ENVIRONMENTAL GOVERNANCE AND THE NEW ARCTIC FRONTIER: WHEN THE NORTH OPENS AND SECURITY DECLINES

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Contents

Introduction

> ***2008 Canada-EU Summit Statement: excerpt from the Citadelle Declaration***
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> ***…We also reiterate our shared interest and objectives for the Arctic and the North, which include, among others, protecting the environment and ensuring that northerners can contribute to economic and social development in the region now and in future generations. We recognize and reiterate the importance of, and the global interest in, the international scientific community's research activities. We commit to preparing a joint progress report on Arctic cooperation in 2009, taking into account work completed in the context of the Northern Dimension and the Arctic Council.***

What are the major opportunities and risks associated with this statement? What risks to security (environmental, economic and socio-cultural) present the greatest challenges to these lofty objectives? This article examines major Arctic development opportunities and risks from the standpoint of searching for proposals to improve international governance mechanisms for sustainable development in the region.

The major premise of this paper brings us into conflict with two prevalent positions in the international dialogue on Arctic development. Firstly, we differ from those who would say that Arctic development should not occur. We expect that it will occur, and for the sake of poverty alleviation in the North, especially regarding indigenous peoples, likely should occur in a carefully managed fashion. Secondly, we differ from those that suggest that the existing international regime for Arctic governance is adequate to manage development opportunities and risks. By contrast, we argue that much greater attention needs to be given to the international governance regime to improve regional management for sustainable Arctic development.

The Strategic Context

Resource Exploitation and Changing Arctic Policy

The rapid recession of polar ice in the Arctic—with ice-free summers projected to occur in the High Arctic by as soon as 2013 based on the most recent 2008 projections[1]—and the associated prospect for expanded and accelerated commercial development of resources previously locked away below miles of ice has precipitated an intense re-examination of Arctic policy by the eight Arctic circumpolar nations—Canada, Denmark (Greenland, Faeroe Islands), Norway, Russia, and the United States, Finland, Sweden and Iceland—and also within the European Union at large, for which Arctic resources are an important mainstay of their economy, particularly for those countries with significant reliance on Arctic oil and gas.

With the Arctic melt occurring more quickly than forecasts of just two years ago and the attendant prospect of vast and accessible Arctic resources, the dynamics of Arctic state interchanges have undergone their own "sea change." Following the Cold War and up through 2006, the eight Arctic nations pursued a common environmental and sustainable development agenda. But, since that time, there has been an inverse correlation between receding ice and a nationalist territorial impulse on the part of Canada, Denmark, Russia, the United States, expressed via bellicose, nationalist posturing, replete with sovereignty "visuals" for the media, such as the spate of flag planting by Canada and Denmark in 2005, and in 2007 by Russia[2] and attendant military exercises. Where before the preferred mechanism for advancing dialogue was a relatively transparent, consensus-based and broadly inclusive dialogue, interactions since 2006 have become increasingly fractious, opaque and dominated by an exclusive club of the "A5" Arctic coastline states: Canada, Denmark, Norway, Russia and the United States. The A5, encouraged largely by Denmark, sought to cool their respective rhetorical forays into the Arctic in May of 2008 via an impromptu Arctic Ocean Conference at Ilulissat, Greenland. The outcome of the conference was the *Ilulissat Declaration*, which announced the unique position of the A5 to address the challenges posed by the exploitation of natural resources, as well as changes affecting the environment and indigenous people brought about by climate change, this special stewardship role accorded to themselves "by virtue of their sovereignty, sovereign rights and jurisdiction in large areas of the Arctic Ocean."[3]

The main Arctic "trophy" is oil and gas, but also minerals and metals, and attendant control of Arctic shipping lanes that are anticipated to become viable within coming decades. Given the resource potential of the Arctic, there is no question that, despite its ecological vulnerabilities as a semi-closed system, its land, marine waters, and seabed will be developed in coming decades. Nor is there any doubt that the coastal circumpolar nations will be the primary

beneficiaries of such development. This is not a value judgment but, perhaps, an irresistible force.

The International Arctic Governance Regime

Currently, there exists no broad and inclusive mechanism geared to addressing Arctic governance in support of sustainable development of Arctic resources. Whether Arctic development will be sustainable and whether it will engage and respond to broader pan-Arctic, European and global geopolitical interests, will depend primarily upon the political will of the five coastal states and the particular governance mechanisms (whether in place or to be created) which they utilize and to which they agree to adhere.

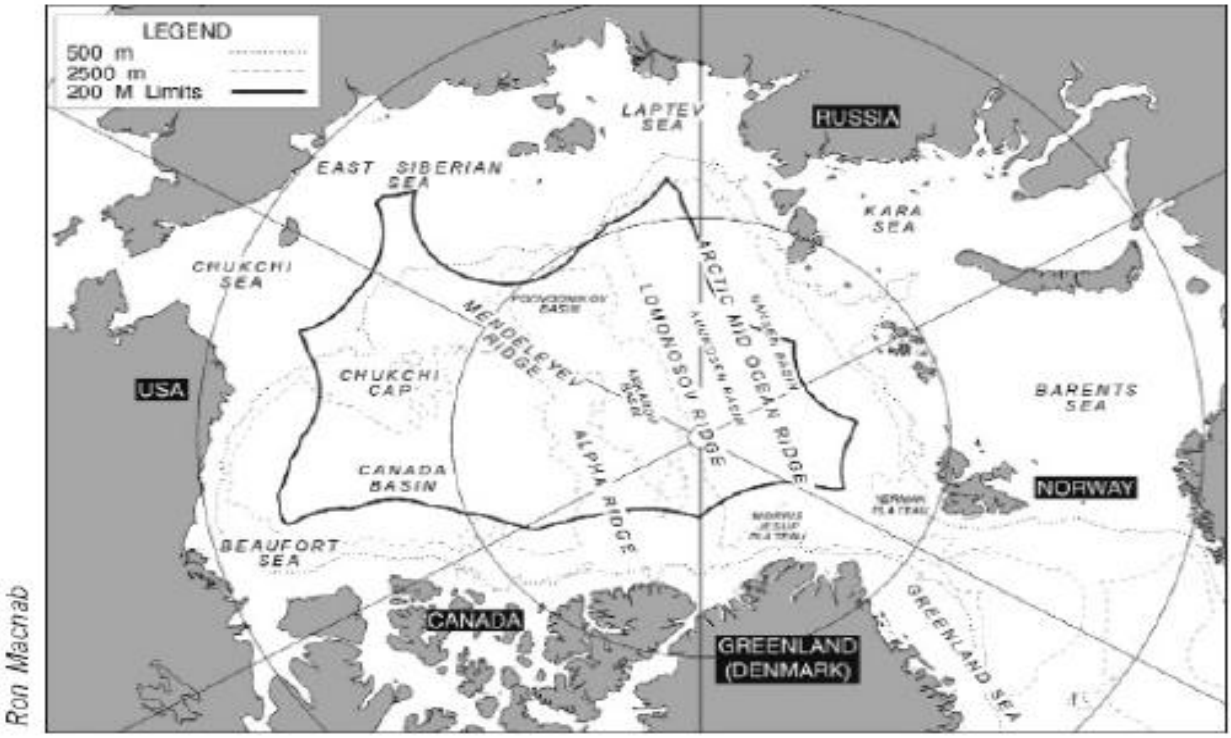
International Legal Instruments

The move to establish sovereignty over much, if not all, of the Arctic predominantly entails use of international legal instruments, principally as set out in the 1982 United Nations Convention on the Law of the Sea (UNCLOS) to which the A5 reaffirmed their commitment via the Ilulissat Declaration while rejecting the need for a new, comprehensive legal regime for Arctic governance.

Customary Law is another key element of positioning for sovereignty rights. For instance, Canada places considerable emphasis not just on its employment of science to establish a baseline as per the provisions of UNCLOS Art. 76, but also as regards its historical and customary use of portions of the Arctic to which it lays claim, both through presence (e.g., operation of vessels, such as Coast Guard ice-cutters which it has also augmented) and industrial development (e.g., Prime Minister Harper noted his government supports construction of the Mackenzie Delta gas pipeline, which could have a terminal in the Beaufort, while Tar Sands cargo might be moved through Tuktoyaktuk).[4] The habitation and use of Arctic offshore waters by Canada's First Nation peoples also supports customary law regarding "use it or lose it" arguments.

UNCLOS provides signatories with a ten-year time frame from their respective ratification of the instrument within which to delineate their section of continental shelf as it extends outward beyond already established national 200-nautical mile Exclusive Economic Zones (EEZs) into Arctic waters.[5] Most resources that might be profitably developed through 2015— and likely through 2050—are largely located within coastal areas that lie within or closely outside the already defined EEZs of the littoral Arctic States. Their respective EEZs form a continuous circle around the Arctic, as shown in Figure 1 below.

Figure 1: Map showing the coastal Arctic states, their joint Exclusive Economic Zones



(EEZs), and the natural prolongations of their land territories

Source: Arctic Marine Transport Workshop 2004. Editors: Dr. Lawson Brigham, United States Arctic Research Commission Ben Ellis, Institute of the North. Sponsored by the Circumpolar Infrastructure Task Force, Secretariat at the Institute of the North United States Arctic Research Commission International Arctic Science Committee. 28-30 September 2004.

However, that having been said, the longer standing disputes over "ownership" of Arctic resources occur in straits that lie between two countries within or closely beyond their EEZs, including the following[6]:

- Russia and Norway in the Barents Sea;
- Russia and the United States (regarding the Bering Strait between the two nations);
- Norway and Iceland (and other contracting parties to the Treaty in Svalbard);
- Norway and Denmark (regarding the Fram Strait between Greenland and the Norwegian Island of Spitsbergen);
- Canada and Denmark (regarding the Nares Strait between Canada and Greenland);

- EU, United States and Canada (Regarding ownership of waters within the waters of the Arctic Archipelago inclusive of the Northwest Passage[7]); and
- United States and Canada (the eastern Arctic waters of the Beaufort Sea, involving 7000 nautical miles).

Intentions to abide by the provisions of UNCLOS (somewhat problematic for the United States, which is not a signatory) regarding disputes involving overlapping claims would be settled by the countries themselves by negotiating mutually satisfactory agreements, or, where this is not viable, taking their disputes to arbitration. [8] However, the arbitration provision within UNCLOS has no real teeth. If nations are at an impasse, a potential alternative might be the World Court, which is an option fraught with risk for all disputing countries.

UNCLOS is supplemented by a raft of maritime conventions, each targeted at a specific and often narrow aspect of marine safety and pollution prevention (e.g., regulation of particular classes of emissions and discharges from ships). Most of the maritime conventions are administered by the International Maritime Organization (IMO), a specialized agency of the United Nations.

The Arctic countries also work through various sub-Arctic agreements. For example, the European Arctic nations, including Russia, and also the European Commission, belong to the Barents Euro-Arctic Council or BEAC. A number of bilateral agreements also exist to address Arctic sustainable development and environmental issues.

Additionally, there are a number of non-Arctic sub-regional institutions and agreements that pertain to sustainable resource management, which have broader scope than the Arctic region, but include some Arctic nations, hence providing another channel for clusters of Arctic states to press for managerial arrangements for sustainable development that could benefit the broader Arctic, e.g., the Northwest Atlantic Fisheries Organization (NAFO).

The Arctic Council

The one regional institution in place to promote cooperative, consensus-based dialogue is the Arctic Council, an intergovernmental body created in 1996. Through the Council, a high-level, albeit non-binding or soft law environmental protection agreement, the eight circumpolar participants meet bi-annually to identify environmental and sustainable development priorities. The organization relies on scientific research both to define and execute its mandate. Research projects are identified and developed by the members on an *ad hoc* basis, although they have been carefully selected to meet the organization's broader strategic objectives of enhancing knowledge of the Arctic environment.

In addition to its national members, the Arctic Council provides for the active participation and full consultation of Arctic indigenous representatives (permanent participants) and observers,

including non-Arctic countries, intergovernmental and non-governmental organizations. The council has been quite successful in focusing attention and creating consensus on key environmental and sustainability threats to the Arctic, including the need for global action on long-range chemical pollution, the significance of global warming to the Arctic and, most recently, for strengthened measures aimed at pollution prevention associated with gas and oil exploration, and shipping.

This said, however, the Council lacks both the scope and the authority of a regional governance agreement. Hence, recommendations it issues related to development, e.g., proposals for improved shipping safety, are made as suggestions that the members could pursue, should they care to do so, at the national level and through international mechanisms. While some national measures have been undertaken, as well as cooperative efforts that are spinoffs of recommendations (for example, NGO assistance to Russia to remediate an oil spill by renewing aging infrastructure), Council recommendations for protection of the Arctic ecosystem have not been successfully translated into provisions within international (principally maritime) instruments.

Broader European Geo-Political Interests

European nations as a whole—not just the Arctic circumpolar states—have an interest in who owns and who has access to Arctic resources given their energy dependence on Arctic oil and gas (about which we discuss more later), and benefits they derive from fisheries and from land-based resources (mining, forestry, etc.) . For these reasons, the European Union will seek to stay active in Arctic governance.

Mining of the High Seas seabed remains open to nations globally under provisions of UNCLOS. However, if Arctic rim states succeed in laying claim to the existing seabed, other nations will be largely, if not entirely, shut out. For instance, Russia has been trying to convince the world to adopt the “sector theory,” carving the Arctic into sectors belonging to Arctic rim states using the North Pole as a reference point.

Furthermore, Europe, in addition to the Arctic nations, stands to benefit from Arctic shipping, which would reduce costs of Arctic goods and provide new means of moving their own products to North America and Asia. Russia stands to gain the most in the near term because it has the ability to utilize the North Sea Route.

Shipping right-of-passage is also provided under UNCLOS. However, pragmatically speaking, commercial traffic, when and where economically viable and where accommodated by infrastructure, will be a source of revenue for those controlling sea routes. But initially, oil and gas and to a lesser extent coal development and associated tanker shipping and to some extent cargo shipments (forestry, grain, etc.) will determine which countries profit economically from

shipping. Russia is far advanced in contrast to other nations to promote trans-Arctic shipments because of a combination of a favorable conditions with resources situated near ports include oil and gas, and timber.

Threat of Militarizing the Arctic

Russia has recently suggested that the U.S. deployment of 5,000 troops in a Northern Edge military exercise in Alaska in May 2008 is an example of military build up to which it contends it is reacting as regards its own military exercises and troop build-up. On 10 June 2008, Lt. Gen. Vladimir Shamanov, who heads the Russia Defense Ministry's combat training directorate, announced that Russia's Defense Ministry is planning to expand the presence of the Russian Navy in the world's oceans, including extension of the operational radius of submarines deployed with the Northern Fleet to protect Russia's claims in the Arctic.

While these are by no means alarming claims, they could presage the potential for conflict if the international governance regime proves inadequate to manage national claims in the Arctic in the coming decades.

What Constitutes the Arctic?

The High Arctic includes the territory and waters north of the Arctic Circle (66° 33'N). This area includes the Arctic Ocean in its entirety, as well as portions of Canada, Greenland (a territory of Denmark), Russia, the United States (Alaska), Iceland, Norway, Sweden and Finland. Also included is the Hudson's Bay Complex (HBC; also referred to as the Hudson Bay System), which includes Hudson, James and Ungava Bays, the Foxe Basin and the Hudson Straits.[9]

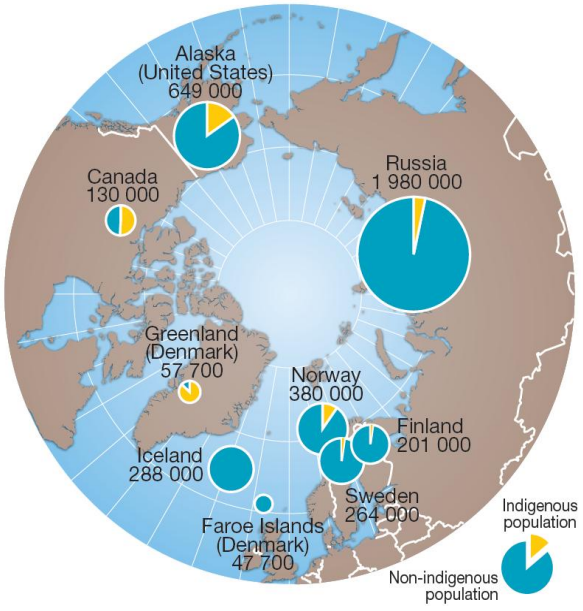
Inflow of water into the Arctic comes from the Atlantic Ocean via the Norwegian Current and from the Pacific via the Bering Strait. Water enters the Pacific from the Bering Strait and outflows are also carried into the Atlantic via the East Greenland Current. The HBC receives a considerable flow of freshwater from rivers entering the complex. The total outfall or water exiting the HBC, which includes some water that initially entered from the Pacific, 900 cubic kilometers of freshwater from rivers, and water from ice and snow melt, contributes almost a third of freshwater entering the High Arctic from all rivers feeding the Arctic. This freshwater discharge eventually enters North Atlantic circulation.

Approximately 4 million people inhabit the Arctic, of which 10% (350,000) are indigenous, representing more than 30 distinct peoples, descendents of peoples who have continuously inhabited the Arctic (depending on the group) from about 30,000 to 4,500 years ago. The greatest concentration of indigenous peoples in the Arctic live in Greenland (about 80% of its total population, predominately Inuit) and in Canada, where they constitute a majority of the

populations of the territory of Nunavut (88%) and close to half of the population of the Northwest Territories (also predominately Inuit and also Cree and other peoples). In Norway, aboriginal people constitute about 15% of its Arctic population. Within the remaining Arctic regions, indigenous peoples constitute only a small percent of the Arctic populations (e.g. 5% in Arctic Russia and 16.5% in Alaska[10]). In Sweden approximately 2.5% of its total population is indigenous. Figures are somewhat misleading as some aboriginal groups are nomadic, such as the Sámi, who travel across the Scandinavian Arctic, their numbers therefore are difficult to quantify accurately in census figures.

About two thirds of the total Arctic population is concentrated in settlements of more than 5,000 inhabitants each. In the Russian Arctic, more than 80% live in such settlements, in Iceland more than 70%, in Alaska about 60% and in Sweden about 50%. By contrast, just over 40% of the population in the Canadian Arctic lives in settlements with more than 5000 inhabitants, less than 40% in northern Norway and the Faroe Islands, and only one third of Greenland's population.

Figure 2: Population distribution in the circumpolar Arctic, by country (including indigenous population)



Source: UNEP Grid Arendal. 2008. Published in International Polar Year (IPY) educational posters, Vital Arctic Graphics. Based on Arctic Pollution Issues: A State of the Arctic Environment Report. Stefansson Arctic Institute, 2004. Arctic Human Development Report.

Most people living outside of cities in the Arctic live in small, isolated and remote communities. There are few roads or railways connecting many of the Arctic's remote communities to supply

lines (although Russia has a fairly extensive network of river systems and rail that can or could be utilized to connect to Arctic ports). In many areas, including in Canada and the U.S. state of Alaska, community supplies are delivered by sea-plane and re-supply ships that use small harbors which are not designed or equipped to accommodate large cargo ships. Many indigenous people rely on seasonal hunting, which takes them hundreds of miles from their home base. A number of remote communities still lack access to basic or adequate infrastructure, such as clean drinking water, sewage, health and education infrastructure.

The Arctic Human Development Report emphasized three dimensions of human development essential to all Arctic residents: (a) controlling one's own destiny, (b) maintaining cultural identity, and (c) living close to nature.[11] The culture and health of indigenous people, in particular, is predicated upon interactions with the environment, inclusive of a traditional diet (e.g., large marine and land animals and fish).

In 2004, a UNDP measurement of the circumpolar Arctic economic production (the High Arctic) estimated a "gross domestic product" based on 2001 data equivalent of more than US $230,000 million in purchasing power parity (PPP). UNDP estimated that, collectively, Arctic economies in 2004 generated as much as one-quarter of the Canadian economy or, comparatively speaking, the equivalent of 80% of the entire economy of Saudi Arabia, the world's leading oil producer and exporter, while surpassing that of Sweden "a country whose demographic weight is similar to that of the entire Arctic area and is among the most industrialized countries in the world."[12]

The significant production generated within the Arctic is largely attributable to resource extraction, in particular, oil and gas development within Russia, Scandinavia and Alaska, and extraction of metallic minerals, and precious metals (e.g., nickel, copper, tin, iron ore, gold and diamonds). Fisheries contribute to overall employment (e.g., fisheries-related activity accounts for more than 20% of employment in Greenland and 5% in Iceland and Norway)[13] and are an important aspect of the cultural life of indigenous peoples (including whaling), while also playing a critical role in indigenous health as a key source of nutrition. There is almost no manufacturing activity in the Arctic, while the service sector is dominated by government.

Russia accounted for 66% of all wealth generation in the Arctic in 2006, with its domestic output contributing 11% to its GDP.[14] Russia has the highest per capita GDP in its overall Arctic zone, followed by Canada, within which the Northwest Territories have the highest per capita gross domestic product of anywhere in the Arctic, attributable to diamond mining.[15] Population density is one factor accounting for the differences in per capita GDP among Arctic nations. Economic statistics are shown in Figures 3-5 below.

Figure 3: Gross Product. Circumpolar Arctic, regions and countries, 2001

(Millions of $US-PPP, 2002)

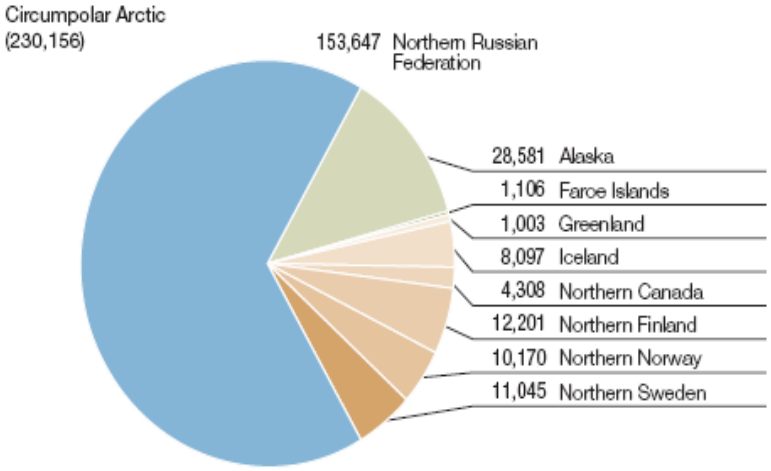


Figure 4: Circumpolar Arctic GDP, 2001

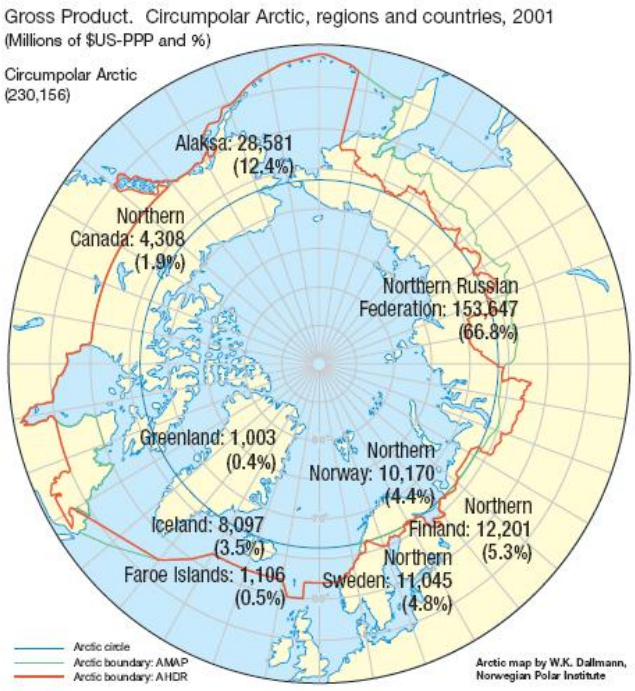


Figure 5: Gross Domestic Product. Circumpolar Arctic, regions and countries, 2001

(% of national GDP, and per capita difference)

Country or region	Gross product as percentage of national GDP, 2001. (% of national GDP in $US-PPP)	Difference between GDP per capita of the region (or country) and the national level, 2001. ($US-PPP per capita)
Circumpolar Arctic	1.87	n.a.
Alaska	0.29	10,787
Faroe Islands	0.71	-5,468
Greenland	0.65	-11,123
Iceland	100.00	0
Northern Canada	0.51	12,785
Northern Finland	9.63	-5,537
Northern Norway	7.61	-7,681
Northern Sweden	5.14	-2,603
Northern Russian Federation	14.95	5,227

Notes: n.a.: not applicable

Source for Figures 3-5: UNDP. 2004. Human Development Report.

The Arctic supports a wealth of large marine mammals (bowhead and beluga whales, walrus, harbor seal and polar bears, etc.), fisheries (cod, turbot, haddock, herring, capelin, etc.) and plankton and benthic species (e.g., mollusks and shellfish) upon which they depend, as well as a forestry sector.

The Arctic's ecosystem remains little understood, including that part that has, until recently been under the ice. However, this semi-enclosed ocean ecosystem is known to be extremely sensitive. It is slow to recover from environmental insults and, therefore, highly vulnerable not just to single incidents, such as oil spills, but also to cumulative effects of human-generated activities.[16] For example, climate change, and, within the Hudson's Bay Complex, massive hydro-electric development which has changed the period when massive volumes of freshwater enter the complex from four of the world's largest river systems from spring and summer to winter, [17] are contributing to noted declines and stresses on large marine mammals, and also Northern cod. Some fish species are already in decline (e.g., Atlantic char), while some migratory species, such as the Atlantic salmon and Atlantic cod are expanding their range northward into the Arctic. Many migratory seabird species breed, stage and overwinter in the Arctic. Some species, such as the eider duck, have undergone a precipitous decline attributed to affects of global warming.[18]

These environmental stressors are in advance of the major developments that the Arctic region can anticipate. How will these be managed?

Trends in Arctic Development

All Arctic states draw considerable benefit from Arctic resources, with future development of extractive oil and gas and mining resources offering the means of enhancing or maintaining respective domestic output as non-renewable resource production elsewhere diminishes. Arctic development—both of extractive industries and associated shipping, if undertaken in a manner that safeguards the environment, including the mammals and fisheries it supports, offer the prospect for alternative revenue sources (e.g., royalties) for northern peoples, including aboriginal peoples for whom traditional lifestyles are already being compromised by the cumulative effects of climate change.

Of all of the countries currently benefiting from the Arctic, Russia's interests are by far the most significant, providing the foundation for its economic resurgence. The lion's share of Russia's current oil and gas production is derived from the Arctic: 90% of national gas and 60% of national oil production. Gazprom, Russia's state-owned oil and gas monopoly (formerly headed by Russia's president, Alexander Medvedev), is Russia's largest hard currency earner, contributing 25 % of federal tax revenues.[19] Within North America, Arctic oil and gas and mining resources have become increasingly significant sources of revenue, with development of the former seen as critical to North American efforts to achieve greater energy security.

Current and projected development activities within the Arctic are discussed below, followed by a discussion of associated benefits and risks of these activities. While national benefits and reliance on the Arctic are noted, it is also important to recognize how inter-connected, hence inter-reliant, Arctic nations—and Europe at large—are as regards dependence on Arctic resources.

Resource Extraction

Oil and Gas

The Arctic currently produces approximately one quarter of the world's gas and one-tenth of its oil supply. Within Canada, Russia, and Alaska, collectively, more than 400 oil and gas fields account for approximately 240 billion barrels (BBOE) of oil and oil-equivalent natural gas producing 10% of the world's known conventional petroleum resources (cumulative production and remaining proved reserves).

In Russia, as noted above, Arctic oil and gas constitutes the mainstay of its national production. According to a 2005 UN estimate, Russia has 28 trillion dollars worth of natural gas reserves. Siberian Arctic oil and gas development accounts for 78% of all of Russia's oil and 84% of its natural gas.

The oil fields at Prudhoe Bay, Alaska, valued at 8 trillion dollars in 2005, are the largest in North America.[20]

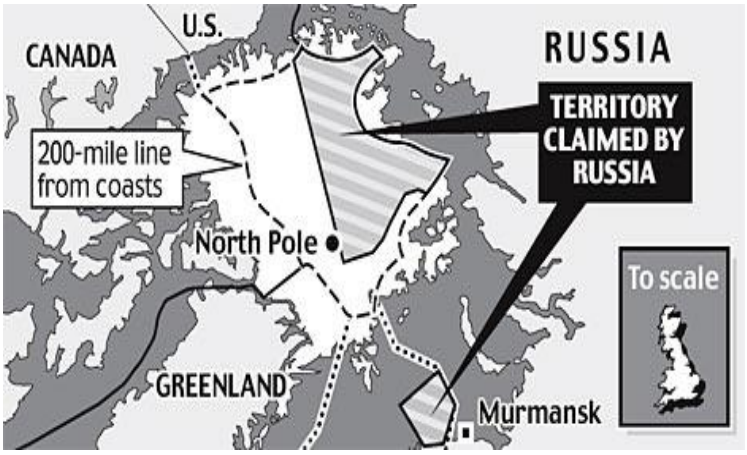
Canadian oil and gas fields have been located in two main basins in the Mackenzie Delta/Beaufort Sea region and in the high Arctic.[21] [22]

Most Arctic oil and gas has yet to be explored. A 2008 U.S. Geological Survey report estimates that the High Arctic contains one quarter of the world's undiscovered energy (oil and gas) reserves, an amount of energy that is equivalent to 375 billion barrels of oil, hence potentially surpassing Saudi Arabia's 261 billion barrel reserve,[23] sufficient to supply global demand in oil for up to three years at present consumption rates of 86 million barrels a day.

The majority of this remaining oil and gas is located offshore. Of undiscovered energy reserves, about 75% of oil and 90% of gas reserves are thought to lie within Northern Russia's territory. The U.S. is also thought to have significant reserves of undiscovered oil and gas.[24] Greenland, Iceland and the Faroe Islands are thought to have potential reserves as well. In addition to reserves that lie within national EEZs, there remain the reserves in territory that, at present, is part of the Arctic commons or High Seas, until otherwise proven by a country to be part of its extended territory under the rules of UNCLOS.

Potential Russian offshore deposits in the Arctic are in the billions of tons of oil and trillions for natural gas. The oil and gas content of the Barents and Kara seas alone is estimated at 50 billion-60 billion tons of standard fuel as compared to 10-12 billion tons of standard fuel in its Caspian Sea reserves. Extension of its continental shelf could add another 15 billion -20 billion tons of oil and gas. As Russia's current reserves, including those in the Arctic, are expected to peak by 2010, it becomes clear why Russia sees much at stake as regards asserting its claim from its EEZ outward to the pole within the Lomonosov Ridge.

Figure 6: Territory Claimed by Russia



Source: Daily Mail. 29 June 2007.

Norway, which is the world's third largest exporter of oil (after Saudi Arabia and Russia), is looking to gas and also oil in offshore Arctic reserves to offset diminishing crude production from its current producing North Sea and Norwegian Sea offshore fields.[25] Norway is also the largest supplier of gas after Russia to the European Union (e.g., one quarter of all the gas consumed in Western Europe in 2003 was supplied by Norway). Offshore natural gas deposits from two offshore fields in the Arctic, one owned by Russia and to be developed in a joint venture with participation from Norway and France, are expected to supply as much as 7% to 9% of total European Union's gas consumption by 2020.[26] After that date, some observers suggest that Norwegian gas reserves will peak.

The U.S., the world's largest single country importer of oil and of gas (after the EU as a whole for gas), granted leases for gas and oil in offshore Alaskan waters in 2008 in response to bids totaling close to US $2.7 million for exploration within the Chukchi Sea in a 4,310 square mile area the size of the U.S. state of Pennsylvania.[27] These reserves are needed to offset the decline of Alaska's Northern Slope reserves.

Canada, the largest exporter of gas to the United States, is looking to development of gas in the Mackenzie Valley and its adjacent offshore Arctic waters in the Beaufort Sea (adjacent to the Chukchi Sea off Alaska) as a keystone in its northern development "use it or lose it" strategy announced in August 2008 by Prime Minister Stephen Harper. Prior to his announcement, Canada's federal Indian and Northern Affairs Department (INAC) had already approved three leases covering 611,000 hectares of the Beaufort seabed to BP Exploration Company Ltd. for a total of US $1.2 billion, the bid topping a 2007 lease of US $585 million won in INAC's bid process by Imperial Oil and ExxonMobil Canada, and at the time the highest amount bid in two decades. Canada has also approved exploration leases in the eastern Arctic around Svalbard.[28]

Global Geopolitical Significance of Arctic Oil and Gas

Arctic oil and gas is of global geopolitical significance, as well as regional. The main clients of current and potential Arctic oil and gas production are the European Union,[29] the world's largest importer of oil and gas, the United States and Japan. Even if the United States, Japan and European countries succeed in diversifying domestic production in renewable and nuclear sources of energy, they will remain reliant on oil and gas for much of their energy for decades to come. This will contribute to substantial geopolitical maneuvering to enhance energy security. The Arctic has not and will not escape these pressures; they will only intensify with attendant stresses on the economic, environmental and socio-political circumstances of the Arctic.

For instance, despite notable commitments and related efforts to reduce reliance on hydrocarbons, the EU's dependence on imported gas is projected to rise from about 57% today to 84% by 2030, while imports of oil are expected to increase from 82% to 93% of the total consumed.[30] The rise in demand will occur as European energy production of gas, solid fuel and nuclear energy declines by 73%, 59% and 41 %, respectively. Therefore, the Arctic presents a welcome source of non-renewable supply not only for coastal states, but for European countries faced with diminishing supplies of energy.

Russia is the EU's largest supplier of gas. It anticipates increasing its exports to the EU and other western states by 23% by 2020 or 318 billion cubic meters per year, as compared to 192 billion cubic meters exported in 2007. However, some analysts suggest that Russia cannot meet future EU demand for gas without development of its Arctic offshore reserves to supplement other new fields it is planning to bring into production, offsetting current production that could peak as soon as 2010.[31] Russia's currently producing fields including Gazprom's three major fields in West Siberia contribute three-quarters of its gas production. However, these Siberian fields are declining by an estimated 6% to 7% percent per year. Hence, offshore gas and oil resources in the Arctic, while more costly to identify and develop, are seen as critical to Russia's future. To this end, Vladimir Putin in 2007 proposed establishing a National Arctic Council to coordinate national policy in the interests of strengthening Russia's interests in the Arctic.[32] His action was followed by President Medvedev's observation in August 2008 that "Our biggest task now is to turn the Arctic into Russia's resource base for the 21rst century."[33]

At the same time, Russia's strategy of using its energy resources to influence EU and NATO politics it perceives as contrary to its interests or ambitions is strengthened by its control over the majority of Arctic oil and gas resources. The recent conflict between Russia and Georgia is predicated in part upon Russia's recognition that an independent oil and gas pipeline routed through Georgia would diminish its ability to influence NATO membership and EU policy. A seasonally ice-free Arctic will provide a complement, if not an alternative option, to transporting oil and gas to European clients via eastern routes.[34] Further, an extension of its Arctic reserves, principally through the Lomonosov Ridge continental shelf extension (Russian claims 460,000 square miles of the ridge covering an area the size of western Europe and thought to contain up to 5 billion metric tons of oil and gas) would further consolidate its improved balance of trade and leverage vis-à-vis Europe, while also helping to fuel Russia's own rising domestic oil and gas consumption. [35]

Investments made in Arctic exploration and production, despite the high costs of drilling and technical challenges posed by a harsh and fragile environment, are indicative of the willingness of oil and gas firms to invest in exploration, despite periodic set-backs such as the current global financial crisis.[36] On land, challenges include lack of roads and other infrastructure (with the exception of Norway and parts of the Russian Arctic) and melting permafrost. Offshore,

there are seasonal limitations imposed by ice cover, with the exception of Arctic waters in the eastern Arctic around Greenland and Norway, which have long been ice free. Even in open seasons, there are still ice-related hazards, while at the beginning and end of the drilling seasons, heavy fog often blankets the Beaufort and Chukchi seas. Arctic night is another impediment.

Drilling in Arctic offshore waters beyond the immediate shallow coastal zones can entail drilling to unprecedented depths (e.g., in contrast to a typical Hibernia offshore well depth of about 85 metres, an offshore well in Newfoundland's Oyster Bay is 2,400 meters). Availability of oil drilling rigs is limited. As of 1 August 2008 there were a grand total of 65 rigs available for oil drilling worldwide.[37] Design and production of an offshore rig can take from three to ten years. Gas exploration is also expensive. The odds of finding a productive offshore gas or oil well are estimated by the industry at about 50-50. The cost of drilling one oil well in cold Arctic waters is estimated to be about US $50 to US$ 60 million. Should oil be found, raising the viscous substance to the surface within Arctic waters is still fraught with technical challenges, hence without commercially assured results.

Extraction techniques applied to production remain experimental beyond 100 meters. Undersea pipelines are another alternative but are also problematic.[38] Nevertheless, the economic rewards coupled with dwindling supplies in many other regions make exploration a sufficiently attractive proposition that the pace is beginning to pick up. Shipping traffic can be expected to increase, and would likely be the preferred method of moving oil and gas to Europe from Russia.

Mining

The Arctic Circle supports hundreds of mines. Russian mines produce gold, tin, tungsten, diamonds, nickel, copper, and coal. Coal is mined in Svalbard, and iron ore is mined in northern Sweden. Canada, Greenland, and Alaska produce gold, diamonds, tin, tungsten, silver, copper, lead, zinc, nickel, asbestos, uranium, coal and other minor ores. All of these developments require mine infrastructure (i.e. roads, power lines, and settlement buildings, etc.) placing stresses on native flora and fauna, especially if not managed properly.

Nearly 100% of the explored reserves of nickel, cobalt, tin and rare earth elements in the Arctic are located in Russia's North. Russia extracts more than 90% of its nickel and cobalt, 98% of platinum metals and 60% of copper,[39] as well as apatite, tin, diamonds, and gold from the Arctic. Most of these resources are found in its Kola Peninsula, as well as Russia's northern Ural Mountains, Siberia, and Russia's Far East.

In Alaska, lead and zinc are extracted at the Red Dog Mine, which accounts for two-thirds of U.S. zinc resources. Some gold mining continues in several areas of Alaska.[40]

Mining development in the Arctic will contribute to shipping demand, including international traffic.

Fisheries

The Arctic fishery is not well documented, including its potential resulting from climate changes and the ice melt. However, there is no doubt of its importance. Currently, more than 40% of global commercial fisheries are located in the Arctic. For example, the Barents Sea cod fishery, which accounted for US $.9 billion in Norwegian export of whitefish, together with Russia's Alaska Pollock fishery, which contributed US $1.2 billion to the Russian Far East economy in 2000, together account for 20% to 25% of the global catch of whitefish. Overall, the Barents Sea has yielded an average of 2.5 million tonnes of fish annually. Some 500,000 tonnes of cod harvested each year—more than half the Atlantic cod sold on the global market—are taken each year from the Barents Sea, a catch valued at US $1 billion.[41]

With global warming, a rise in demand on poorly characterized fisheries is anticipated, including an increase in illegal catch, already thought to be substantial. For example, in the Barents Sea, the illegal catch of cod is thought to be 100,000 tonnes, one-fourth of the allowable catch.

In the United States, the Assistant Secretary for Oceans and Fisheries within the State Department's Bureau of Oceans, Environment and Science, testified to a Senate Commerce Committee this spring that a commercial fishery is expected to develop north of the Bering Strait, inclusive of U.S. waters off Alaska. The North Pacific Fishery Management Council, which oversees Alaskan coastal fisheries, has called for a moratorium on commercial fishing until a stock assessment is undertaken.[42]

In Canada, fishing in the Nunavut region includes an emphasis on development of the turbot and shrimp fishery, which has drawn many southern Canadian and foreign trawlers but proved of little benefit to the local Nunavut population. Arctic char is also fished.

Forestry

Russia has the world's largest forest stocks, about 82 billion m3, with significant forests located in proximity to the Arctic Ocean or its tributaries, including within North West Russia. Canada also has large forest reserves located within proximity of the Arctic. At present, forestry products are largely exported by means other than ships, with the exception of Russian ship traffic to Europe, primarily via the port of Arkhangelsk [43]

Shipping

Lower average temperatures than in the past now prevail across the entire Arctic coastline. Within Russia's Arctic offshore waters, during the summer navigation period ice cover has diminished 35% in the Karsk and Laptev Seas, which could extend navigation by one month. In the East Siberian and Chukotsky Seas summer ice cover has diminished by 70%, raising expectations that navigation of commercial vessels in eastern Arctic waters could be extended by 1.5 months.[44]

Despite these conditions, however, media reports have tended to exaggerate the potential within the next decade for trans-Arctic commercial shipping, given continued prospects for a short navigation season, unpredictability of ice movement (icebergs will still be present in open waters), the added cost of polar class vessels, insurance costs, the need to create and upgrade ports and harbours and associated land-based infrastructure, and to revise out-of-date navigation charts and create charts for vast expanses of, as yet, unexplored waters.[45] This buys time for sounder planning of shipping in the Arctic. Partial transits, or those between Arctic nations, or from one part of the Arctic to the Atlantic or Pacific, will predominate, at least in the next decade, with most of these transits associated with movement of Arctic generated goods to client states.

Ice conditions are improving faster on the Russia side of the Arctic, which coupled with in-place and planned investment in infrastructure and the opportunity to move oil over sea rather than land, suggest that the Northern Sea Route already in use by Russia (which moves goods through the year-round open waters of the Greenland Sea to Scandinavia and Europe), will be commercialized well in advance of a Northwest Passage, the latter likely not viable until 2050. For example, oil transport in the Barents Sea undertaken to move oil production within the Russian Shelf is predicted to increase by a factor of at least six by 2020 to 32 tons per year, while some predict the growth to be as high as 130 million tons/year.[46]

Current traffic

Ice classification of global shipping fleet

The size of the global tanker fleet that has some form of ice classification is indicative of growth in Arctic shipping. In 1992, only 3% of the world tanker fleet had some form of ice classification, but this had increased by 2006 to about 8%, with projections of 18 million tons in dry weight shipping capacity by 2008 or a 10% increase over 1992.[47] Increased emphasis in recent years has been placed on the need for harmonization of Arctic ship design requirements, with a number of organizations, including within the shipping industry, calling for the use of the higher, if not the highest class, of ice classification (related to hull strength, etc.) to minimize the potential for accidents.

Ice breakers

Russia in June 2008 announced it will build a new fleet of ice breakers after 2010, adding to its current fleet of 18 icebreakers. Canada also commissioned one new ice breaker in 2008. Ice breakers have been used primarily for conducting research, and for search and rescue operations. In security terms, there is little for ice breakers to control in the Arctic at this time. But, that will change in the coming few decades.

Commercial shipping traffic

Most cargo transport occurs between Russia and Europe through the Barents Sea. About one half of transport of goods from Russia's western region (Barents and Kara Seas) is associated with oil and exploration activities. From 2002 to 2015, Norwegian experts have projected a near 4 fold expansion of transit through the Barents Sea.[48]

In 2006, the number of tankers transiting through Greenland's waters was about 225 vessels. About 30 tankers designed to transport liquid natural gas (LNG) are expected to transit through Icelandic waters in 2008.

Maritime traffic in Svalbard's waters in the eastern Arctic (between the Barents and Greenland seas) is increasing. The principal cargo is coal from Norwegian and Russian mines. Norwegian coal production rose ten-fold within a decade: from 290,000 tons in 1994 to 2.9 million tons in 2004.

Arctic cruise ship traffic has increased from 50 ships in 2004 to 250 ships in 2007. The majority of cruise tourism occurs in the eastern Arctic, offshore of Greenland, and, in the summer season around Svalbard. Cruise vessels are also an increasing presence off Nunavut and, in the western Arctic, off the Alaskan coast. [49]

Ship traffic is under-estimated as pilots are not required to report transits throughout the Arctic.

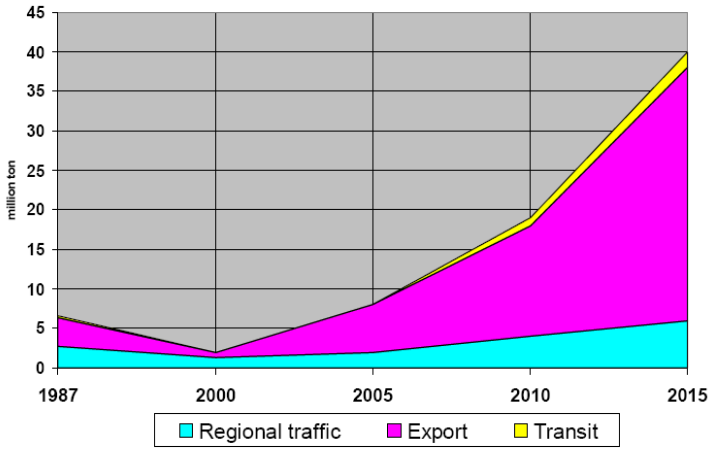
Potential commercialization of trans-Arctic routes

Three trans-Arctic routes are of interest for commercial trans-Arctic shipping (using the Arctic to move goods between the Atlantic and Pacific oceans). The Northern Sea Route along the northern coastline of Eurasia (e.g., from Russia to Europe and North America crossing via the North Pole) is considered to be the most commercially viable, owing to the length of its ice-free season and comparative ease of navigation. A direct route over the pole connecting Russia to Europe, the East and North America is also under consideration. The much discussed Northwest Passage (NWP) could provide up to seven potential transit routes through a maze of Canadian islands to connect Europe to Asia, cutting off 9,000 kilometers from a Panama Canal route.

Northern Sea Route (previously referred to as the Northeast Passage)

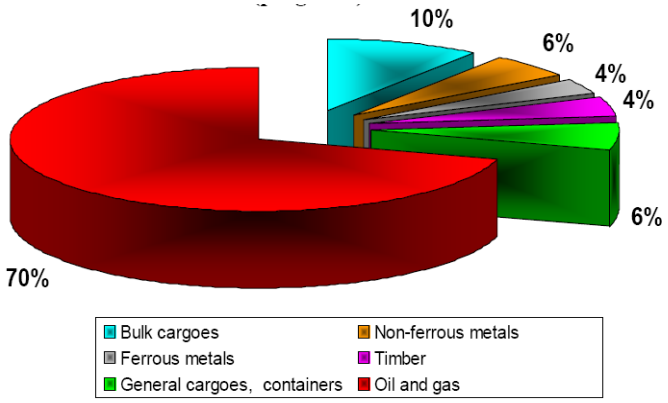
A Northern Sea Route would shave off from 35% to 60% of the distance of commercial voyages between the Far East and Europe, compared with passing through either the Suez or the Panama Canal.[50] It would provide Russia with a direct export route for products from western Siberia to Europe, North America and the Far East. To make it commercially viable, a Russian study suggests that transit fees currently charged will need to be lowered.[51] The major limiting factors, apart from ice, are the relatively shallow depths of Arctic ports and coastal areas, which limit the size of ships. In 2004, 52 vessels made 165 voyages through the Northern Sea Route carrying a total of 1.75 million tonnes of cargo. Cargo volumes for ships transporting cargo via a northern sea route were roughly stable from 1999 to 2006 at about 1.5 million tonnes. Russian scientists in a 2006 study projected that by 2015 there could be up to about 10 times this number using a Northern Sea Route. Traditional Russian cargoes using the northwest route include non-ferrous metals and ores, timber, coal and deliveries to Arctic settlements, totaling about 1.5 to 2.0 million tonnes annually. [52] Shipment of petroleum products is predicted to increase from 465 shipments in 2003 to between 795 and 5,890 thousand ton shipments by 2015.[53]

Figure 7: Traffic Volume along the Northern Sea Route to 2015



Source: Ivanov, Y.M. 2005. Prospects for Development of Sea Transportation in Arctic and Problems in Providing Icebreakers Assistance. Stavanger, 22–25 November 2005

Figure 8: Traffic Structure along the Northern Sea Route to 2015



Source: Ivanov, Y.M. 2005. Prospects for Development of Sea Transportation in Arctic and Problems in Providing Icebreakers Assistance. Stavanger, 22–25 November 2005

Direct northern route over the pole

This passage could save ships about 8,000 miles off trips made currently in established passages. Most traffic would be from Russia to Asia and Europe, but also to North America. Thus far, this route has largely been the preserve of seasonal scientific exploration and tourist vessels. From 1977 to 2004, there were 52 voyages to the North Pole by icebreakers and in 2004 by eight surface ships. Thirteen of the voyages were in support of scientific research and the remaining 39 were devoted to tourist voyages to the North Pole and across the Arctic Ocean.[54]

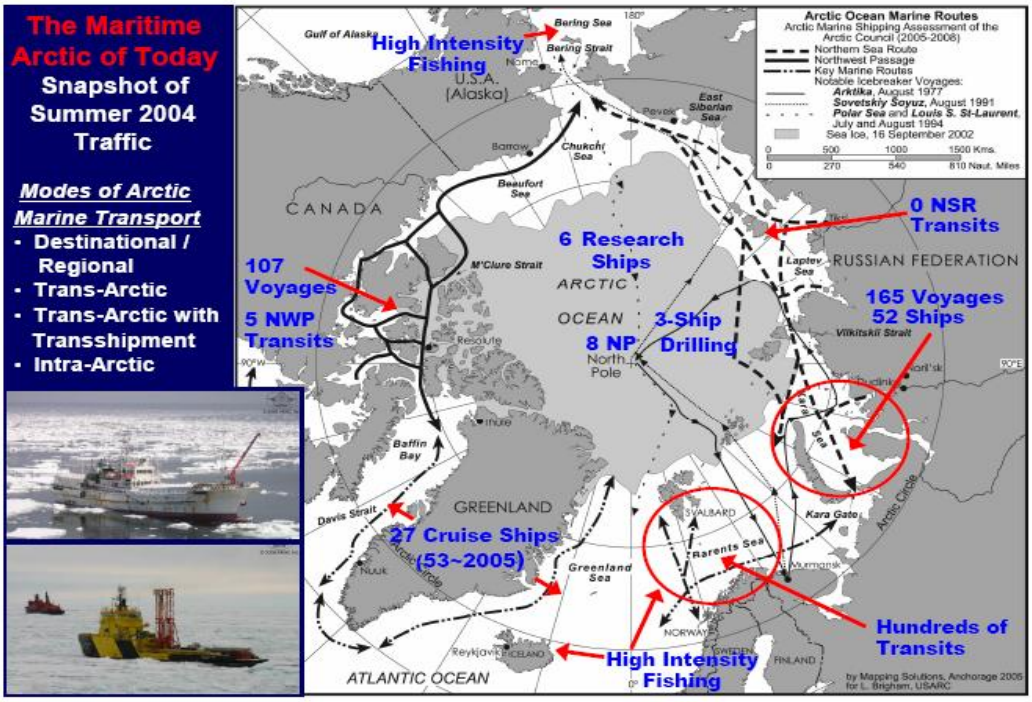
Northwest Passage

Operation of vessels has occurred on a seasonal ice-free basis now for two years (2006-2007), [55] but only three international commercial transits have been made through the Northwest Passage. These included the passage of a Russian tug towing an icebreaker to dry dock and a cruise ship. Just one international commercial supertanker has made the voyage, the United States SS Manhattan, which in 1970 transported one barrel of oil as a trial run to test transport of oil via this route from Alaska's North Slope (an oil pipeline was built instead). The standard route through the NWP is limited to 10 m draft, hence would exclude many standard ships. A route through the Prince of Whales Strait would be viable for larger traffic but ice conditions are expected to continue to be problematic in this route. Transport Canada predicts the greatest use of the passage in the coming decade will be for cargo being shipped east and west, using the passage's southern route, and for in-transit movement (local traffic). As well, infrastructure would have to be developed to make the passage commercially viable, including

construction of deepwater ports for docking, fuel resupply facilities and ship repair facilities. Canada considers the passageway to lie entirely within its internal waters, while the United States and European Union consider portions of the passage to lie within international waters.

The most likely near-term commercial use of the Northwest Passage will likely come from a Bafflinland's St. Mary River iron ore mining development on Baffin Island. The company expects to produce 18 million tonnes of direct-shipping iron ore per year for which European steel mills are expected to be its primary client. The mine is expected to produce for at least 25 years. The company has scheduled a 250,000-ton bulk sample shipment in 2008 to test use of the Northwest Passage to transport the mine's cargo to Europe.[56] It plans to use Very Large Bulk Carrieres (VLBCs), which would make 60 to 70 loaded transits over a season to transport 300,000 to 400,000 tonnes of cargo per year.

Figure 9: Maritime Arctic Traffic in the summer of 2004



Source: Mapping Solutions, Anchorage 2005.

The Benefits and Risks of Arctic Development

Development of Arctic resources is already benefiting the coastal states and Europe economically. Depending on how resources are developed and utilized, they can contribute to stability of northern economies. However, should Russia use its near monopoly on Arctic gas and oil destined for Europe, it could undercut regional and potentially global stability. Development can also be a great boon to indigenous peoples if it occurs in a manner that includes them in managerial decision making and systematically works to build their administrative and technical capacity to participate in development.

Should development occur in a fashion that does not protect the environment—*the main danger being the impulse to develop too quickly before arranging adequate management and monitoring provisions and regulatory requirements are in place to minimize and, where feasible, prevent accidents*— the adverse effects would be felt most keenly in the near term by Arctic states dependent on fisheries and would be devastating to indigenous and other northern peoples. Further, the legacy of future generations in all Arctic nations would be denigrated, if not squandered.

Northern communities

Resource extraction provides significant benefits to inhabitants of northern communities, including indigenous peoples who have little alternative source of income. As well as income from royalties for land, marine water and seabed rights owned by indigenous peoples, both they and other northern inhabitants stand to gain from creation of and improvements to northern infrastructure, such as schools and hospitals (including some built by private firms as part of negotiated agreements). Creation of ports and roads could further contribute to spin-off economic opportunities that benefit northern peoples.

Employment associated with industrial development is welcomed by northern communities, just as in any community, notes Duane Smith, president of the Inuit Circumpolar Council (ICC).[57] However, for Inuit and other northern people to be able to take full advantage of economic opportunities associated with Arctic development, northern communities will require an improved level of education, and access to specialized training (e.g., to participate in harbor and port operation, ship piloting, and commercial fisheries development). He noted that for indigenous people, a parallel and significant concern is that an increase in ship traffic (tourism vessels constituting the most immediate concern, but ultimately commercial cargo traffic as well) with ice-breaking capacity required to negotiate the Arctic will further contribute to the rate of disappearance (or fragmentation) of Arctic ice that hunters rely on as a means of transport to reach hunting grounds and game.

While wildlife is not a significant source of revenue (although sale of seal products, such as fashion clothing is an important source of revenue where little alternatives exist), the main importance of is its contribution to both the aboriginal culture and nutrition. A subsistence diet (known as "country food" in Canada) remains the main or most significant source of nutrition for aboriginal people. Where the traditional diet is diminished or abandoned the incidence of diabetes has skyrocketed far above levels seen in southern populations.

The cumulative effects of climate change are the main factor altering the length of seasons during which hunting can occur. Traditional knowledge, which informs hunting patterns and is important to safety, is bound to become less relevant as hunting practices become more constrained. Rising fuel costs also contribute to rising costs of traditional lifestyle as hunters now rely extensively on use of motorized transport, such as snowmobiles and boats for transport. It typically costs tens of thousands of dollars to properly equip a single Arctic hunter.[58]

As traditional lifestyles come under increasing stress, the importance of alternative sources of revenue will take on increasing importance, yet need to be balanced with development that is sustainable, in particular, as regards the environment.

Environmental considerations

In the fragile Arctic environment, environmental risks constitute one of the major challenges to sustainable development. Understanding of the Arctic ecosystem is largely circumscribed to the portion of the Arctic that is easily visible, such as marine mammals and birds, or commercially important to man, such as Arctic char. Yet almost nothing is known about other parts of the food web, such as benthic plants and animals (e.g., mussels and shellfish), which make up more than 50% of the Arctic biomass.[59]

Degradation of the Arctic terrestrial and marine environment is a key concern as associated with extraction activities and attendant infrastructure creation (pipelines, roads, ports), and increased shipping activities (industrial and tourism activities in particular).

A 1998 assessment of environmental risks to the Arctic—conducted by the Emergency Prevention Preparedness and Response (EPPR) Working Group of the Arctic Council when an ice-free Arctic was still thought to be decades away—noted that there were six major activities underway in the Arctic at that time, all related to releases of oil, gas, chlorine, heavy metals, oxides, propane, butane and gas condensate associated with extraction and industrial activity. These were deemed to constituted "Category 1" [60] threats to the environment or those with high probability of occurrence and high magnitude of threat. These include activities that in many of the coastal states' legislation are frequently prohibited or undergoing phase out. EPPR recommended that Category 1 activities be surveyed "to identify the need for strict

operational controls or construction standards to reduce the risk of these activities." The 1998 EPPR study further concluded that there were 24 Category 2 and 3 activities in the Arctic in 1998**,** with at least two in each country, except for Finland and Iceland, which only had Category 4 Activities. Of the 24 category 2 and 3 activities, 18 were deemed to pose a threat from oil spills and two from radioactivity.[61] All types of Category 1 risks were found to occur within Russia.[62]

With respect to shipping, suggestions have been variously suggested by the Arctic Council, governments, the maritime industry and non-governmental groups that provisions within international maritime conventions (those administered by the International Maritime Organization) be amended to include mandatory provisions regarding ice class, pilot training, ballast discharge (some organizations calling for completely sealed ships in the Arctic to reduce the potential for introduction of exotic species) and registration of ship traffic. However, critics have observed that regional provisions of these instruments have thus far failed to be implemented, though in fairness, the fault seems to lie with the Parties' lack of compliance.

Oil spills

EPPR found that the greatest threat to the Arctic from a release of a pollutant requiring emergency response was from the transportation and storage of oil. EPPR noted that all of the Arctic States had oil terminals, or major transportation routes of oil or hazardous materials supporting communities in their Arctic areas. Other activities include the exploitation of petroleum and mineral resources by all of the countries, except Finland and Sweden. Iceland has a hazardous materials waste site, and the Russian Federation has several nuclear sites and radioactive waste sites in its Arctic area. Other threats under Categories2 and 3 included releases of heavy metals, noxious liquid substances, and other hazardous substances.

Oil spills on land are likely to be more localized than those occurring offshore. The main concern on land is from leaking pipelines. Spills tend to be localized although still severe, for example as occurred with Russia's 2004 Komi oil spill, during which about 100,000 tonnes of oil spread into its freshwater Pechora River system. Since 1998, Russia has taken steps to improve its oil pipelines that were leaking oil. Several new major oil pipelines are also expected to be built in Russia to serve both the EU and Far East customers, while it appears that with proposed revisions to regulations in Canada's Northwest Territories and federal focus on Arctic development as announced by Prime Minister Steven Harper in August of 2008 that a Mackenzie Valley gas pipeline promoted for the past two decades will finally be built. A gas pipeline from Alaska's Northern Slope is also under consideration.

Pipelines on land in Alaska can be expected to lead to greater pressure within a few years to a decade for offshore oil and gas production, required to maintain productivity. It is likely that once gas pipelines are in place, proposals for parallel oil pipelines could face a shorter

timeframe in terms of regulatory hurdles. Melting permafrost will place increasing stresses on pipeline maintenance, raising costs.

The extent to which effects of an offshore oil spill would be localized would depend on the location, as well as the season in which a spill occurs, and, of course, the size of the spill. In some areas, currents operating within Arctic waters could quickly transport oil from offshore spills many miles from the initial location. For example, an oil spill in offshore waters of Alaska's Chukchi Sea would quickly be transported eastward into neighbouring Canadian Arctic waters of the Beaufort Sea. Within the coastal and offshore waters of the Beaufort (anticipated to yield 20% of the anticipated 450 billion barrels of oil thought to be contained in Arctic reserves), much of current and future drilling activity can be expected to occur in the area of the "Beaufort Gyre" where shallow coastal waters suddenly plunge to more than 3,000 metres. During the spring and summer seasons—the period when exploration is at its height—the shelf area draws plankton, and consequently, also large marine mammals that feed on plankton (bowhead whales) fish, and also seabirds, seals and, when they can reach the seals over remaining ice cover, polar bears. The counter-clockwise whirlpool effect of the Beaufort currents (the Gyre) is created as shallow Pacific currents enter and float on top of deeper, colder Atlantic waters. The whirlpool effect means that any oil spill would have a long residence time and be thoroughly "mixed" into the water column at the location of the shelf to effect maximum damage to wildlife. Some of these waters ultimately mix with those of the Transpolar Drift Stream, in which waters off of the Siberian coast of Russia traverse the Arctic basin to enter the North Atlantic off the east coast of Greenland.

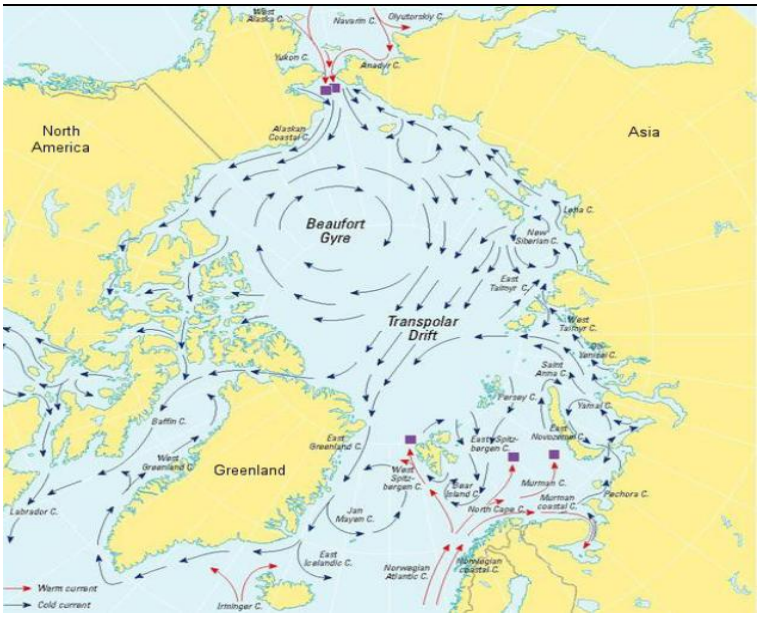
Within the shallow 100-metre waters of Canada's Hudson's Bay Complex (Hudson, James and Ungava Bays) large areas of marshlands and coastal low lands would be particularly vulnerable to effects from an oil spill. Depending on where and when a spill might occur within the complex, oil could be transported into Hudson's Strait and from there to the North Atlantic.

The Arctic Council's Arctic Monitoring and Assessment Programme (AMAP) notes that to-date there have been no large oil spills in the arctic marine environment from oil and gas activities. However, as offshore exploration and production activity increase, there will be increased potential for development activities to harm Arctic marine wildlife. Based on activity in the North Slope of Alaska for 1995-2002, it appears that about half of spills within the petroleum industry occurred during production. Transport and spills associated with general use of petroleum account for the remainder of oil-related spills.[63] The U.S. Mineral Management Service estimates that there is a better than one-in-five chance of a major spill occurring over the lifetime of energy activity in just one block of leases off Alaska. Those chances increase as more blocks are sold.[64]

Should an oil spill occur, there is no prospect in the Arctic to mitigate the effects, as there is, as yet, no effective or proven technology to clean up an oil spill in Arctic waters. The remoteness

of the Arctic itself inhibits emergency response. In most offshore areas there are no roads, harbors are open on only a seasonal basis and lack sufficient oil remediation equipment, and/ or have no means of moving equipment in a timely manner to an oil spill location. Seasonal challenges include ice; extreme cold, high winds, and, in some seas, such as the Chukchi and Beaufort, heavy fog contributing to low visibility. All of this means that oil spill technology and emergency response capacity are not available.

Figure 10: The Beaufort Gyre



Source: Arctic Council. Arctic Monitoring and Assessment Programme (AMAP). 1998. Arctic Ocean Circulation.

The Exxon Valdez spill in southern Alaska, large spills in the North Sea in Europe, as well as a small spill in Canada's Gulf of St. Lawrence, all suggest that spills in the Arctic, large or small, have substantial adverse effects, which are typically of long duration (as suggested by the 1989 Exxon Valdez spill from which five out of nine seabird species have not yet recovered, while residual oil keeps petroleum hydrocarbon levels elevated in bottom-dwelling invertebrates).

Further, the impacts of spill would have maximum effect on marine life because offshore areas where production and exploration occur typically straddle the same geographic areas where marine life is most concentrated (coastal and "shelf" regions where deeper water begins).

Consequently, says Transport Canada's Manager for Special Projects and the Arctic, Ross MacDonald, prevention is the only viable option, a view that is consistent with that promoted by the Arctic Council.

The international World Wildlife Fund (WWF) has called for a complete moratorium on oil and gas exploration and shipment of oil. However, the Canadian chapter of WWF has taken a

softer position, recognizing that oil and gas development and associated royalties offer the Inuit one of their few significant means of economic development. They suggest a Regional Integrated Management Plan be in place prior to exploration.

Aboriginal views regarding safety measures required prior to exploration or production vary. In Alaska, native groups have joined with environmental groups to bring suit to prevent exploration, while Canada's Inuit living in the western Arctic, as informed by industry consultation, favor pressing ahead with development. In both instances, aboriginal people stand to gain from royalties accruing from production.

Seismic drilling impairments

Risks posed to wildlife by oil and gas exploration include impaired sonar ("deafness") as a result of sonic blasts emitted during seismic drilling of gas and oil.

Shipping and the environment

Most ships currently plying Arctic waters as well as those anticipated in the future, are and will be well equipped for ice-laden polar waters (e.g., double hulls), although not necessarily the highest or most stringent class. The IMO at the urging of the Arctic Council has developed Guidelines for Ships Operating in Arctic Ice-Covered Waters.[65] Still, inexperienced pilots from non-Arctic coastal states have the greatest potential for accident, owing to their unfamiliarity with navigation in polar waters and tendency of pilots to speed in waters that are open but studded with ice flows and icebergs.

Figure 11: Example of Ice Damage to a Bulk Carrier

Bulk carrier Reduta Ordona in dry dock in 1996 showing damage caused by striking an ice flow at speed in Canada's Hudson Strait in July 1996

Source: Transport Canada. 2007. Canadian Arctic Shipping Assessment, Main Report. Prepared by the Mariport Group Ltd., Digby Nova Scotia. June 2007.

In addition to cargo spills that could result from such accidents, environmental risks include introduction of exotic species in ballast (sealed Arctic vessels have been proposed), and stack emission of black carbon, which contribute to global warming.

Nuclear accidents

A major release of radioactive contaminants from a nuclear activity (e.g., from radioactive waste dump sites, such as Russian sites in the Kara Sea and Cold War era nuclear test sites, such as Novaya Zemlya) could require emergency response actions within all the Arctic counties.[66] According to various reports, the risk of a nuclear spill or leak has diminished as Russia's economy and the environmental consciousness of its people have led authorities to address environmental safety concerns. Transport of nuclear waste could present another risk.

Weaknesses in International Governance

The Regional Management Framework

Currently, the international system is not sufficiently strong to allow for a comprehensive system of processes and rules to ensure sustainable Arctic development. This is troubling because with the fragile Arctic ecosystem, a key issue is not just who establishes initial ownership but *how* ownership is managed cooperatively on a regional basis. Actions taken in one coastal state jurisdiction will affect all of the Arctic coastal states, and also those countries who use or are clients for its resources.

The current mix of global conventions offers a patchwork of provisions that apply predominately to establishment of sovereignty (UNCLOS), while the sovereignty dispute resolution mechanism has yet to be tested with respect to the Arctic. UNCLOS is also restricted as regards utility for broad regional governance purposes as applicable to the Arctic. It does not contain provisions for shared assessments of the environment and lacks adequate provisions for enhanced monitoring, control, surveillance, compliance and enforcement mechanisms. It contains no mechanism for regulation of new and emerging activities. Furthermore, while UNCLOS permits coastal states to enact laws against maritime pollution within their EEZs out to 200 nautical miles, the Arctic's highly fragile ecosystem entails that, like many environmental issues, there will be no borders that can stop significant threats to the broader regional ecosystem.

Although the United States is not a member of UNLCOS, it can be argued that the Convention's provisions have passed into the realm of customary law. The expressed commitment of the United States, along with the other Arctic coastal states, including Russia, is to reaffirm the

"legal framework" of UNLCOS, as well as to the "orderly settlement of any possible overlapping claim" via the *Ilullisat Declaration*. However, should this goodwill decline, which is not too difficult to contemplate, and two coastal states come to an impasse, it is unclear how well the convention's arbitration mechanism under Art. 76 would work, given that it requires agreement of the two parties. Presumably where agreement could not be reached, the next venue would be the World Court, in which case, again, it is uncertain if all of the coastal states (e.g., the United States) would agree to participate in this mechanism or be bound by its decisions.

Protection of the environment is largely limited to the scientific work of the Arctic Council, to long-range transport of chemical pollution affecting the Arctic (i.e., the Stockholm Convention on Persistent Organic Pollutants), and as regards specific provisions of several IMO maritime conventions geared to shipping emissions and waste dumping. While such instruments do afford broad international input into decision-making, they are either cumbersome or lacking teeth or both regarding their usefulness as a tool applicable to protecting a unique and especially sensitive regional ecosystem. Other global framework conventions, such as the Convention on Biological Diversity, RAMSAR and CITES are very broad, hence offering limited prospects for regionally coordinated action on the Arctic.

The prospect of trans-Arctic shipping routes and increased cargo and oil tanker and other types of commercial traffic, some flying flags of convenience, means ship-based oil spills and accidents could impact areas of the Arctic that extend well beyond a single country or countries. In this respect UNLCOS is actually restrictive as regards how far a coastal state can go to protect sensitive areas beyond territorial waters. Where a coastal state finds "generally accepted rules", such as provisions within IMO maritime conventions, inadequate, it must seek approval from the "competent international organization" (e.g., the IMO) to alter these rules. Norway's 2006 attempt to move tanker and cargo ship traffic off its northern coast to avoid grounding and to separate north- and south-bound traffic were both rejected on the basis that they interfered with Law of the Sea provisions prohibiting a coastal state from requiring foreign vessels to observe design, construction, manning or equipment standards other than generally accepted international rules and standards." [67]

One proposal has suggested that the Arctic be designated a MARPOL-Special Area under the International Convention for the Protection of Pollution from Ships, a provision intended to apply to particularly vulnerable areas within the world's oceans and seas. The provision is already applied to the Antarctic, the Baltic, and North Sea as applicable to specific substances (oil; noxious liquid substances, SO2 emissions and garbage). However, the IMO observes that the Special Area requirements already in place have not taken effect in any of its specially designated areas because of lack of notifications from MARPOL Parties whose coastlines border the relevant special areas. Without mandatory notifications by ships apprising coastal states of their presence and cargo, the special provision would also prove difficult to

implement. The IMO also allows for Party identification of *Particularly Sensitive Sea Area (PSSA)*, within which restrictions can be placed on shipping (limits on when a ship can enter a PSSA; type of ships, etc.) as a mechanism to protect ecologically vulnerable areas. However, without a regional vehicle to bring the Parties together outside of the global IMO venue to develop concerted strategies based on consensus, it is uncertain how individual country proposals would be received or how well they would succeed with respect to implementation.

In addition to weaknesses in their provisions, both UNLCOS and IMO conventions also have poor records of enforcement. This current void in regional governance poses the danger that opportunities for rationale dialogue could surrender ground to a militaristic, conflict-based model. While it is highly improbably, though still possible, that Arctic flag-waving would culminate in actual shots being fired across a bow, regional tensions based on natural resource and environmental disputes, as pegged to borders and likely excluding many key actors in the heat of tension, will work to the detriment of everything else: environmental, economic (including in Europe and other energy importing markets) and socio-cultural security.

While the Arctic issue is still young, an opportunity exists to establish a solid alternative dialogue-based process that emphasizes cooperation in support of a mutually beneficial and sustainable path forward. Those geared only to establishment of economic ownership (UNCLOS Art. 76) simply do not offer such opportunity.

On the environmental side, despite the stellar scientific information produced by the Arctic Council, its recommendations have necessarily been geared to fine tuning such provisions as exist in international conventions and bringing attention to the potential for a regional framework approach. Even on the science side, the Arctic Council has been restricted to the role of an advisory body. There is no regional mechanism that is capable of conducting or facilitating a regional monitoring program, which is very much needed to begin to understand and document cumulative effects of climate change, hydroelectric activity, and other large-scale human activities as they affect the Arctic environment, and economic opportunities for adaptation to climate change.

One option could be an **Arctic Regional Management Authority** that would be empowered to develop strategies and to develop associated action plans that would be instituted at the national level. Such an authority would need to engage not just the coastal states, but the circumpolar community, and, ideally the EU as well.

Add Geo-Political Tensions to the Current Gaps in Governance

While all Arctic nations will benefit from Arctic oil and gas development, Russia, with or without Lomonosov Ridge oil and gas reserves demarcated by a line through the North Pole, will be the main beneficiary of Arctic development in this area and Europe the main external

client for its production. Russia has and is using European energy dependence as the lever for strengthening, if not extending, its post Cold War borders. For these reasons, development of Arctic oil and gas reserves and attendant shipping lanes cannot be viewed as merely a "regional" issue. Ownership and management of Arctic oil and gas resources contribute to — and are affected by— larger geopolitical security concerns in which all nations have an interest. Therefore, the fora in which Arctic development is addressed need to extend beyond the current coastal state backdoor discussions, such as those typified by Ilulissat.

By the same token, circumpolar nations and the EU community require a regularized governance mechanism which is sufficiently broad as to include geopolitical as well as localized development concerns. This would ideally allow for regularized dialogue through which nations, all of which are beneficiaries of Arctic resources, to collectively seek constructive solutions with respect to access to Arctic resources and management. Such dialogue can contribute to other discussions occurring via international, regional and binational fora as aimed at diffusing and hopefully resolving perceived security conflicts.

Regional dialogue needs to be predicated upon recognition that Arctic resources, regardless of who ultimately lays claim to them (and including any remaining commons), benefit all of the Arctic nations and Europe, including through highly interdependent economic constructs, many of which are already in place, and others which will likely be developed through 2050. It is highly likely that some of these constructs yet to be developed, including infrastructure required for shipping lanes, will involve both national and joint venture arrangements. Hence, a key goal of such a regional mechanism should be consideration of cooperative approaches that can further achieve mutual benefits deriving from national and shared (common) Arctic resources. This approach is entirely consistent with objectives aimed at management of sustainable development, such that any benefits achieved are taken not only for near-term gain, but with the intent to provide for future generations through preservation of the Arctic's fragile environment. Further, activity in one area, such as oil and development or shipping, should not occur at the expense of another economic activity, such as fisheries preservation and development.

It is in the interest of each Arctic state individually and as can be affected through cooperative managerial decisions to ensure rigorous sustainable development practices are adhered to, recognizing that negligence by one nation in such a closed ecosystem will impact the resources managed by others. Such actions would help to minimize the potential for degradation, such as occurred as a result of past negligence, including that occasioned by abandoned nuclear submarines and aging pipelines in the Russian Arctic, and the grounding of the Exxon Valdez off the coast of Alaska. Further, regional efforts to utilize provisions of maritime conventions, for example UNCLOS provisions aimed at establishing sensitive areas, and through other international mechanisms, will have a better chance of success where Arctic states can demonstrate they have already instituted and are actively enforcing requirements of equal or

greater strictness within their respective territories and via provisions of regional and binational agreements pertaining to the Arctic.

For instance, the European Union is considering whether to formulate a pan-European Arctic policy at the European Council level, with a communiqué from the EU French Presidency expected this autumn. It is anticipated that such a policy would be anchored in elaboration of an EU Arctic environmental policy. The reference in the Ilullisat Declaration announcing the intent of the five coastal Arctic states to take steps not just nationally and in cooperation with one another, but also with "other interested parties to ensure the protection and preservation of the fragile marine environment of the Arctic Ocean" and its work in other international fora, including the Barents Euro-Arctic Council (BEAC), appears to provide an opening for EU input, even as critics have noted that the division between the "A5" coastal Arctic nations and the non-coastal states, has driven a wedge between them that also diminishes the balance within the one Arctic regional mechanism in existence, the Arctic Council.

End Notes

1 U.S. Department of the Interior. U.S. Geological Survey (USGS). 2008. Circum-Arctic Resource Appraisal: Estimates of Undiscovered Oil and Gas North of the Arctic Circle. Edited by Peter H. Stauffer. USGS Fact Sheet 2008-3049. http://pubs.usgs.gov/fs/2008/3049/fs2008-3049.pdf.

2 In 2005, Canadian Defence Minister Bill Graham erected a Canadian flag on Hans Island to assert Canadian ownership over the waters of the Nares Strait between Canada's Ellesmere Island and Greenland. Denmark responded by deploying a warship to plant its flag on the island. The two countries subsequently agreed the dispute was really a minor one they could resolve diplomatically. Russia's subsequent foray in a mini-submarine to the North Pole in August of 2007, where it sunk a titanium flag in the seabed, was, by contrast, depicted in the media as a cold war shot across the bow toward establishment of Russian economic and military dominance of the Arctic. Canadian Prime Minister Stephen Harper used his first press conference upon taking office in 2006 to suggest to the United States that it back off of claims to the waters within the Arctic archipelago that form part of the Northwest Passage. This dispute too has since been downplayed by diplomats on both sides as a non-argument, Harper has not ceased to make Arctic sovereignty a central platform of his northern policy with this August's announcement of a "use it or lose it" approach to Arctic resources and, to defend them, construction at a projected cost of Cdn $3.1 billion of up to eight Polar Class 5 Arctic Offshore Patrol Ships and construction of a deep water port Nanasivik. Harper commented "In defending our nation's sovereignty, nothing is as fundamental as protecting Canada's territorial integrity; our borders, our airspace and our waters," said the Prime Minister. "More and more, as global commerce routes chart a path to Canada's North and as the oil, gas and minerals of this frontier become more valuable, northern resource development will grow ever more critical to our country." He followed up a year later with an announcement that the first of Canada's ice breakers will be the John G. Diefenbaker, but its construction remains 8-10 years away (Government of Canada. Prime Minister's Office, press releases of 9 July 2007 and 28 August 2008).

3 Ilullisat Declaration. 2008. Arctic Ocean Conference. Ilulissat, Greenland, 27 – 29 MAY 2008.

4 GoC. Transport Canada. 2007. Canadian Arctic Shipping Assessment. Main Report. Prepared for Transport Canada by The Mariport Group Ltd. June 2007.

5 Art.76 provides two approaches for measurement of the maximum length of extended continental shelf. Each nation has 10 years from its ratification of UNCLOS to submit its claim to extended continental shelf. Iceland ratified it in 1984, Finland, Sweden, Norway ratified in 1996, Russia in 1997, Canada in 2003 and Denmark in 2004. The United States has not ratified the treaty. Russia submitted a claim to the 2000-kilometre (1,240 mile) underwater mountain ridge known as the Lomonosov Ridge. The Russian claim extends into territory that Canada, Denmark and the United States consider geological extensions of their own continental shelves. The convention's Commission on the Limits of the Continental Shelf (CLCS), which reviews the claims, has political power only. The commission has recommended that Russia submit a revised claim. Denmark in August 2007 initiated a month-long Danish expedition to demonstrate that Danish territory off Greenland extends outward via the Lomonosov Ridge. Canada's Prime Minister, Steven Harper, announced on 26 August 2008 a much expanded Canadian mapping effort to support shelf extension claims Canada will submit. Norway and Iceland also have yet to submit their claims. (Huebert, 2008; Byers, 2007; AP, 2007a, AP, 2007b).

6 Wallis, Diana. 2006. Is it time for an Arctic Charter? Perspectives on Governance in the Arctic Region." Published in Speech to the Seventh Conference of Arctic Parliamentarians of the Arctic Region, Kiruna, Sweden. 3 August 2006.

7 The U.S. does not recognize Canada's sovereignty over the passage, which it considered "international waters". Canada refers to the passage as "internal waters". Prime Minister Stephen Harper announced in August 2006 that Canada intends to enforce its rights under the UNCLOS Art. 234, which allows Canada as a coastal state to exercise environmental protection of the passage by

means of adoption and enforcement of environmental laws and regulations within its 200 nautical mile limit exclusive economic zone. Donald McRae, a prominent Canadian expert on Arctic issues, in a 200y interview with DFAIT posted on its site, asserts that "Canada's position on the internal waters of Canada is really based upon historic title. It is based upon use and occupation. It is based upon the geographical nature of the relationship of the islands to the ice." As reported by DFAIT, 2007, Interview with Donald McRae. Canada's Position on the Internal Waters of Canada , tp://geo.international.gc.ca/cip-pic/arctic/donald_mcrae-en.aspx. [boldface emphasis added] Rodney Neufeld, a legal officer with DFAIT, further observed that Canada and the U.S. "agree to disagree" on the legal status of the passage, continuing a pattern whereby the U.S. informs Canada of ship transits and complies with Canadian shipping regulations (as reported in TransportWeekly, Arctic Shipping 2008).

8 GoC. The Coast Guard in Canada's Arctic: Interim Report. Standing Senate Committee on Fisheries and Oceans. Fourth Report. June 2008, citing Alan H. Kessel. Legal Advisor, Department of Foreign Affairs and International Trade. Committee Proceedings. 12 February 2008.

9 There is no set definition of the Arctic. The Arctic marine area as described by the Arctic Council in its 1998 Arctic Monitoring and Assessment Programme report includes the Arctic Ocean, the adjacent shelf seas (Beaufort, Chukchi, East Siberian, Laptev, Kara and the Barents Sea), the Nordic Seas (Greenland, Norwegian and Iceland seas), the Labrador Sea, Baffin Bay, Hudson Bay, the Canadian Arctic Archipelago and the Bering Sea. The connection with the shallow Bering Sea occurs through the narrow Baring Strait, while the main connection with the Atlantic Ocean is via the deep Fram Strait and the Nordic Seas. The Arctic Ocean is divided into two deep basins, the Eurasian and the Canadian by the transpolar Lomonosov Ridge. The entire area of the "High Arctic" is roughly 1.5 times that of the United States, and the coastline approximately 45,000 kilometers in length.

10 Population estimates, except those for Alaska and Russia, are based on the census date noted in the UNDP Human Development Report table. The Russian percentage cited in the2004 UNDP report is 4%, the 5% estimate taken from the 2006 Statistics Norway report 'The Economy of the Circumpolar Arctic' by Gérard Duhaime and Andrée Caron appearing in The Economy of the North, Oslo, edited by Solveig GlomsrØd and Iulie Aslaksen. The figure for Alaska noted in the text is from the 2006 U.S. Census.

11 United Nations Development Programme (UNDP). 2004. Arctic Human Development Report (AHDR). Akureyri: Stefansson Arctic Institute.

12 Ibid.

13 Ibid.

14 Duhaime, Gérard and Andrée Caron. 2006. The Economy of the Circumpolar Arctic", in Solveig GlomsrØd and Iulie Aslaksen (eds.), The Economy of the North, Oslo, Statistics Norway, chap. 2, pp 16-25.

15 Ibid; UNDP, 2004.

16 The National Round Table on Environment and the Economy consultations with aboriginal, government, development, academic and other stakeholders observe in one of their state of the debate reports that "the most significant risks from non-renewable resource development in the future are likely to arise from the cumulative environment, social and cultural impacts of multiple exploration programs, mines, oil and gas facilities and pipelines, along with roads and other infrastructure required to support these projects."

17 Some scientists theorize that the influx of so much freshwater to the HCB and thence to the Atlantic through the Labrador Strait, could contribute to transformation of the Atlantic Oscillation. The current's transport of balmy Gulf Stream air northward has insulated Europe from the cold winters associated with northern latitudes. Because freshwater floats on the top of currents, while salt sinks below, some experts theorize that the evaporation from the top layer of massive amounts of Arctic freshwater entering the Atlantic waters would result in lowered temperatures.

18 GoC. Department of Fisheries and Oceans (DFO). Central and Arctic region. 2005c. An Overview of the Hudson Bay Marine Ecosystem. By D.B. Stewart and W. L. Lockhart. Can. Tech. Rep. Fish. Aquat. Sci: 2586: vi+487 p. .Cat. No. Fs97-6/2586E. ISSN 0706-6457.

19 U.S. Department of Energy. Energy Information Administration. 2008. Country Analysis Briefs. Russia: Natural Gas. May 2008. http://www.eia.doe.gov/cabs/Russia/NaturalGas.html

20 Alexander Granberg, head of the Council for Location of Productive Forces and Economic Cooperation in presentation to the Arctic Marine Transport Workshop, 2004; Russian article.

21 Arctic Council. AMAP. 2007. Oil and Gas Assessment. Another 2007 citing Russia's Northern Fleet Admiral Vladimir Vysotskiy provides somewhat lower estimates of 90% of gas and 60% of oil.

22 U.S. Department of the Interior. U.S. Geological Survey (USGS). 2008. Circum-Arctic Resource Appraisal: Estimates of Undiscovered Oil and Gas North of the Arctic Circle. USGS Fact Sheet 2008-3049.Edited by Peter H. Stauffer. http://pubs.usgs.gov/fs/2008/3049/fs2008-3049.pdf.

23 The 2008 USGS Fact Sheet notes "A number of onshore areas in Canada, Russia, and Alaska already have been explored for petroleum, resulting in the discovery of more than 400 oil and gas fields north of the Arctic Circle. These fields account for approximately 240 billion barrels (BBOE) of oil and oil-equivalent natural gas, which is almost 10 percent of the world's known conventional petroleum resources (cumulative production and remaining proved reserves). Nevertheless, most of the Arctic, especially offshore, is essentially unexplored with respect to petroleum." More than 70% of undiscovered natural gas (three times the amount of oil) is estimated to occur in the West Siberian Basin, the East Barents Basins, and Arctic Alaska. More than 70% of the mean undiscovered oil reserves are estimated to occur in the Arctic Alaska, Amerasia Basin, East Greenland Rift Basins, East Barents Basins, and West Greenland–East Canada. The USGS estimates undiscovered conventional energy resources of the Arctic to be approximately 90 billion barrels of oil, 1,669 trillion cubic feet of natural gas, and 44 billion barrels of natural gas liquids. The figure for Saudi Oil reserves is from a September 2007 paper issued by the Defence Academy of the United Kingdom, Advanced Research and Assessment Group, Russian Series titled Russia and the Arctic: The "Last Dash North" and authored by Mark A. Smith and Keir Giles.

24 Recent developments, as reported in the June 2008 interim report on the Arctic by Canada's Coast Guard to the Senate Standing Committee on Fisheries and Oceans observes that Imperial Oil Lt. and Exxon Mobil Canada have acquired exploration licenses from the federal government in 2007 to explore 205,000 hectares of Arctic sea floor about 100 km north of the Mackenzie Delta in the NWT, for which they agreed to spend $585 million over the next five years. Shell Oil was awarded leases off Alaska's northern coast in 2005 and in 2008 under the Bush Administration leases in the amount of US $2.6 billion.

25 EurActiv. 2008. EU, Norway Eye 'Huge' Arctic Oil and Gas Deposits. 29 August 2008. http://www.euractiv.com/en/energy/eu-norway-eye-huge-arctic-oil-gas-deposits/article-157314

26 These include the Shtokman field, with an estimated 3.8 billion cubic meters of gas, which would make it the world's largest offshore gas field. The 1,400 m2 Russian field, located 555 km east of Murmansk in Arctic waters 350m deep is slated to be developed under a joint venture with French and Norwegian partners. Similarly, the Snøhvit gas field, situated 140 km offshore of northern Norway, and the first gas development in the Barents Sea, is anticipated to have reserves of recoverable reserves are 193 billion m^3 of natural gas, 113 million barrels of condensate (light oil), and 5.1 million tonnes of natural gas liquids.

27 Associated Press. (AP). 2008. Icy Area Opens to Drills, But What About Spills? Activists Worry About Sea Icein Arctic, Bush Administration Says It's Doable. 13 April 2008. http://www.msnbc.msn.com/id/24094955/

28 INAC, 2008.

29 Within the EU, Germany, Italy, France, Spain, Netherlands, Belgium and the United Kingdom are major gas importers.

30 Associated Press. 2007c. 'Low-Carbon Economy' Proposed for Europe. MSNBC. 10 January 2007. http://www.msnbc.msn.com/id/16560106/

31 Mark A. Smith and Keir Giles. 2007. Russia and the Arctic: The 'Last Dash North'. Defence Academy of the United Kingdom. Advanced Research and Assessment Group. Russian Series. 07/26. ISBN 978-1-905962-23-5. September 2007, citing C.J. Campbell. 2004. The Status of Oil and Gas Depletion in Russia. Energy Bulletin. 13 December 2004. http://www.eerngy bulletin.net/2600.html.

32 Ibid.

33 Boswell, Randy. Russian Leader Raises Stakes in Race for Arctic Resources. Ottawa Citizen. 18 September 2008.

34 Arial Cohen, in a November 2007 article on "Europe's Strategic Dependence on Russian Energy" for the conservative Heritage Foundation, observes that Russia is systematically working to diminish western control of energy resources as affected via a consolidated strategy of control of exploration, supply lines and other infrastructure, either through direct contracts or majority control of joint venture agreements. Cohen observes that since 2004, Gazprom invested US $2.6 billion in 23 major joint ventures, such as long-term agreements with Turkmenistan, Uzbekistan and Kazakhstan aimed at supplying Europe with oil. Russia has sought to circumvent gas and oil routing through former Soviet bloc countries such as Ukraine, Belarus and Poland. Where countries have resisted its overtures, for example to Lithuania for majority control of an oil refinery and to Latvia for control of its oil-export terminal, Russia has responded by cutting back on oil deliveries. At home, Putin reversed a trend toward privatization of energy companies to once again place them under control of government-controlled entities. Cohen notes that Putin also expressed interest in 2007 in the prospect of a gas cartel with Argentina, Bolivia, Venezuela, Iran and Qatar. Hence, control of the majority of Arctic gas and oil resources, coupled with the most advanced Arctic infrastructure for shipment of these resources to Europe, whether by sea or through a network of Arctic rivers that link its offshore production to land-based pipelines, would contribute to its predominance as Europe's foremost energy supplier.

35 It is for this reason that national claims to the Lomonosov Ridge are of such interest to Russia, Canada and also Denmark, all of which are engaged in mapping exercises to support their respective claims over portions of the ridge. Russia has estimated that the portion of the ridge to which it has laid claim, which extend to the North Pole, could yield up to 10 billion tons of gas and oil. Canada's ability to tap into the Lomonosov Ridge reserves as extending outward from its EEZ would contribute to North America's goals of greater energy independence, given that the main client of Canadian gas is and will likely remain the United States.

36 For example, it costs perhaps US$50 million to drill one deep water well in the Arctic's icy waters. It can take two to three years to drill one well.

37 As reported by ODS Petrodata as of June 2008, there were a reported 296 offshore drill rigs globally, of which all but 40 were already contracted.

38 An example is Snøhvit for which Norway is using a subsea production system to carry gas to a land-based plant on its north-western coast . Source: SPG Media Limited.2008. PLC Offshore Technology.com. Snøhvit Gas Field, Barents Sea, Norway. http://www.offshore-technology.com/projects/snohvit/.

39 Smith, Mark A. and Keir Giles. 2007. Russia and the Arctic: The 'Last Dash North'. Defence Academy of the United Kingdom. Advanced Research and Assessment Group. Russian Series. 07/26. ISBN 978-1-905962-23-5. September 2007, citing a 6 June 2007 article by Admiral Vladimir Vysotsky, Commander of Russia's Northern Fleet, in Orientir.

40 Arctic Council and Arctic Science Committee (IASC). 2005. Arctic Climate Impact Assessment (ACIA). Cambridge University Press.

41 Government of Norway. Ministry of Foreign Affairs. 2006. The High North: A Strategic Focus for Norway. Speech by former State Secretary, Liv Monica Stubholt. Delivered in Ottawa. 11 May 2006.

42 http://www.fakr.noaa.gov/npfmc/

43 Encarta, Econ. 2007 Arctic Shipping 2030: From Russia with Oil, Stormy Passage,or Arctic Great Game?. 2007. Commissioned by Norshipping-07. Report 2007-070

44 Mineweb, 2008.

45 Chircop, Aldo. 2008. Climate Change and the Prospects of Increased Navigation in the Canadian Arctic: Some issues to consider for ICCMI 2008, citing CMMC, 2006. Review of the Seminar "Canadian Arctic Issues in a Changing Climate," organized by the Company of Master Mariners of Canada in conjunction with the Marine Affairs Program of Dalhousie University and Lloyd's register, North America, December 2006 (revised January 2007).

46 GoC. Transport Canada. 2007. Canadian Arctic Shipping Assessment. Main Report. Prepared for Transport Canada by The Mariport Group Ltd. June 2007.

47 Duggal, B.S. and Sanko Kisen. 2006. Ice Class Ships. Operational Guidelines. Seaways. August 2006. http://www.nautinst.org/ice/docs/iceClass_Duggal%20.pdf

48 Norwegian Maritime Directorate. 200b. Arctic Shipping Activities into the Next Decade

49 Arctic Council. 2008. Arctic waterways need protection. By Jesper Hensen. 01 August, 2008. http://arctic-council.org/article/2008/8/arctic_waterways_need_protection

50 Scandinavian Shipping Gazette, 2008. Last updated 29-08-2008. http://www.shipgaz.com/magazine/issues/2008/16/article3.php

51 Smith, Mark A. and Keir Giles. 2007. Russia and the Arctic: The 'Last Dash North'. Defence Academy of the United Kingdom. Advanced Research and Assessment Group. Russian Series. 07/26. ISBN 978-1-905962-23-5. September 2007, citing a 6 June 2007 article by Admiral Vladimir Vysotsky, Commander of Russia's Northern Fleet, in Orientir.

52 The Fridtj of Nansen Institute. 2000. Northern Sea Route Cargo Flows and Infrastructure –Present State and Future Potential By Claes Lykke Ragner. http://www.fni.no/doc&pdf/FNI-R1300.pdf

53 Ibid.

54 Icebreakers reaching the North Pole during this period included those from Russia (42), Sweden (4), Germany (2),United States (2), Canada (1), and Norway (1). Source: Arctic Marine Transport Workshop 2004. Editors: Dr. Lawson Brigham, United States Arctic Research Commission Ben Ellis, Institute of the North. Sponsored by the Circumploar Infrastructure Task Force, Secretariat at the Institute of the North United States Arctic Research Commission International Arctic Science Committee. 28-30 September 2004.

55 RFI conversation with Ruth McKechnie,July 2008.

56 RFI 2008. Interview with Ross MacDonald, Manager Special Projects and the Arctic, Transport Canada. 1 August 2008; Baffinland Iron Mines Corporation. The St. Mary River Project. 2007. Copyright St. Baffinland Iron Mines Corp. http://www.baffinland.com/MaryRiverProject/default.aspx;

57 RFI conversation with Duane Smith, July 2008.

58 Mary Simon. 2007. Inuit and the Canadian Arctic: Sovereignty Begins at Home. ITK President's Speaking ProTour:Speech to The Canadian Club of Ottawa. Reproduced by the Unit Tapirit Kanatami. 23 October 2007.

59 Parks Canada, 2008.

60 Category 1: High probability of occurrence & High magnitude of threat; Category 2: Low probability of occurrence & High magnitude of threat ; Category 3: High probability of occurrence & Low magnitude of threat ; Category 4: Low probability of occurrence & Low magnitude of threat.

61 Ibid.

62 Ibid.

63 RFI conversation with Ruth McKechnie,director of oil and gas science for the GoC, INAC. July 2008.

64 Canadian Press Article as reproduced in Oilweek. May 29, 2008. http://www.oilweek.com/news.asp?ID=16400

65 IMO Doc. MSC/Circ.1056, MEPC/Circ. 399, 23 December 2002 (IMO Polar Code, 2002).

66 Wikepedia, citing Thomas Nilsen, Bellona, 24 August 2001, retrieved 7 December 2006, and Moran, Bradley and John N. Smith, Plutonium in the Russian Arctic, or How We Learned to Love the Bomb, Retrieved 7 December 2006.

67 Stockee, Olav Shram, 2007, citing LOSC Art .211, para 6.