperation during the Cold War (Young 1992). According to Young, there exists in the Arctic a regime complex that covers most issue areas in the region. “There is no shortage of functional arrangements that have developed to address specific issues of Arctic Ocean governance,” with UNCLOS as the constitutive foundation. Young sees the regime complex of Arctic Ocean governance as including three components: international arrangements for functional issues areas, including those in the Arctic; regional arrangements with the Arctic Council at the forefront; and arrangements that deal with non-Arctic states regarding Arctic issues.

Regimes and regime complexes are never static (Young 2010). With the changes now occurring in the Arctic, the regimes and regime complexes governing specific issues are also changing. As the prospects for the opening of Arctic waters become brighter, Young believes a mandatory Polar Code and regulatory regime dealing with ship-based tourism are top priorities for the development of functional arrangements. At the international level, the International Maritime Organization (IMO) has developed a set of Guidelines for Ships Operating in Ice-covered Waters, and those guidelines are still being revised in response to pressing changes in the Arctic.

ROLE OF NON-ARCTIC STATES: FROM BEHOLDER TO STAKEHOLDER

The drivers that are changing the Arctic, both climate change and economic globalization, mainly come from outside the Arctic. The consequences of these changes are influencing both Arctic and non-Arctic states. This is one of the reasons for non-Arctic countries' interest in Arctic issues. Other reasons include, but are not limited to, business opportunities from the opening of Arctic passages, the availability of natural resources in the Arctic, and the richness of biodiversity in the region. This is also true for China's active participation and presence in the Arctic during the past two decades.

Arctic governance is also changing, especially regarding the Arctic Council's treatment of non-Arctic countries. The legitimacy of non-Arctic countries' participation in scientific research in the region can be traced back almost 100 years. With the opening of the Arctic, the participation of non-Arctic states is needed to address the pressing challenges the Arctic faces today. Thus, the voices of non-Arctic states should be listened to (Young, Kim, and Kim 2012). The more inclusive approach of the Arctic Council, clearly shown by its decision in 2013 to accept six new observer states, is a welcome gesture in this regard.

MECHANISMS FOR MUTUAL COMMUNICATION: FORMAL PLATFORMS AND INFORMAL CHANNELS

According to Young both in this paper and in many of his previous writings, it is not possible to exclude non-Arctic states' legitimate interests and participation in Arctic affairs. But the question is how to foster mutual understanding between these two groups. More channels should be opened for enhanced communication between Arctic and non-Arctic states. The Arctic Circle, initiated by Iceland's President Olafur Ragnar Grimsson, is a healthy start.

Young notes that "the remit of this mechanism would be to address the needs for governance featuring clear links between the Arctic and the outside world" and that this is evidenced in the mission of the Arctic Circle "to facilitate dialogue and build relationships to address rapid changes in the Arctic," and to "include a range of global decision makers from all

sectors, including political and business leaders, indigenous representatives, non-governmental and environmental representatives, policy and thought leaders, scientists, experts, activists, students and media.”

IMPLICATIONS FOR CHINA’S PARTICIPATION IN THE ARCTIC: AMBITIOUS BUT CAUTIOUS

China’s growing interest in the Arctic is evidenced in its increased involvement in the Arctic research, greater investment in Arctic resources, enhanced bilateral and multilateral diplomatic relations with the Arctic states, and expanding connections with the Arctic through informal channels. China’s interest in the Arctic mainly includes scientific research on environmental issues, economic interests in shipping routes, and the exploitation of resources. China is clear that the realization of those interests must be consistent with international laws governing the Arctic and the domestic laws of the Arctic states.

As the Arctic governance system evolves, so does China’s participation in Arctic affairs. China now is participating in Arctic affairs not only through formal (intergovernmental) channels such as the Arctic Council and other intergovernmental organizations in the region, but also through a variety of informal channels such as bilateral dialogues between China and individual Arctic states. Sino-U.S. Arctic-related issues have been discussed since 2010 and remain on the list of issues in economic and strategic dialogues between China and the United States. The first China-Nordic Arctic Cooperation Forum was held in June 2013, and more informal dialogues, such as ones between China, Russia and Canada, have been held in the past several years, mainly through the initiation of research centers in Chinese universities. China has also enhanced its investment in Arctic states through joint projects on minerals and other natural resources.

China’s involvement in the Arctic has sparked articles with such titles as “The Chinese are coming to the Arctic,” “China Joins the Arctic Play,” “The Dragon Looks North,” and so on. It seems that most of those commenting on China in the Arctic are journalists; very few of them are prudent scholars in the field. As China’s interest and influence in the Arctic grow, the country is nevertheless cautious about its Arctic initiatives.

To sum up, Young’s analysis of the changing Arctic governance system offers insightful ways for China to participate in the Arctic. China’s

participation also must adapt to ongoing changes in the governance of the Arctic.

References

- Borgerson, S. G. 2008. "Arctic Meltdown: The Economic and Security Implications of Global Warming." *Foreign Affairs* 87(2): 63-77.
- Byers, M. 2010. *Who Owns the Arctic?: Understanding Sovereignty Disputes in the North*. British Columbia: Douglas & McIntyre.
- Howard, R. 2009. *The Arctic Gold Rush: The New Race for Tomorrow's Natural Resources*. London and New York: Continuum.
- Sale, R. and E. Potapov. 2009. *The Scramble for the Arctic: Ownership, Exploitation and Conflict in the Far North*. London: Frances Lincoln.
- Young, O. R., Jong Deog Kim, and Yoon Hyung Kim. eds. 2012. *The Arctic in World Affairs: A North Pacific Dialogue on Arctic Marine Issues*. Korea Maritime Institute and East-West Center.
- Young, O. R. 1992. *Arctic Politics: Conflict and Cooperation in the Circumpolar North*. Hanover: University Press of New England for Dartmouth College.
- Young, O. R. 2010. *Institutional Dynamics: Emergent Patterns in International Environmental Governance*. Cambridge: MIT Press.
- Young, O. R. 2011. "The Future of the Arctic: Cauldron of Conflict or Zone of Peace?" *International Journal* 87: 183-193.

Comments on Chapter 4: Japanese perspective

Fujio Ohnishi

INTRODUCTION

Oran Young's paper covers broad aspects of Arctic governance, and his analysis is helpful and insightful for students of international relations and observers wanting to obtain a better understanding of the ongoing trends in Arctic international relations.

Put briefly, the major argument in his paper is that Arctic Ocean governance takes the form of a regime complex, which is further developed from his previous year's paper on Arctic governance. He identifies three components of Arctic Ocean governance: a growing collection of international arrangements dealing with functionally defined issues; the role of the Arctic Council, and the rights and responsibilities of non-Arctic states regarding Arctic issues.

Among the many articles dealing with Arctic governance, the distinctive feature in his analysis is the inclusion of the interests and concerns of non-Arctic states as an important component of the current Arctic governance system. This is striking for non-Arctic states. Accordingly, it is difficult to oppose his suggestion for the establishment of a consultative forum to facilitate constructive engagement between the Arctic states and interested non-Arctic states regarding Arctic Ocean governance.

How should the Japanese government respond to his argument? The Japanese government appreciates the achievements of the Arctic Council as an effective high-level forum in the field of environmental protection and sustainable development in the Arctic. More recently, it also sees the council as an important instrument that helps to deal with the regional impact of climate change in the Arctic. Thus, it has sought to obtain observer status, and its application was approved at the ministerial meeting in Sweden 2013.

However, the Japanese government has not formulated a more detailed view on Arctic governance. So, it is difficult to document the government's perspective toward Arctic governance in this commentary. Instead, my commentary will address three topics Young identifies for discussion in this session:

1. Which issue areas can non-Arctic states participate in for governance

- of the Arctic Ocean in the near future?
2. What is the impact of increases in bilateral cooperation on Arctic governance?
 3. Is the Arctic region in a condition of stability and peace not because Arctic Ocean governance has evolved, but mostly because there are no significant challenges to the “Arctic regional order?”

WHICH AREAS CAN NON-ARCTIC STATES PARTICIPATE IN FOR GOVERNANCE OF THE ARCTIC OCEAN IN THE FUTURE?

As Young argues in his paper, one of the distinct features of regional governance in the Arctic is that it consists of a collection of issue-specific or functional arrangements, which he argues constitute a regime complex. The issue areas under Arctic governance are gradually expanding. The role of the Arctic Council is significant in this regard because it provides a high-level forum where new arrangements can be discussed and formulated (e.g., the 2011 Arctic Search and Rescue Agreement, and the 2013 Marine Oil Pollution Preparedness and Response Agreement).

The first agenda item that this commentary submits as a point for further discussion concerns possible issue areas in which non-Arctic states can participate. This point is not spelled out in Young’s paper, which may have been intentional as a means of limiting possibilities.

From the perspective of Japan and surely those of other non-Arctic states, this is one of the most important concerns for their future involvement in Arctic governance. To have this discussion, it is important to acknowledge that non-Arctic states hold certain rights and responsibilities under the law of sea, which applies to the Arctic Ocean. This acknowledgement naturally leads to an understanding that non-Arctic states should be included as legitimate stakeholders in future institutionalization of issue areas pertaining to their rights and responsibilities in the Arctic.

As a matter of fact, however, there are few remaining issue areas in this regard that are not covered already by the web of existing issue-specific arrangements for the Arctic. Most of these issue areas are in existing global and regional agreements, or have already been placed on the agenda. These include biodiversity, fishery management, marine and air pollution, and science.

A few exceptions are: 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.

WHAT IS THE IMPACT OF INCREASES IN BILATERAL COOPERATION ON ARCTIC GOVERNANCE?

The second item this commentary suggests for discussion is the impact of bilateral cooperation on Arctic governance, which is mainly multilateral in nature. One of the current tendencies of international relations in the Arctic is an increase in bilateral cooperation in such forms as free trade agreements between Arctic and non-Arctic states. This tendency may accelerate with further participation by non-Arctic states in the Arctic region. Will the increase in bilateral cooperation interfere with multilateral cooperation?

To date, there have been no such signals. However, it is theoretically possible for a country that complains about the current governance system to make use of bilateral cooperation in an attempt to encroach on existing multilateral cooperation. Even without such an intention, increases in bilateral relations diversify the current pattern of international relations in the Arctic, which is based on multilateral relations. The diversification in patterns of international relations 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. The impact of increases in bilateral cooperation is further discussed in the next section.

HOW ARE CURRENT INTERNATIONAL RELATIONS IN THE ARCTIC PERCEIVED?

The third topic this commentary addresses is a counter-argument to Young's perception of the modes of international relations in the Arctic. I agree with his observation that the Arctic is on track to remain a peaceful region with few conflicts for the foreseeable future. He called the current Arctic a "zone of peace," citing the famous phrase of Mikhail Gorbachev,

although he provides no explanation about whether the word “peace” means merely the absence of war or more than that. He probably intends the latter, namely that peace means not only the absence of war, but also the existence of a cooperative relationship among states. I agree that the Arctic is a peaceful region in the sense that it is marked by stable relations among the Arctic states.

However, I disagree with his view on the major force for peace in the Arctic. According to Young, the major force 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 my 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.¹ This order consists of a pattern of international activities that sustains four major goals: 1) the eight Arctic states’ membership as members of international society, 2) maintenance of rules under the United Nations Convention on the Law of Sea and other relevant international agreements, 3) the absence of war secured by the overwhelming dominance of the United States in terms of the 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 regional order perspective is different from the discourses of realists and liberals, in one of which Young’s view falls. This view is based on the assumption of an international society approach and possesses two advantages as an explanatory framework for international relations in the Arctic. The first advantage is to provide a broader view of Arctic international politics than the realists’ military-focused view and the liberals’ governance-focused view. The regional order perspective can improve understanding by incorporating both security and environmental concerns.

The second advantage of the examination of the Arctic regional order is that it reveals the influence of great powers on present Arctic international relations. There is an inequality in power among the Arctic states that affects their relationships. In other words, the condition of Arctic

international politics is that of an “anarchical society of states,” a term coined by Hedley Bull. An anarchical society has no government; patterns of international activity are based on power politics among Arctic states.

The Arctic regional order perspective yields two main findings.² In the first place, the leading Arctic power is obviously the U.S., which has mainly worked as a regulator placing boundaries on the range of membership and issue areas for regional cooperation in the Arctic. As a matter of fact, the U.S. has persistently supported the Arctic Eight framework since the 1990s and has limited issue areas to environmental cooperation and sustainable development until recent years. The preference for Arctic Eight membership and the two issue areas, which constituted two profound goals of the Arctic regional order, displays continuity in international Arctic politics throughout the 1990s and the 2000s.

In the second place, this perspective produces insights about the role of small powers. Although I do not focus on it significantly in my draft paper, the initiatives for regional cooperation also arise from the incentives of small states to put themselves in a better place in the power constellation of international relations.

What, then, can we expect for the future development of the Arctic regional order? One of the inferences we can draw from this study is that the participation of non-Arctic states in Arctic politics would alter the present regional order by affecting membership and issue areas in the regional society of the Arctic. The participation of non-Arctic states will gradually develop in a direction toward bilateral relations rather than multilateral ones, and from environmental protection-oriented cooperation to business-oriented activities. This may pave the way for a new pattern of international activity in the Arctic. For example, China markedly moves toward this direction. If China continues in this direction, it may undermine the U.S.’s role as a regulatory player. This is because its regulatory power mostly affects multilateral activities, not bilateral ones. Thus, increases in bilateral cooperation could be a source of disorder. In other words, diversification in international relations in the Arctic necessarily affects the present regional order regulated by the US.

If multilateral cooperation moves to adjust its role in line with business-oriented cooperation, the regional disorder will be tempered. In any case, the Arctic regional society cannot close its door to new global players, if it expects to benefit from new possibilities. Closing the door irrationally would cause unnecessary tension with the outside world. As one such

attempt to prevent the closing of the door, Young's recommendation for the establishment of an informal forum is useful and will be effective.

Note

1. I defined the concept of Arctic regional order and of Arctic regional society in my recent conference draft paper, "The Struggle for Arctic Regional Order: Developments and Prospects of Arctic Politics," presented at the Slavic Research Center /Global COE International Summer Symposium "Border Studies: Challenges and Perspectives in the Twenty-first Century," August 2-3, 2013, pp.1-20. At this session of the SRC/GCOE conference, I discussed my view with other speakers (Shinji Hyodo, Rob Huebert, Lassi Heininen, Alexander Sergunin and Klaus Dodds). In this paper, I argued that the development of Arctic politics is the history of the Arctic regional order. I will attach this paper with this commentary. See also the program at <http://borderstudies.jp/en/events/symposia/index.htm>.

I developed the idea of Arctic regional order based on my previous studies: "Hokkyoku gabanansu no wakugumi wo meguru kobo: hokkyoku hyogikai no obuzabaa mondai" ("Struggle for the Framework of Arctic Governance: the Issue of Observer Status in the Arctic Council"), *Hokkyokukai Kiho (Arctic Ocean Quarterly)*, Vol. 15 (2012), pp.39-51; "Hokkyoku niokeru chiiki kyoryoku" ("Regional Cooperation in the Arctic"), *Hokkyokukai Kiho (Arctic Ocean Quarterly)*, Vol. 16 (2013), pp.45-53; Fujio Ohnishi, Hwang Sehee, Satoru Nagao, "Hokkyoku to Hihokkyokuken shokoku" ("The Arctic and Non-Arctic States"), *Hokkyokukai Kiho (Arctic Ocean Quarterly)*, Vol. 16 (2013), pp.54-60; "Hokkyoku no gunji doko" ("Military Trends in the Arctic"), *Hokkyokukai Kiho (Arctic Ocean Quarterly)*, Vol. 16 (2013), pp.61-70; and "Kikohendo to Hokkyoku mondai no Genzai" ("Climate Change and the Present Arctic Issues: Increasing possibilities of economic development and Pressure on the Response of the Japanese Government"), *Interijence repoto (Intelligence Report)* Vol.59, August issue (2013), pp. 34-49.

2. These two findings were also argued in my previous paper, "The Struggle for Arctic Regional Order: Developments and Prospects of Arctic Politics," *supra* note 2, pp.18-19.

Comments on Chapter 4: Korean perspective

Sung Jin Kim

INTRODUCTION

The Arctic is one of the most dynamic regions on the Earth for symbolizing climate change and the economic value it holds. Changes in the Arctic are opening a new era in areas of resources, energy, shipping, fisheries, tourism, science and research, gathering attention around the world, let alone the Arctic states. On the other hand, the region is presenting another task to be resolved by humanity, such as minimizing damages of new challenges on the long-preserved Arctic ecosystem and natural environment as well as protecting the tradition and culture of indigenous residents. Sustainable Arctic development became a universal issue, an important proposition for peaceful and happy lives and coexistence of mankind. An in-depth discussion on these problems requires wide participation and cooperation among all stakeholders, including non-Arctic states. For that reason, the Arctic Council recently decided to give permanent observer status to six non-Arctic states, including Korea, China and Japan as a way to expand cooperative dialogue.

Now, the Arctic, the last frontier of mankind, is fast becoming the center of global attention. Therefore, a venue for more progressive and practical discussion should be prepared to address various and complex issues involving the Arctic Ocean and neighboring areas. There are rising needs for sound governance where participating nations and non-Arctic states cooperate and pool their wisdom to make effective and reasonable decisions and put them into action. This year marks the third year of the NPAC, organized by the EWC and the KMI. Encouraged by dedication and efforts of these two organizations, representative experts from the Arctic states, non-Arctic states, government of indigenous people in the Arctic, universities, companies and NGOs participated in this conference. It has contributed a great deal to highlighting major issues and seeking future development direction.

Given that issues of the Arctic are inter-connected, it is agreed that no single problem could be addressed independently and they should be dealt with from a holistic and comprehensive approach. Under the principle of sustainable Arctic development and preservation of local culture and

tradition, the Arctic should be used for universal benefits of humanity with consideration to various issues. Most of all, scientific research and analyses, cutting-edge technology and financial resources should be in place. Therefore, there is an urgent need for more evolved governance to discuss various issues and build consensus.

In this paper, I would like to present my personal opinion on new governance formation based on the discussions over the last two years and the presentation by Professor Oran Young. I will also explain the future policy direction of Korea's Arctic policies after the nation earned permanent observer status at the Arctic Council this year.

GENERAL OPINION ON THE PRESENTATION BY PROFESSOR ORAN YOUNG

The presentation by Professor Young is in the same vein of that in the previous year. Regardless, this year's study showed a more a detailed analyses and practical considerations. He said, "Governance is a social function centered on steering societies toward socially desirable outcomes and away from socially undesirable outcomes." I think that definition is crystal clear and appropriate.

Overall, Professor Oran Young proposed a very comprehensive and meaningful agenda, such as the nature of Arctic governance system, its limitations and suggestions for future development. At last year's seminar, we agreed that the current Arctic Ocean governance was not a single top-down management system. It was rather a regime complex composed of the arrangements of the Arctic Council, UNCLOS, IMO and other international norms and regulations. The Professor said that a single governance, such as 'the Arctic Treaty' was almost impossible to be agreed on, given the time required to reach such an agreement, the failure case in 2008 and negative stance of major nations including the US. Based on this diagnosis, he logically expected that unique governance in soft law form will continue with the Arctic Council at the center.

In the same vein, he emphasized that it was high time that a new type of governance be set and tangible achievement be made based on previous discussions. While respecting roles of the Arctic Council last year, he stressed the importance of an informal discussion channel with non-Arctic states, which involves companies and NGOs if necessary.

As for relations with non-Arctic states, he said that interaction and cooperative dialogue should be expanded. Given the increasing number of issues to be discussed between Arctic and non-Arctic states on an equal footing, the expansion of observer status is meaningful. However, he was concerned that some of the Arctic states are sensitive to the potential impacts of new observers. This could complicate the problem-solving procedure of the Arctic states and weaken their vested rights.

I believe that the decision in May will prove to be beneficial rather than disruptive. It will provide opportunities for non-Arctic states to directly participate in the discussion of major Arctic issues as well as raise their voices, while clarifying the responsibilities and obligations of new observer states. In this way, climate change can be effectively responded and capabilities of possible user nations can be tapped. Therefore, it is important to encourage observer nations to join in the discussions of the Arctic Council and to present their opinions. Cooperative atmosphere between to the Arctic Council and observer states should be promoted for the common good based on common sense.

In conclusion, Professor Young suggested comprehensive principles or guidelines in discourse as followed:

1. A zone of peace through peaceful means
2. Arctic development based on stewardship
3. A manner respectful of right holders including indigenous peoples
4. Adaptive governance to maintain the resilience of Arctic systems

Likewise, a need of forming a new Arctic Ocean governance, as suggested by Professor Young, can be widely shared. The principles of the new governance are actually universal and practical guidelines. Now is the time to realize them step-by-step. As Dr. Young emphasized in his presentation, “the Arctic Ocean governance system should be developed in such a way that the whole is greater than the sum of the parts.” We all hope that the Arctic Council will play a central role in harmonizing various policy demand and capability of the international society for sustainable development of the Arctic Ocean. As an observer nation, Korea actively seeks cooperation opportunities within the Arctic Council and will prepare Arctic cooperation policies at the government level. These policies will include scientific cooperation with the Arctic Council and its members, basic direction towards mutual developments of economic and

social sectors as well as concrete cooperation measures. I hope cooperation between nations, international organizations and NGOs under the mutual vision will strengthen coordination for sustainable Arctic development. To strengthen its scientific research foundation, Korea plans to build a new ice breaker and intensify the functions of the research station in Svalbard. When these efforts are added to a more active bilateral cooperation with the Arctic Council members, Korea will contribute greatly to solving practical problems.

OPINIONS AND QUESTIONS ON THE PRESENTATION

1) First, professor Young predicted that the Arctic Council might take action with a binding force to regulations on bioprospecting, anti-terror responses and a ban on commercial fisheries. Given the current worries on the issue, his prediction is reasonable.

- However, in my opinion, since bioprospecting is a basic activity for bio analysis and research, excessive limitations could hamper the understanding of Arctic changes and development of green technology. Moreover, a ban on such activities should be consistent with the existing international regulations. I would ask for the Professor's opinion on that front.
- I understand that a possible ban on commercial fisheries is a heated debate. Commercial fisheries activities are being carried out in many parts of the Arctic Ocean. However, would the ban be limited to established activities or would it also include future commercial fisheries to come? Would it be directed at the entire types of fisheries or only certain types? I expect quite a controversy around what is to be banned. If the ban on commercial fisheries is for fisheries activities in the central Arctic Ocean including high seas where no commercial fisheries activities have so far been in place, can such a decision be made solely by the Arctic coastal nations? I think the issue should be reviewed from the perspective of international laws and would like to ask for your opinion.
- The ban on fisheries activities reminds me of serious disputes over the sea lion skins between the EU and Canada. This issue should be thoroughly reviewed from a harmonized approach, considering

the tradition and livelihood of indigenous peoples as well as legal aspects. In my opinion, it would be feasible to analyze the distribution and size of fisheries resources in detail and to prepare international regulations for sustainable development. May I ask for your opinion?

- On top of that, before imposing new regulations, enough research and impact analyses should be conducted first, while stakeholders including non-Arctic states, need to have a sincere and open discussion on the issue. For that matter, a consultative body may be required. I would like to ask for the Professor's opinion on this too.

2) Opinions and Questions on the Arctic Circle

- The Arctic Circle is proposed by *Iceland President Ólafur Ragnar Grímsson*. The Arctic Circle will be welcomed if it is thoroughly discussed and contributes to solving problems surrounding the Arctic. Many have pointed out that the scope of discussion is limited at the Arctic Council and various forums have been held to complement this. However, it is also true that there have not been enough discussions on problem-solving, strongly supported by the Arctic nations. Although the Arctic Circle is positive about the possible use of various capabilities and opinions to solve problems of the Arctic, it could duplicate efforts of the Arctic Council or reach decisions that contradict those of the Arctic Council. It is also unclear whether the Arctic Circle could enlist support of all Arctic nations. So, my question is how the Arctic Circle should harmonize with the established governance, particularly the Arctic Council, and whether such efforts can be effective.
- Moreover, according to the comprehensive principles suggested by Professor Young, the Arctic Circle may develop into a new form of Arctic governance. Then, how feasible is this?

3) In the conclusion, Professor Young presented comprehensive principles to clarify the direction of the Arctic governance and to strengthen its foundation. I agree with many of the principles, as would many nations and participants. Although the standards are not easy to achieve, they are very useful in building the foundation for governance, a vital part of building a consensus. However, since the principles are all-inclusive, there may be difficulty in fully comprehending them or making relevant

decisions. Some conservatives might suggest that they are not very practical.

- The Arctic Council has already prepared various responsible measures to the regime complex in the Arctic through nine declarations, many of reports and the Arctic Vision. Then, how are the principles through Professor Young different from the activities of the Arctic Council? Which organization should be chosen and which stakeholders should be targeted to reach an agreement on the principles? I would like to suggest to Professor Young to further develop the ideas into more specific concepts. I would advise that the principles be implemented as a ‘declaration’ after gaining agreement from the Arctic Council participants and indigenous groups. Can I ask for your opinion on this?

4) Lastly, the Arctic Ocean already started changing rapidly. Therefore, adjustment to the changes will be very important in the future. Economic activities and reinvestment in the region need to constitute a virtuous cycle in this ‘adjustment.’ The Arctic Vision, which was adopted at a recent meeting, also prioritized economic cooperation. In this regard, a new approach towards economic activities is necessary. A ban or delay of activities cannot guarantee smooth adjustment. We are at a stage in which we should ponder on the possible activities with certain technologies and policy measures and their ramifications on the local community. In addition, these measures should be feasible with the current technology. Does the IMO Polar Code consider this technological aspect?

SUGGESTIONS

Arctic Ocean governance is the comprehensive destination-an outcome which reflects all issues of the Arctic. Our ultimate goal is to prepare a useful international agreement, such as the Arctic Treaty. In reality, however, it is also desirable to launch an informal consultative body which respects the rights and status of the Arctic Council and includes non-Arctic states, just as Professor Young proposed. Although the body would be an informal channel, it should act as a sound and productive venue in which a bond

of empathy is developed after various voices are shared in a reasonable procedure.

I would like to remind all participants that we need to move toward the next stage and the NPAC should initiate the first step. The following measures need to be put into action in the coming days:

1) Firstly, a system which communicates achievements of the NPAC to the Arctic Council should be in place.

- I hope that the NPAC expands direct exchanges with multiple influential bodies and prepares measures on matters of mutual interest.
- To this end, I suggest a small organization called ‘The Forum for Arctic Ocean Governance’ be established within the NPAC to further develop the presentation of Professor Young. I ask the Chairman of the NPAC organizing committee to share with us some good ideas on forming such a forum in consultation with the EWC and KMI.

2) Secondly, ‘a Round Table of Observer States’ needs to be developed along with experts from the Arctic Council observer nations which are also participants of the NPAC. The round table should make mutual efforts to contribute to activities of the Arctic Council through the process of building a consensus.

- Later, such efforts should be developed into ‘an Arctic Research Community for Observer States’ which promotes joint researches between research institutes of observer nations in the North Pacific.

3) Thirdly, as for issue-specific agendas that are being discussed or will be discussed in the future, small working groups or TFs need to be developed within the NPAC, carrying out research activities mainly through online seminars.

- For example, studies can be conducted on issues presented by AMAP, CAFF, EPPR and PAME, the environmental working groups under the Arctic Council, as well as on other global issues, such as commercial shipping, fisheries, wildlife conservation and black carbon.
- Analyses on mutual influence between the Arctic region and the

North Pacific nations will provide us with detailed cases on regional interconnectivity.

- For instance, an analysis on ramifications of Arctic changes on weather and ecosystems of the North Pacific coastal nations will help them prepare for or prevent natural disasters. Accordingly, it is necessary to seek measures for joint research on technological problems as well as information and data sharing.

4) Lastly, it would be very meaningful for research institutes in Asian observer states to have a regional cooperative mechanism on the challenges and opportunities in the Arctic. In particular, China, Japan and Korea may share a lot of common perspectives on the Arctic issues. As we are aware of, they have well-organized Arctic scientific capacity and facilities including science stations, ice-breaking research vessels and research institutes. Moreover, they have high end technology for sustainable development of the Arctic such as shipbuilding, offshore plant, telecommunications and construction. At the same time, their economic system is highly dependent on the resources imported and global shipping. So changing the Arctic could provide a new arena for cooperative research. The NPAC can be an important venue to discuss this regional cooperation. This could be developed as an open and informal regional research forum embracing science, business and policy issues in the Arctic.

CONCLUSION

As we know very well, there is a long way to go to reach a consensus on various issues of the Arctic, particularly, Arctic Ocean governance as well as to find solutions. However, Arctic Ocean governance is a task humanity should solve at some point. We should take one step at a time, rather than trying to take on the issues in a rush. That one step should be a meaningful footprint towards the prosperity of mankind. I hope this forum provides provisions for problem-solving efforts. There is a Korean saying that a journey of a thousand miles starts with a single step. It is a noteworthy lesson to be learned from our forefathers.

Oran R. Young is a research professor and co-director of the Program on Governance for Sustainable Development at the Bren School of Environmental Science & Management at the University of California, Santa Barbara. Young served for six years as founding chair of the Committee on the Human Dimensions of Global Change of the U.S. National Academy of Sciences. As an expert on Arctic issues, Young recently chaired the Steering Committee of the Arctic Governance Project. Past service in this realm includes co-chair of the Working Group on Arctic International Relations, vice-president of the International Arctic Science Committee, chair of the Board of Governors of the University of the Arctic, a consultant to the Standing Committee of Parliamentarians of the Arctic Region, and co-chair of the 2004 Arctic Human Development Report. Young has a Ph.D. in Political Science from Yale University, an M.A. in Political Science from Yale University, and an A.B. in Government from Harvard University.

Jong Deog Kim is a research fellow at the Korea Maritime Institute, a government-affiliated organization in the Republic of Korea. He currently serves as Director General of the Strategy Research Division, Head of the Polar Policy Research Center and Manager of the Arctic Policy Research Program, which includes the North Pacific Arctic Conference in the Korea Maritime Institute. He has led and participated in several national projects on coastal and ocean policy and international marine environmental relations throughout his research career. Kim has a Ph.D. in Oceanic Architecture and Engineering from Nihon University and an M.A. and B.A. from Seoul National University.

Yoon Hyung Kim is an emeritus professor of economics at Hankuk University of Foreign Studies and a senior fellow at the East-West Center. He also serves as an executive director of the Korea Forum for Progress. He served as independent director of the Korea Gas Corporation, S-Oil, and the Korea Resource Management Corporation. He is a former director general of the Planning Board of the Ministry of Energy and Resources and a former senior fellow at the Korea Development Institute. On Arctic marine issues, he presently chairs the Organizing Committee of the North Pacific Arctic Conferences at the East-West Center. Kim has a Ph.D. in Economics from Stanford University, an M.S. in Statistics from Stanford University, and a B.A. in Economics from the University of Wisconsin at Madison.

The Korea Maritime Institute (KMI) is a government-affiliated research organization under the umbrella of the National Research Council for Economics, Humanities and Social Science (NRCS) in the Republic of Korea. Since its establishment in 1984, KMI has been a major think-tank in the development of national maritime and fisheries policies including shipping and logistics, port development, coastal and ocean management, maritime safety and security, and fisheries affairs.

The East-West Center (EWC) promotes better relations and understanding among the people and nations of the United States, Asia, and the Pacific through cooperative study, research, and dialogue. Established by the U.S. Congress in 1960, the Center serves as a resource for information and analysis on critical issues of common concern, bringing people together to exchange views, build expertise, and develop policy options.

