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Article

UNCLOS AND THE BALANCE OF ENVIRONMENTAL AND ECONOMIC RESOURCES IN THE ARCTIC

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ABSTRACT

The Arctic is a resource that teeters on the brink of exhaustion. The northern polar region is a necessary component of global weather and climate, via the hydrological cycle and the cooling effect of carbon trapping and ice albedo. This environmental role, however, is balanced precariously against the economic value that is trapped under the ice, in the form of fishery stocks, mineralogical wealth, and potential trade routes.

In spite of this delicate balance, the United Nations Convention on the Law of the Sea ("UNCLOS") gives extraordinary license to just six nations to determine the fate of the Arctic. Their historical exploitation of the Arctic, however, suggests that additional oversight is necessary. Several control mechanisms are considered and a new system is proposed: the use of UNCLOS itself, and the International Tribunal on the Law of the Sea as a governing body to prevent destruction of the Arctic global resource.

INTRODUCTION

When nations first conceived the Arctic as a part of the global commons, they believed the northern ice to be an insurmountable barrier to navigation and fishing.[1] In subsequent agreements, these nations assumed the polar ice-cap to be an insurmountable barrier to mineral extraction as well.[2]

Now, however, the Arctic appears quite different.[3] Since 1977, American oil concerns have been drilling for oil under the northern slope of Alaska.[4] Recent exploration has included offshore areas, which contain eighty-four percent of remaining exploitable Arctic resources, totaling 90 billion barrels of oil and 1,670 trillion cubic feet of natural gas.[5] The melting ice has also cleared an alternate path for shipping, reenergizing the search for the legendary Northwest Passage.[6] On the other hand, the effects of climate

change have had a dramatic and deleterious effect on the native Alaskan, Canadian, and Greenlander Inuit, as well as indigenous plant and animal species.[7] These same effects will be felt across the globe as the polar melt accelerates global warming, decreases ocean salinity, and raises sea levels.[8]

Tempted by the benefits, and confronted by the responsibilities of managing the Arctic, the question of who has what claims on the northern polar region has become more pressing than ever before. The answer to this question is important for two reasons: first, clarifying polar property rights will prevent confrontations between states who wish to develop Arctic resources; second, establishing a framework for polar property rights-whether vested in a small collection of nations or an international body-will provide a forum in which states that are negatively affected by the impact of melting polar ice may seek redress.

The question of Arctic sovereignty has been explored in the past by many authors, including several in Donald Rothwell and Alex Oude Elferink's collection of papers titled THE LAW OF THE SEA AND POLAR MARITIME DELIMITATION AND JURISDICTION.[9] The authors collected therein explore some of the economic and environmental concerns unique to the Arctic, but ultimately conclude that there "is little about Arctic maritime zone claims which is particularly distinctive to the Arctic ... most [claims] reflect a standard law of the sea approach."[10] This opinion, or variants on it, is commonly shared by authors such as Donat Pharand[11] and Alex Oude Elferink.[12] These authors, and the majority of their counterparts, believe that Article 76 of the United Nations Convention on the Law of the Sea (which permits states to extend their sovereignty beyond 200 miles) is the instrument which ought to exclusively determine polar property rights.[13]

The thesis of this article, however, is to suggest that the Law of the Sea-as it is currently applied to the Arctic-is ill equipped to deal with the variables unique to that region. Although the Law of the Sea does provide a mechanism to settle competing claims, it does so without respect for the importance of the Arctic environment to non-Arctic nations.[14] Because of the strong economic incentives in favor of an ice free Arctic, this regime facilitates, rather than counterbalances, the disappearance of polar ice.[15] This article argues that in order to resolve this imbalance, the International Tribunal for the Law of the Sea should extend its existing precedents to impose economic liability for environmental harms prohibited by the Convention on the Law of the Sea.

In reaching its thesis, this article proceeds in four sections. Section I explores the geographical and environmental concerns which particularly impact the Arctic region. Section II considers the Law of the Sea as it is currently applied to the Arctic. Section III examines the economic and mineralogical value of the Arctic region. Section IV considers the tension between the environmental and economic uses to which the Arctic may be put, and explores the effect of Article 76 of the United Nations Convention of the Law of the Sea in balancing those interests; this section also proposes an alternative regime for managing Arctic resources.

SECTION I: THE ARCTIC REGION & THE ENVIRONMENT

The Arctic region-as the term is used in this article-includes the Arctic Ocean; the Barents, Kara, Chukchi, Laptev, East Siberian, and Beaufort Seas; the Bering and Fram Straits; and the northernmost coasts of Canada, Denmark (via Greenland), Iceland, Norway, Russia, and the United States (via Alaska).[16] The six Arctic littoral states completely encircle the Arctic Ocean and its adjacent seas, with the exception of an outlet into the North Pacific Ocean through the Bering Strait, and an outlet into the North Atlantic Ocean through the Fram Strait.[17] The marine Arctic[18] has a surface area of 11.5 million square kilometers, of which sixty percent has so far been shown to be continental shelf.[19]

The same chemical, organic, and radiological pollutants that contaminate the ecosystems of the rest of the planet pose particular problems for the Arctic. The freezing temperatures of the Arctic, both on land and at sea, prevent pollutants from breaking down into non-toxic constituent components.[20] For instance, although the Arctic nations stopped using leaded gasoline more than a decade ago, the measurable lead in fish and wildlife in the area has not declined.[21] In addition to the cold, the currents which flow to the Arctic from all over the world bring as much as 60% of the pollutants ultimately sited in the Arctic from somewhere else.[22] Thus, the failure to include non-Arctic nations in future Arctic clean-up efforts would leave the majority of incoming pollutants unaddressed.

While the Arctic suffers special harms from ordinary pollutants, the ordinary conditions of the Arctic play a special role in maintaining the global environment. [23] First, the cool water of the marine Arctic plays an important role in global oceanic heat exchange, helping to keep the temperature and salinity of the tropical seas constant;[24] second, the Arctic ice reflects solar energy in the form of light, further helping to cool the planet;[25] third, although the Arctic is not a significant carbon sink,[26] perennial Arctic ice has nevertheless trapped significant amounts of methane and carbon dioxide over the past several hundred years.[27]

Changes in any of these three processes have potentially major global impacts above and beyond the temperature increases generated by the underlying greenhouse effect. Decreased Arctic ice will result in a slower hydrological cycle, trapping heat in the tropics and the Arctic, while simultaneously mitigating the temperature effects of climate change on the North Atlantic region.[28] Moreover, slower currents are less effective at transporting the evaporated freshwater that would otherwise migrate north from the tropics, creating on the one hand more severe precipitation events in the low latitudes, while on the other hand preventing water vapor from traveling across continental land masses (thus resulting in droughts).[29]

Another result of melting Arctic ice is an overall rise in the global mean sea level.[30] Observed increases in sea level due to Arctic melt indicate that decreases in Arctic sea ice and the Greenland ice sheet alone have already contributed a .98 ± .29 millimeter rise to global sea levels.[31] Were both the Arctic and Antarctic ice to melt completely-it is difficult to imagine one without the other-the total increase in sea levels would be between

seventy-five and ninety meters.[32]

SECTION II: THE LAW OF THE (ARCTIC) SEA

In spite of the unique global value of the Arctic environment, there is no legal regime peculiar to the Arctic.[33] Writers speculate that this is so because the development of intercontinental ballistic missiles and long range piloted bomber aircraft turned the Arctic into a strategic zone in which the rival superpowers were uninterested in sharing control.[34] Instead, the Arctic, like the rest of the planet's oceans, is governed by the United Nations Convention on the Law of the Sea.[35]

Laws and customs regarding freedom of navigation have little relevance to the Arctic, because the non-coastal areas of the Arctic traditionally have been considered un-navigable.[36] This axiom, however, is increasingly subject to doubt. Nevertheless, the laws and customs that are *most* applicable to the Arctic are those that extend the sovereignty of the Arctic littoral states into the polar waters; it is these laws that grant license to the Arctic states to exploit the resources of the oceans and sea beds at the expense of the Arctic environment, and therefore these laws are the subject of this section.

THE FORMULATION AND RATIFICATION OF THE LAW OF THE SEA WITH RESPECT TO THE ARCTIC

The modern law regarding sovereignty over coastal waters and their subjacent sea beds originated following President Truman's 1945 proclamation with respect to the continental shelf.[37] This proclamation explicitly stated that the "United States regards the natural resources of the subsoil and the sea bed of the continental shelf beneath the high seas but contiguous to the coasts of the United States as appertaining to the United States, subject to its jurisdiction and control."[38]

This pronouncement was made part of U.S. statutory law by the Congress of the United States in 1953, when it passed the Outer Continental Shelf Lands Act.[39] Moreover, federal courts have consistently held that the extension of national sovereignty over the continental shelf is within the constitutional authority of the American legislature.[40] The Truman proclamation was given the force of *international* law[41] thirteen years later, by the Convention on the Continental Shelf.[42]

The United Nations re-opened the question of sovereignty over the continental shelf during its Third Conference on the Law of the Sea, held in New York in 1973.[43] The renewed interest in the legal regime controlling the sea beds resulted from technological advancements that made geological, cartographical, and mineralogical exploration possible farther and farther from the coast.[44] The United Nations Convention on the Law of the Sea ("UNCLOS") was eventually adopted and entered into force on November 16, 1994.[45] UNCLOS has been signed and ratified by five of the six Arctic nations, the United States being the only Arctic nonsignatory.[46]

In spite of the fact that the United States has not formally adopted UNCLOS, the applicability of the Convention's Articles governing sovereignty over the continental shelf to the United States-namely Articles 76 through 85--is for several reasons not seriously in dispute. First, many writers contend that Article 76 has become a *de facto* part of customary international law because of its wide adoption-either via ratification of the Convention itself or via unilateral laws modeled after the Convention.[47]

Second, the United States has repeatedly demonstrated its intent to be bound by the provisions of UNCLOS not relating to Part XI, which prohibits mining on the deep-sea beds. For instance, after refusing to sign the treaty in 1983, President Reagan announced his intention that the United States nevertheless act in accordance with UNCLOS.[48] Although it never reached a floor vote, President Clinton referred UNCLOS to the Senate Committee on Foreign Relations in 1994.[49] The Bush administration similarly pushed for ratification of the Convention, likely because it found "that the Convention's navigational and national security benefits far outweigh any costs to the U.S."[50] UNCLOS has found similar support in the decisions of the federal courts.[51]

UNCLOS itself sets forth rules regarding, inter alia, the economic exploitation of the sea, freedom of navigation, scientific research, and environmental protections. UNCLOS' guidelines governing sovereignty are of particular importance to the Arctic, because-as is addressed in greater detail below-they concentrate control of the region in the hands of the six Arctic nations.

With respect to sovereignty over the oceans, UNCLOS lays out a system for defining the extent of coastlines and thereafter goes on to delineate three zones over which coastal states may exercise varying levels of control.[52] Coastlines are ordinarily defined as the "low-water line along the coast as marked on large-scale charts officially recognized by the coastal State."[53] This coastline is referred to as the "normal baseline."[54] Where coastlines are protected by reefs, the baseline is extended to the low water line of the reef, and not the sandy beach.[55] Finally-and of particular importance to Canada, whose Arctic coastline is made up of many islands-where the coastline is particularly jagged, or is fringed by islands, straight baselines may be drawn to connect "appropriate points" in order to create a fictional coastline that extends from island to island.[56]

Beyond their coastlines, states exercise varying levels of sovereignty over the three adjacent ocean zones. The first such zone is the territorial sea, defined in Articles 2 through 16.[57] The territorial sea is defined as an area extending from the coastal baseline to a point twelve nautical miles[58] distant.[59] Although coastal states are required to permit innocent passage through their territorial seas, they retain sovereignty over the seabed, water, and airspace.[60]

Engulfing and extending beyond the territorial sea is the contiguous zone, which extends twenty-four nautical miles from the coastal baseline.[61] A state's sovereignty in the contiguous zone is limited to the control necessary to "prevent infringement of its customs, fiscal, immigration or sanitary laws and regulations within its territory or

territorial sea," and to punish infringements of international law.[62]

Finally, the Exclusive Economic Zone ("EEZ") engulfs both the territorial sea and the contiguous zone, extending a distance of 200 nautical miles from a state's coastal baseline.[63] In its EEZ, a coastal state has "sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or non-living, of the waters superjacent to the sea-bed and of the sea-bed and its subsoil, and with regard to other activities for the economic exploitation and exploration of the zone, such as the production of energy from the water, currents and winds."[64]

Article 76 of UNCLOS, however, extends limited state sovereignty *beyond* the EEZ in cases where the continental shelf exceeds 200 nautical miles from the coast.[65] The continental shelf is limited by Article 76 to either "350 nautical miles from the baselines from which the breadth of the territorial sea is measured or ... 100 nautical miles from the 2,500 metre isobath, which is a line connecting the depth of 2,500 metres."[66] Because the 2,500 meter isobath may be located farther than 250 nautical miles from any particular coast, use "of the 2,500 metre isobath criterion could in some cases cause the outer limit to extend beyond 350 nautical miles."[67]

Another limit on the extent of a coastal state's continental shelf is the Commission on the Limits of the Continental Shelf ("CLCS").[68] A state seeking to establish its continental shelf beyond 200 nautical miles is required to submit to the Commission details of its claim along with supporting technical and scientific data within ten years of that state's adoption of UNCLOS.[69] The CLCS makes recommendations regarding the extent of the continental shelf based on member states' submissions.[70] Coastal states are thereafter required to promulgate the final delineation of their continental shelf based on the recommendation of the CLCS.[71]

Annex VI of UNCLOS establishes the International Tribunal for the Law of the Sea ("ITLOS"), whose jurisdiction explicitly extends to "any dispute concerning the interpretation or application of this Convention."[72] To date, ITLOS' decisions have failed to have major impacts on the Arctic region, although recent developments, discussed in greater detail below, suggest that the Tribunal is preparing to extend its jurisdiction to include transboundary environmental harms.

UNCLOS' sovereignty rules have equal application in all the planet's oceans, and thus, although they lead to special results in the Arctic, do not distinguish between the rights and duties of Arctic states as opposed to non-Arctic states.

In addition to UNCLOS, the United States, Canada, Sweden, Finland, Denmark, Russia, and Iceland, as well as representatives of the Aleut, Athabaskan, Gwich'in, Inuit, Raipon, and Saami indigenous peoples participate in an international body called the Arctic Council.[73] The participating states, especially the United States, have been insistent that the Arctic Council not address issues of military concern, nor have the power to raise revenue from its member states except on a voluntary basis.[74] The Arctic Council may, in the future, play a pivotal role in defining the future of the Arctic, but since its creation in

1996, "there has been little evidence that it is evolving into something more than a means of shared communications."[75] Indeed, this was the express and intentionally limited purpose of the Council.[76] Perhaps because of these restrictions, the declarations of the Arctic Council have not resulted in changes to the jurisdictions or consumption patterns of the member states,[77] and therefore do not stand as an obstacle to member states' exploitation of their continental shelves in conformity with Article 76 of UNCLOS. On the other hand, where the Arctic Council has exercised the authority it does have, it has used language that is carefully both vague and circumspect. For example, it appealed to the parties that they "consider issues related to the Arctic region in: their work on the mitigation of climate change; their work on the impacts of, vulnerability and adaptation to, climate change; and their efforts to promote the effective implementation of the Convention."[78]

UNCLOS AND THE GEOGRAPHY OF THE ARCTIC

Only three regions of the Arctic exist outside of the 200 nautical mile Exclusive Economic Zones automatically granted to coastal states by Parts II and V of UNCLOS.[79] These three regions are the central portion of the Arctic Ocean, a portion of the Barents Sea known as "the Loophole," and a portion of the Norwegian Sea.[80] Of these three areas, only a small fraction of the central Arctic Ocean is beyond the sovereignty claims of the Arctic states.[81]

The first key variable in determining the precise extent of state sovereignty over the Arctic is the resolution of Canada's claim that the waters immediately surrounding the Arctic Archipelago, also known as the Strait of Anián, are a part of Canada's territorial waters.[82] Canada premises this claim first on its own reading of UNCLOS' definition of territorial waters.[83] Second, Canada claims to exercise sovereignty over the Strait of Anián based on its theory that these waters are "historic internal waters."[84] Russia has expressed support for the Canadian position,[85] which is opposed by the United States and the European Union, both of which seek to use the Strait of Anián as a trade route.[86]

Another variable is the validity of Russia's Article 76 claim. Russia's original claim over the Arctic was advanced by Joseph Stalin, who simply "drew a line from Murmansk to the North Pole, and then from the North Pole to Chukchi and claimed it as the 'U.S.S.R. Polar Region."'[87] This "sector theory" was originally advocated by Canada as well, which has now abandoned it for the position outlined above.[88] Russia, however, having formally dropped the sector theory as the basis for its claim to the entirety of the sea bed, has made a submission to the CLCS which would reclaim virtually all of the surrendered sea bed territory.[89] In response to this submission, the Arctic parties to UNCLOS, as well as the United States, have expressed their concerns over what they perceive as a land grab.[90] Russia's scientific documentation and support of its claims is ongoing.[91]

SECTION III: THE ARCTIC REGION & THE ECONOMY

In addition to the environmental value that the Arctic possesses, the region has economic value above and beyond that of the ecological services it provides to the rest of the globe. The Arctic, for instance, has been a valuable resource for fishing and aquaculture for hundreds of years.[92] Similarly, the North East Passage above Russia has been an important trade route for several decades; retreating ice now makes the coastal Arctic above Canada, the Northwest Passage, a more tempting trade route than ever.[93]

By far the most economically valuable and environmentally destructive use to which the Arctic has been put, however, is as a source of mineral wealth.[94] This mineral wealth is of increasing importance, because a new United States Geological Survey claims that the Arctic contains significant energy resources.[95]

OIL & NATURAL GAS EXTRACTION IN THE ARCTIC

The economic importance of the energy resources trapped under the Arctic seabed is difficult to overstate. In 2007, Alaska produced 722,000 barrels of oil per day.[96] This is only a fraction of the state's 1988 production peak of 2,017,000 barrels of oil per day.[97] Today, Alaskan oil production accounts for more than sixteen percent of all U.S. production; in 1988, it was more than a third. Natural gas is a significant energy resource in Alaska (433.5 billion cubic feet are marketed from Alaska per year) but contributes only 2.2% to the U.S. market.[98]

U.S. Arctic oil exploitation pales, however, in comparison with that of the other Arctic nations.[99] Norway, for instance, has produced dramatically more oil from its Arctic sea beds than the United States has over similar periods. In 2007, Norway produced 2,564,884 barrels of oil per day compared to Alaska's mere 722,000 barrels per day; approximately 500,000 barrels per day more than Alaska's 1988 peak.[100] The other Arctic nations each produce significant quantities of oil as well.[101]

A real increase in interest in the Arctic as an energy source has occurred in the last few years, following the release of the United States Geological Survey's Circum-Arctic Resource Appraisal Report.[102] The report relied on "a probabilistic methodology of geological analysis and analog modeling."[103] The report concluded that the Arctic has 90 billion undiscovered, but technically recoverable, barrels of oil; 1,670 trillion cubic feet of undiscovered, but technically recoverable, natural gas; and 44 billion barrels of undiscovered, but technically recoverable, natural gas liquids.[104] Of those energy resources, almost a third of the oil was located in the Alaskan Arctic,[105] and over a third of the natural gas was located in the West Siberian Basin.[106] Retreating sea ice facilitates the recovery of this and other as yet undiscovered Arctic energy reserves.

Off-shore mining poses serious environmental hazards that are not always visible to the naked eye. For instance, drilling can cause ocean currents to change, altering the marine environment, and affecting temperatures worldwide.[107] It can also destroy marine

habitats and their biological communities in the vicinity of hydrothermal vents.[108] More obviously, oil exploration, especially in the harsh conditions of the Arctic, risks oil spills into the Arctic waters. BP Exploration (Alaska), for instance, is on average responsible for an oil spill every day in its Prudhoe Bay operation.[109] These spills have the effect of depleting the populations of Arctic wildlife, including game animals hunted for food by indigenous Arctic peoples.[110]

FISHING & AQUACULTURE IN THE ARCTIC

The Arctic hosts populations of salmon, cod, saithe, haddock, redfish, herring, capelin, halibut, northern shrimp, blue whiting, pollock, flatfish, and snow crab.[111] It is, in addition, either the home of or a key habitat for a wide variety of commercially exploited marine mammals including the minke, fin, and sei whales, and hooded, harp, grey, and harbor seals.[112] The fishing industry plays a key role in the economies of several of the Arctic states.[113]

The resources derived from Arctic fisheries are major export earners for Norway, for instance, contributing as much as 14% of total exports from Norway in 2001, and 1.5% of the Norwegian GDP in 1999.[114] The total production of Atlantic salmon alone in Norway in 2000 was worth $1.6 billion.[115] Arctic fishing, either directly through actual fishing, or indirectly through processing plants, employed 30,000 Norwegians in 2003, or 6.5% of the total population.[116] In Iceland, the fishing industry employed 8% of the population in 2000, and contributed over 11% to GDP.[117] In 2002, the fishing industry off the coast of Alaska was responsible for about half the value of fish and shellfish landed from U.S. federal waters.[118] The total value of American Arctic fisheries production in 2001 was estimated at $3 billion dollars.[119]

The effect of climate change on the Arctic fishing industry is generally projected to be positive.[120] This is so for two reasons: First, warmer temperatures and retreating sea ice will create larger habitat areas for some species like cod and herring, and some longer spawning seasons.[121] Second, reduced ice cover will increase the range of Arctic fishing fleets, allowing ships to enjoy longer cruises and to fully take advantage of the increased fish populations.[122]

THE ARCTIC AS TRADE ROUTE

Historically, the sea route above Canada linking the North Atlantic and North Pacific Oceans, the much sought after Northwest Passage, has been more legend than fact.[123] Retreating ice, however, raises the possibility that the Northwest Passage will be a commercially viable trade route within this century.[124] If opened, the Northwest Passage, while free of ice, "could cut the sea-route for cargo from Europe to the Far East by 4,000 miles, from the current route through the Panama Canal, and a ship could eliminate over 6,650 nautical miles on a trip from England to Japan."[125]

Another, perhaps more promising, trade route is that over Russia, or the "North East

Passage." The North East Passage has several advantages over the Northwest Passage, including that it is free of "Canada's thicket of islands," and thus provides "a more straightforward path than the labyrinthine Canadian archipelago allows."[126] Moreover, the ice conditions in the North East Passage are already such that in recent years, "at least a million and a half tons of shipping" have passed through the waters above Russia during the eight ice free weeks each summer.[127]

Another promising trade route made possible by the specter of global warming is the Arctic Polar Route, or a sea path directly across the North Pole.[128] This trade route "would shorten circumpolar shipping by 8,000 miles versus 5,000 saved by NWP."[129] Although experts do not realistically believe that the Arctic will be sufficiently free of ice to allow such a passage within the foreseeable future, U.S. Coastguard specialists imagine the possibility of an "international icebreaking fleet ... breaking a shortcut like an E-Z Pass lane right over the North Pole."[130] Clearly, weakened and retreating sea ice is crucial to each of these three transportation possibilities.

NATIONAL INTEREST IN ARCTIC RESOURCES

As mentioned above, Russia has been particularly ambitious in staking its claim to the Arctic Ocean and the resources therein. It was the first nation to submit a claim to the CLCS in accordance with Article 76 of UNCLOS.[131] That claim, moreover, included not only the North Pole itself, but an expanse which includes nearly half the Arctic Ocean, and significant quantities of oil and natural gas.[132] Russia, moreover, has sent two submarines to the seabed near the North Pole, where it planted a flag to signify its interest and proposed sovereignty over the region.[133]

The other Arctic states have responded to Russia's legal claim unfavorably.[134] More than that, however, the reality of Russia's ability to reach the floor of the Arctic Ocean has galvanized the government of Canada to pledge an increase in its Arctic military presence.[135] Norway subsequently submitted its own claim to the CLCS to extend its continental shelf.[136]

UNCLOS' extension of exclusive state jurisdiction over the sea bed has incentivized the Arctic nations with respect to mineral exploration. No such extension, however, has been made with respect to fishing rights. For this reason, perhaps, the majority of the fisheries described above exist within the 200 mile EEZ of each of the Arctic nations.[137]

Where fisheries exist *outside* of the EEZ, however, and thus within the less regulated "high seas" zone, individuals and corporations are increasing their operations. For instance, in the unclaimed region of the Bering Sea mentioned above, the change in practices has been dramatic: While in 1980 just 15,000 metric tons of pollock were harvested, that figure grew to 1,000,000 metric tons by 1986.[138] By 1992, the pollock population had collapsed and was no longer commercially viable.[139] In response to the pollock collapse, the United States and Russia, as well as delegations from China, Japan, South Korea, and Poland, concluded in 1994 the Convention on the Conservation and

Management of Pollock Resources in the Central Bering Sea.[140]

No such regional compact exists for the central waters of the Arctic.[141] Although the Arctic does fall within the general province of the Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, retreating ice will open larger areas and new populations to exploitation without new or additional safeguards to compensate.[142] Given the importance and value of the fishing industry to many of the Arctic nations, as well as the sad history of the Bering Sea pollock fishery, it is unrealistic to imagine that the Arctic will be immune to over-fishing. It will be particularly difficult to implement regional agreements similar to the Convention on the Conservation and Management of Pollock Resources in the Central Bering Sea, because while in that case the United States and Russia were the two prime movers, an Arctic fishing regime will have to include nations like Norway and Iceland, whose GDPs are much more reliant on the fishing industry.

Finally, the increasing interest in the Northwest Passage has been exhaustively documented.[143] The United States, for instance, has been rigorously pushing the claim that the Strait of Anián is in fact an "international strait" (and therefore subject to freedom of innocent passage) for years.[144] Canada, in response to this claim, has attempted to extend its sovereignty more definitively through the enactment of nominally anti-pollution regulations which have the effect of excluding or limiting shipping in the region.[145] UNCLOS was ratified by Canada after its first enactment of anti-navigation regulations during the 1970s, but Canada has continued to regulate the Arctic Archipelago.[146] Although the dispute between the United States and Canada has not been settled, the increasing interest in the topic from industry as well as from legal commentators is clear.

Thus, many of the important economic benefits enjoyed by the Arctic nations are made possible or more valuable by the increasing degradation of the Arctic environment. Higher temperatures and retreating polar ice enables mineral exploration deeper into the polar region, longer fishing seasons and greater catches, and new trade routes. Each of these activities, moreover, not only takes advantage of the declining environment, but generates additional environmental harms through spills and over-fishing. The global interest in an environmentally healthy Arctic must therefore be balanced against the economic interests of the nations with direct control over the region.

SECTION IV: UNCLOS AND THE NEED FOR A NEW ARCTIC REGIME

As can be seen from the foregoing material, a fundamental tension exists between the economic interests of the six Arctic nations and the global environmental function played by the Arctic. This is so because a cold ice-covered Arctic is necessary to: (1) ensure sea level stability; (2) decrease tropical oceans' salinity and temperature; and (3) disburse precipitation events across the globe. On the other hand, an ice covered Arctic stands in the way of literally billions of dollars worth of: (1) oil and natural gas; (2) fish and aquaculture; and (3) savings in the form of fewer miles traveled (via the Northwest and North East Passages, and the Arctic Polar Route).

The economic benefits of fully utilizing the Arctic's resources may become especially attractive to the Arctic states in light of the common perception (whether true or false) that climate change will affect these states to a lesser degree than other nations, or may even result in a net increase in their well-being.[147] Given a scenario in which Arctic states stand to benefit from the depleted ice both economically *and* environmentally, there is no direct incentive, other than altruistic attitudes toward climate change's "losers," for the Arctic nations to even attempt to preserve the Arctic environment. Moreover, the increasing perception that global climate change is irreversible similarly detracts from the incentive to preserve the Arctic environment.[148]

Non-Arctic states, however, have reason to disagree. Even assuming the validity of the theory that global warming will create "winners and losers," most of the non-Arctic nations and regions will be among the losers. Low lying Pacific island nations, as well as major cities like Tokyo, Mumbai, Shanghai, Jakarta, and Dhaka (to name just a few) will suffer greatly, or disappear entirely, if sea levels rise even by a few inches.[149] The droughts and major precipitation events discussed above will affect growing seasons in Africa, Southern Europe, and South America.[150] Given these countervailing interests, the near global subscription to the application of UNCLOS and Article 76 (giving sovereignty over the crucial region to precisely the nations with the least interest in conserving it) is surprising. A new or altered Arctic regime is needed.

USING UNCLOS TO IMPOSE LIABILITY FOR TRANSBOUNDARY HARM

At present there is no binding international instrument giving rise to state liability for environmental harm.[151] Although the International Law Commission has created a set of Draft Articles on the Responsibility of States for Internationally Wrongful Acts, a document which has become increasingly influential in recent years, these Articles continue to lack the force of law. The Articles, moreover, lack sufficient specificity to indicate the scope and standards of state liability.[152]

UNCLOS itself, however, includes numerous references to the duties of states with respect to the environment, specifically with respect to the conservation of living resources within a state's EEZ,[153] protection of the marine environment,[154] and the protection of human life.[155] UNCLOS, moreover, delegates authority to the International

Tribunal for the Law of the Sea to resolve conflicts arising from the "interpretation or application" of UNCLOS, without respect to the location of the harm.[156] In theory, therefore, a structure *already exists* to mediate environmental disputes covered by UNCLOS. Indeed, such disputes have already been brought before the International Tribunal.[157] Were the International Tribunal for the Law of the Sea to exert its authority to impose environmental liability, it would obviate the necessity of pressuring the Arctic nations into signing an additional treaty. Its ability to do so, however, would obviously be conditioned on its ability to properly and effectively assert jurisdiction over the Arctic states for transboundary environmental harms.

The question of jurisdiction is one that may be answered by reference to the parties' patterns of behavior: a pattern of behavior that exhibits an intent to be bound may be sufficient under existing international precedents to impose liability for similar acts in the future. Environmental damage caused by nuclear materials is one area in which liability for transboundary harms has regularly been acknowledged by and among state actors. The Cosmos 954 incident provides a classic example: When a Soviet nuclear satellite crash landed in Canada, the USSR agreed to repay Canada for its remediation efforts.[158]

The United States has also accepted significant liability for harm to the environment and human health caused by nuclear radiation, including: (1) a $2 million payment to Japan after testing on Bikini Island contaminated a fishing boat and sea-life in the area;[159] (2) payments of $386 million for damages caused by fallout that unexpectedly drifted over the populated Rangeley and Turk Atolls;[160] and (3) settlements in over 500 claims by Spanish citizens residing in and around Palomares after a B-52 aircraft collided with a refueling plane and spread plutonium dust over the area, a major part of a clean-up estimated to have cost, in total, more than $120 million.[161] In a similar incident near Thule Airbase in Greenland, the United States Air Force refused to settle claims with negatively affected Danish personnel, but spent $9.4 million financing the cleanup effort, in addition to providing U.S. service members to assist.[162]

The United States has not always been the tortfeasor with respect to international environmental suits. In 1935, prior to the advent of nuclear weapons, the United States sought arbitration regarding damages resulting from sulfur dioxide fumes crossing the boundary between the U.S. and Canada.[163] The arbiters decided that state liability may arise where: (1) the tortfeasor state causes injury to the territory, property, or citizens of another state; (2) the harm is serious; and (3) the injured state can prove its harm by clear and convincing evidence.[164] Canada ultimately paid $350,000 to the United States in compensation for the damage.[165]

Although Canada, Russia, and the United States have not expressly agreed that every transboundary environmental harm will give rise to liability, their repeated claims and payments could be interpreted by international bodies like ITLOS to be sufficient to impose liability in the future.[166] The fact that Canada and the United States have been both plaintiffs *and* defendants in actions for damages created by transboundary environmental harms certainly suggests that they have acknowledged the legitimacy of these actions for purposes of jurisdiction under international law.

Assuming that ITLOS was willing to find sufficient intent to be bound to exert jurisdiction in a claim for damages against one of the Arctic states, the question remains whether the Tribunal would be willing to order compensation. A brief survey of the Tribunal's decisions, however, suggests that it might.

On the one hand, early decisions by ITLOS have recognized the right of coastal states to detain foreign nationals and condemn vessels captured while fishing illegally. These cases primarily reach the Tribunal by way of petitions by the foreign nationals' government for their citizens', prompt release. Until recently, however, the Tribunal's "prompt release" cases have only dealt with vessels condemned for illegal fishing where the vessel was operating illegally *within* the respondent state's EEZ.[167] Thus, these cases did not reach the question of transboundary harms.

Other early cases have addressed the question of transboundary harms, but have not contemplated retrospective damages. In the Southern Bluefin Tuna Case, for instance, the Tribunal considered the allegations of New Zealand and Australia that Japanese experimental fishing programs were severely depleting stocks of Bluefin Tuna on the high seas.[168] Although the Tribunal was willing to concede that the Japanese fishing expeditions had exceeded their allowed allotments to the detriment of Australia and New Zealand, the remedies it ordered were entirely prospective.[169]

Although the Tribunal's previous decisions have been conservative in scope, more recent developments suggest that it may be receptive to the imposition of retrospective liability for activity which crosses international boundaries. In the Volga Case, a Russian ship-the *Volga*-was boarded by Australian military personnel while operating under a Russian license.[170] The ship was intercepted while outside of the Australian EEZ.[171] The ship was confiscated by Australia, and its officers were detained on criminal charges.[172] While the cases against the officers were still pending in Australia, the case was submitted to ITLOS for review.[173] Without deciding the ultimate question of liability, ITLOS consented to the confiscation in principle, and ordered that the *Volga* be released on bond of $1,920,000 AU.[174]

Because it decreased the value of the bond originally imposed by Australia, the Tribunal's decision has been decried as a blow against efforts to thwart illegal depletion of fisheries stocks.[175] With respect to the imposition of liability for transboundary environmental harms, however, the decision has much to celebrate. First, the Tribunal did not require evidence from Australia that the Volga had in fact violated Australia's EEZ.[176] Without this jurisdictional hook, the Volga decision suggests that ITLOS will not disclaim jurisdiction over transboundary harms automatically; instead, the decision implies that the Tribunal may have chosen to recognize the fact that "a foreign vessel may hover just outside a coastal state's EEZ to capture fish as they swim from within the EEZ to the high seas."[177] Second, by setting a bond of nearly $2 million AU (an amount equal to the value of the ship itself) the Tribunal implicitly sanctioned Australia's right to confiscate the ship. By doing so, the Tribunal not only expanded its own jurisdictional limits, but clearly contemplated the imposition of liability within those newly expanded

limits.

Thus, although ITLOS has not historically taken cases in which liability for transboundary environmental harms is at issue, its decision in the Volga case suggests a willingness to do so in the future. An additional relevant question, however, is whether states would submit to the imposition of liability in such cases.

For three reasons, it seems likely that Arctic states *would* be willing to accede to a liability regime if ITLOS chose to impose one. First, such a regime-although not currently in practice-is not outside the explicit language of UNCLOS. As noted above, the Tribunal has jurisdiction to resolve any dispute concerning the interpretation or application of UNCLOS. Because ITLOS' authority is not limited by the treaty to prospective harms, the imposition of liability for past environmental degradation does nothing to expand ITLOS' authority beyond the scope of its enabling statute.

Second, as is addressed in greater detail below, several of the Arctic states have already demonstrated their willingness to pay-and accept payment of-the costs of environmental remediation. For instance, the Soviet Union invested millions of dollars to clean up the nuclear debris deposited in Canada after its Cosmos 954 satellite irradiated large swaths of the Northwest Territories, Alberta, and Saskatchewan.[178] And the United States has paid foreign nations compensation for its own nuclear accidents, including B-52 accidents over Spain[179] and over Thule in Greenland.[180]

Third, to the extent that a liability regime is a modification of existing precedent-although not law-the value of participation in UNCLOS would be a powerful motivator to ensure that Arctic states respect the authority of the International Tribunal. For instance, UNCLOS has significantly extended the sovereignty of the Arctic nations into their surrounding waters, beyond even what was claimed prior to the Convention. Since 1812, Norway, Iceland, and Denmark claimed only a four-nautical-mile territorial sea, and only gained their additional eight nautical miles of territorial sea upon ratification of UNCLOS.[181] Canada and the United States, on the other hand, each claimed just *three* nautical miles of territorial sea prior to UNCLOS.[182] While the extension of sovereignty permitted by the Convention has obvious intrinsic value to any coastal state, Canada in particular is a vigorous proponent of the extended territorial sea in order to maintain its position regarding the Northwest Passage.[183]

Prior to the adoption of UNCLOS, moreover, coastal states lacked jurisdiction beyond the already limited area they claimed as a territorial sea.[184] In 1958, after the initial Conference on the Law of the Sea, Iceland claimed the unilateral creation of a twelve nautical mile Exclusive Fishing Zone ("EFZ"), a claim that was subsequently adopted by each of the Arctic states.[185] Several Arctic states also considered extending their EFZs to 50 miles prior to the end of the Third Conference on the Law of the Sea in 1982, but the creation of a 200 nautical mile EEZ made such proposals emphatically moot.[186]

States have been reluctant to bind themselves to a robust liability regime for environmental damage.[187] Nevertheless, the enormous wealth trapped in the Arctic is

both clearly tempting to the six Arctic states and at least nominally within the jurisdiction of ITLOS. Were the International Tribunal for the Law of the Sea to take a more active role in defining the permissible damage that may be done to the Arctic Environment, there is a strong likelihood that the Arctic states would respect ITLOS' authority.

A BINDING LIABILITY REGIME FOR THE ARCTIC

Based on the precedents already set by ITLOS, a liability regime for the Arctic should consist of two distinct legal concepts:
(1) liability of any state to an Arctic state for damage caused by the acting state to the (a) living resources,[188] or (b) marine environment within the Arctic state's EEZ, and

(2) liability of an Arctic state to any other state for damage caused by the Arctic state to the other state by destruction of the (a) living resources,[189] or (b) marine environment within the Arctic state's EEZ.[190]

The first liability rule is comparable to the old doctrine employed in ITLOS' prompt release cases: a state becomes liable for economic damages when it violates UNCLOS' environmental provisions within another state's EEZ. Although this rule does not stray far from existing precedent, ITLOS has been understandably cautious in crafting judgments in the past, and thus findings of liability would almost certainly be conservative in scope. Because of problems demonstrating causation and comparative fault, this rule would probably have limited application in suits for damages arising purely from global warming. Retrospective application to require remediation for harm which accrued over a period of decades would also be unlikely due to the same proof-of-causation issues. The first liability rule's greatest effect would be to reduce the *future* flow of traceable persistent organic pollutants, heavy metals, and nuclear materials to the Arctic from southern countries. Where Arctic melt was traceable to violations of agreements dealing with greenhouse gas emissions, moreover, Arctic states could conceivably bring suit before ITLOS under a theory of quasi negligence per se.

The second liability rule is more radical but is comparable to the new doctrine hinted at in the Volga case: a state becomes liable for economic damages when it violates UNCLOS' environmental provisions, *regardless of the location of the violation*. Moreover, because equity principles imply the second rule from the first, it seems likely that if ITLOS were to recognize the liability for environmental violations to a state's EEZ, it would eventually be forced to recognize the second liability rule.

Under the second liability rule, as under the first, it may be difficult to demonstrate the requisite causation for damage to the Arctic environment caused by global warming, however, as above, UNCLOS could interact with other treaties and give rise to liability on a theory of negligence per se. Also, warming demonstrably caused by changed currents due to mineral exploration would be chargeable to the offending Arctic state under the second liability rule. The most likely grounds for liability under the second

rule, however, would be direct harms to the polar ice cap caused by mineralogical exploration, fishing, or the expansion of trade routes.

Assessing the viability of a liability regime is difficult because few international environmental protection agreements specifically provide for the payment of monetary damages in the event of breach.[191] The Convention on International Liability for Damage Caused by Space Objects, however, requires that states launching objects into space make restitution for damages caused by their activities.[192] In addition, this liability makes launching nations responsible for the damages caused by private corporations acting within their control.[193] Comparing liability for space objects with the liability contemplated with respect to global warming may seem specious at first glance, but the actual dangers posed by falling satellites are nontrivial.

For instance, in 1978 the Soviet Cosmos 954 satellite entered Canadian airspace and scattered debris "in the North West Territories and the provinces of Alberta and Saskatchewan."[194] The satellite was powered by a nuclear reactor and carried a significant quantity of uranium 235.[195] The Canadian Armed forces and Atomic Energy Control Board undertook the task of recovering and testing the debris over a ten-month period at a total cost of $14 million.[196]

Canada presented a claim against the Soviet Union for $6 million pursuant to Article II of the Convention on International Liability for Damage Caused by Space Objects.[197] Canada argued that strict liability for "space activities, in particular activities involving the use of nuclear energy, is considered to have become a general principle of international law."[198] Although they disputed the legal meaning of the term "damages," the Soviet Union ultimately paid $3 million dollars to defray Canada's cleanup costs.[199]

Cosmos 954 is not the only satellite powered by a fission reactor: thirty-two such objects were launched between 1970 and 1988 by the former Soviet Union.[200] The United States, on the other hand, has deployed only a single satellite powered by a controlled fission reactor.[201] All but three of these fission satellites and their nuclear payloads remain in orbit.[202] In addition to fission reactors, the USSR launched satellites that employed radioisotope thermoelectric generators ("RTGs"), two of which failed and created "detectable amounts of radioactivity in the upper atmosphere."[203] The United States first launched a nuclear powered satellited using RTG technology in 1964 and has launched forty-four RTGs since then, including units on *Apollo, Viking, Pioneer, Voyager, Galileo*, and *Ulysses* missions.[204] While it is impossible to say with certainty what the upper bound on damages would be for harm caused either by space debris or from global warming caused by Arctic melt, the liability would at least be comparable.

In spite of the obvious dangers posed by nuclear powered satellites, the Outer Space Liability Convention has resulted in extraordinary levels of compliance.[205] Launching states participate in a U.N. registry, for instance, in which each object is recorded, as well as its date of launch, orbital parameters, and function.[206] Private launches, moreover, have been heavily regulated by their supervising nations.[207] In the case of Cosmos 954, the single instance where a falling satellite caused significant harm, the tortfeasor nation was

willing to abide by the terms of the treaty and pay damages.[208] Commentators have suggested that this compliance may be due, at least in part, to the hazard of liability risked otherwise.[209]

A concept that is distinct from liability, but which can create similar incentives, is that of sanctions. The Montreal Protocol, which "is frequently hailed as the most successful environmental treaty ever devised," makes use of sanctions to positive effect.[210] Authors have speculated that the Montreal Protocol's success at both obtaining compliance and participation is due, at least in part, to its imposition of sanctions for failure to moderate CFC emissions.[211] Environmental treaties that do not provide for liability of any kind, on the other hand, have proved less successful. The Kyoto Protocol, for instance, is one notorious example. Of particular relevance to the Arctic, however, is the Arctic Council, which has enjoyed even less success at conserving Arctic resources over the past decade.[212]

As can be seen from the success of the Outer Space Liability Treaty, there are three advantages of a binding liability regime. The first benefit is direct: by reallocating costs onto tortfeasors, a liability regime prevents the creation of harm in the first place or, where harm does occur, provides restitution for victims. Thus, arguably because of the tremendous damages that attach to accidents in space, only one satellite has ever created nontrivial damages, and the victim nation was repaid for its remediation costs. In the Arctic, this principle should have particularly salutary effects on the persistent organic pollutant, radiological, and biodiversity issues considered in Section I above.

The second benefit of liability backed pollution controls in the Arctic would be to decrease the rate of Arctic mineralogical exploitation because additional costs would be imposed on oil companies that generate spills, damage the marine environment, and reduce the population of commercially exploited wildlife. Were mining the Arctic sea bed to become a prohibitively expensive activity, 90 billion barrels of oil would be removed from the market.[213] This represents a nontrivial amount of atmospheric carbon reduction,[214] but the larger benefit would be the psychological effect of placing one of the largest unexplored oil fields off-limits. Such a political move would be a strong signal to markets that renewable and alternative energy must play a larger role in the near future.

Finally, the third benefit of establishing a binding liability regime in the Arctic would be the creation of a permanent legal structure. The adoption and ratification of the Outer Space Liability Convention, for instance, has resulted in the creation of the satellite registry, without which it would be difficult to avoid collisions above the Outer atmosphere; moreover, it provided a forum for Canada to seek restitution from the USSR where damages did occur. The apparatus of an *Arctic* system of international liability would almost certainly exert global pressure to decrease greenhouse gas emissions and preserve the Arctic environment. Third parties could use the infrastructure of the Arctic liability regime to pursue greenhouse gas emitters directly in order to either recover damages or raise global awareness.[215] Certainly, parties are already attempting to do so, and such a platform would only increase the viability of these efforts.[216]

In short, imposing liability within the scope of UNCLOS for environmental harm done to the Arctic would have the effect of counterbalancing the economic incentives that Arctic states have to consume globally important resources. To the extent that this disincentive would not be complete due to issues related to proof-of-causation, it would nevertheless be a good first step.

CONCLUSION

The sea ice trapped in the Arctic is of enormous importance to the world for several reasons. First, the freezing conditions that keep the ice cap solid also decrease the salinity and density of the Arctic waters *beneath* the ice. These waters participate in a complex hydrological cycle that cools the tropical regions of the planet while also dispersing freshwater rainfall across the globe, including over the continental landmasses. The reflection of solar radiation by the ice, moreover, prevents heat that would otherwise be trapped within the Earth's atmosphere from affecting global temperatures. Finally, Arctic ice and permafrost participate-to a limited extent-in the sequestration of greenhouse gasses, including methane, a gas sixty times more efficient than carbon-dioxide at trapping heat.[217]

In spite of the global importance of the Arctic environment, the existing law of the sea, as embodied by the 1982 UNCLOS agreement, permits the Arctic nations to extend their sovereignty 200 miles offshore into the Arctic region. Moreover, Article 76 of UNCLOS permits the Arctic states to extend their sovereignty even farther, albeit in a more limited form. The full extent of the extension of state sovereignty is still unknown, but recent data indicates that all but two small portions of the Arctic Ocean may eventually be successfully claimed by Canada, Denmark, Iceland, Norway, Russia, and the United States.

Moreover, the Arctic nations have strong incentives to pursue the extension of sovereignty that is permitted them by Article 76. Oil and natural gas production within the Arctic Ocean and its adjacent seas, for instance, is already a significant economic resource being explored by the six Arctic nations. Moreover, future exploitation is an increasingly tempting prospect both because of declining land-based reserves and because of newly discovered fields within the Arctic Ocean. Additionally, fisheries and aquaculture play a valuable role in the economies of many of the Arctic states. Finally, the Northwest and North East Passages, as well as the Arctic Polar Route, dangle new opportunities for shipping that appear increasingly enticing to trading nations as the ice cap retreats.

The Arctic nations have been increasingly vigorous in pressing their claims under UNCLOS. Russia, for instance, has claimed almost half the Arctic Ocean, including the North Pole, as a part of its continental shelf. Norway has also submitted a claim to the Commission on the Limits of the Continental Shelf, and the remaining Arctic nations have taken extra-legal actions to establish or reinforce their own claims.

Clearly there is a tension between the environmental and economic values stored in the Arctic. Far from creating an international regime which balances the interests of the Arctic states and those of the rest of the world, however, Article 76 provides the six coastal nations with a legal vehicle by which to exploit the mineralogical, biological, and trade resources of the Arctic. A new regime, or changes to the practice of the current one, is necessary.

The existing language of UNCLOS provides precisely such a vehicle for change inasmuch as it gives jurisdiction to the International Tribunal for the Law of the Sea to resolve disputes arising under UNCLOS. In order to more fully fulfill the environmental goals set by UNCLOS and to preserve an important global resource, the Tribunal should exercise its authority by imposing a liability regime for transboundary harms. Such a liability regime would tend to deter environmental degradation without requiring the Arctic states to surrender the sovereignty rights they gained by becoming signatories to UNCLOS.

Footnotes

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1 *See* Donat Pharand, *Freedom of the Seas in the Arctic Ocean*, 19 U. TORONTO L.J. 210, 212 (1969) ("Professor Hyde gives two reasons for assimilating ice to land: first, the surface is 'sufficiently solid to enable man to pursue his occupations thereon'; and second, 'its solidity and permanence constitutes in itself a barrier to navigation as it is normally enjoyed in the open sea."').

2 *See* Kevin Krajick, *Race to Plumb the Frigid Depths*, 315 SCI. 1525, 1525 (2007) (describing recent increases in oil and gas drilling in the Arctic).

3 *See generally* J. Overpeck et al., *Arctic Environmental Change of the Last Four Centuries*, 278 SCI. 1251 (1997) (describing numerous changes in the Arctic).

4 Lincoln P. Bloomfield, *The Arctic: Last Unmanaged Frontier*, 60 FOREIGN AFF. 87, 91 (1981).

5 *See*U.S. GEOLOGICAL SURVEY, CIRCUM-ARCTIC RESOURCE APPRAISAL: ESTIMATES OF UNDISCOVERED OIL AND GAS NORTH OF THE ARCTIC CIRCLE I (Peter H. Stauffer ed., 2008).

6 Nathan Read, Notes and Comments, *Claiming the Strait: How U.S. Accession to the United Nations Law of the Sea Convention Will Impact the Dispute Between Canada and the United States Over the Northwest Passage*, 21 TEMP. INT'L & COMP. L.J. 413, 413 (2007).

7 Gunter Weller et al., *Summary and Synthesis of the ACIA, in*ARCTIC CLIMATE IMPACT ASSESSMENT 989, 1000-01 (Carolyn Symon et al. eds., 2005).

8 *Id.* at 990.

9 THE LAW OF THE SEA AND POLAR MARITIME DELIMITATION AND JURISDICTION (Alex G. Oude Elferink & Donald R. Rothwell eds., 2001).

10 Robin R. Churchill, *Claims to Maritime Zones in the Arctic - Law of the Sea Normality, or Polar Peculiarity?, in*THE LAW OF THE SEA AND POLAR MARITIME DELIMITATION AND JURISDICTION 105, 124 (Alex G. Oude Elferink & Donald R. Rothwell eds., 2001).

11 Pharand, *supra* note 1, at 232-33.

12 Alex G. Oude Elferink, *The Outer Continental Shelf in the Arctic: The Application of Article 76 of the LOS Convention in a Regional Context, in*THE LAW OF THE SEA AND POLAR MARITIME DELIMITATION AND JURISDICTION 139 (Alex G. Oude Elferink & Donald R. Rothwell, eds., 2001).

13 *See, e.g.*, Mark Jarashow et al., Note, *UNCLOS and the Arctic: the Path of Least Resistance*, 30 FORDHAM INT'L L.J. 1587, 1650-52 (2007); Candace L. Bates, Comment, *U.S. Ratification of the U.N. Convention on the Law of the Sea: Passive Acceptance is Not Enough to Protect U.S. Property Interests*, 31 N.C.J. INT'L L. & COM. REG. 745 (2006); Keith F. Miller, *The Implications of UNCLOS for Canada's Regulatory Jurisdiction in the Offshore - the 200-Mile Limit and the Continental Shelf*, 30 DALHOUSIE L.J. 341, 378-79 (2007).

14 *See* United Nations Convention on the Law of the Sea, Dec. 10, 1982, 1833 U.N.T.S. 397 [hereinafter UNCLOS].

15 *See generally* Krajick, *supra* note 2 (describing recent increases in oil and gas drilling in the Arctic).

16 The precise definition of the "Arctic region" varies based on its context. This definition is a conglomeration of that presented by Gordon McBean in Gordon McBean, *Arctic Climate: Past and Present, in*ARCTIC CLIMATE IMPACT ASSESSMENT 21, 26 (Carolyn Symon et al. eds., 2005), and Christopher C. Joyner in Christopher C. Joyner, *The Status of Ice in International Law, in*THE LAW OF THE SEA AND POLAR MARITIME DELIMITATION AND JURISDICTION 23, 25 (Alex G. Oude Elferink & Donald R. Rothwell eds., 2001). I

have relied on this definition because it encompasses a region that includes the coastal and territorial seas of the Arctic littoral states, which will have legal significance in Section III of this article.

17 Donald R. Rothwell & Christopher C. Joyner, *The Polar Oceans and the Law of the Sea, in*THE LAW OF THE SEA AND POLAR MARITIME DELIMITATION AND JURISDICTION 1, 5 (Alex G. Oude Elferink & Donald R. Rothwell eds., 2001).

18 The term "Marine Arctic" is used here to refer to the Arctic Ocean; the Barents, Kara, Chukchi, Laptev, East Siberian, and Beaufort Seas, and the Bering and Fram Straits, as opposed to the coasts of the six Arctic littoral states.

19 McBean, *supra* note 16, at 26.

20 Sarah R. Hamilton, Notes & Comments, *Toxic Contamination of the Arctic: Thinking Globally and Acting Locally to Protect Arctic Ecosystems and People*, 15 COLO. J. INT'L ENVTL. L. & POL'Y 71, 78 (2004).

21 *Id.*

22 *See id.* at 76 ("Even in the most heavily industrial or urban regions of the Russian Arctic ... only forty to fifty percent of the total pollution in local bodies of water can be attributed to local sources.").

23 Harald Loeng et al., *Marine Systems, in*ARCTIC CLIMATE IMPACT ASSESSMENT 453, 458 (Carolyn Symon et al. eds., 2005).

24 *Id.* at 459.

25 *Id.*

26 *Id.* at 516.

27 *Id.*

28 Intergovernmental Panel on Climate Change, *Technical Paper: Climate Change and Water*, at 24 (Bates et al. eds., 2008).

[29] *Id.* at 26.

[30] *Id.* at 20.

[31] *Id.*

[32] Joyner, *supra* note 16, at 27.

[33] *See* Rothwell & Joyner, *supra* note 17, at I.

[34] David VanderZwaag et al., *The Arctic Environmental Protection Strategy, Arctic Council and Multilateral Environmental Initiatives: Tinkering While the Arctic Marine Environment Totters*, 30 DENV. J. INT'L L. & POL'Y 131, 142 (2002).

[35] *See, e.g.*, Elferink, *supra* note 12, at 139.

[36] *See, e.g.*, Stephanie Holmes, Comment, *Breaking the Ice: Emerging Legal Issues in Arctic Sovereignty*, 9 CHI. J. INT'L. L. 323, 327-30 (2008) (Holmes names Hugo Grotius as the father of "Freedom of the Seas Doctrine." According to Holmes, Grotius' theory relied on, *inter alia*, the non-rival nature of navigation. As the central portions of the Arctic Ocean have traditionally been unnavigable and largely unexploitable for fishing and mineral exploration, that principle is of only marginal value to the Arctic). *See also* Pharand, *supra* note 1, at 212.

[37] Miller, *supra* note 13, at 347.

[38] Proclamation No. 2667, 3 C.F.R., 1945 Supp. 39 (1946).

[39] *See, e.g.*, 43 U.S.C. § 1332 (1978) ("the subsoil and seabed of the Outer Continental Shelf appertain to the United States and are subject to its jurisdiction, control, and power of disposition as provided in this Act").

[40] *See, e.g.*, United States v. Louisiana, 363 U.S. 1, 34 (1960).

[41] In the *North Sea Continental Shelf Cases*, the International Court of Justice took particular note of the fact that the "Truman Proclamation ... came to be regarded as the starting point of the positive law on the subject" of sovereignty over the continental shelf. North Sea Continental Shelf (F.R.G. v. Den.). 1969 I.C.J. 3, 32-33 (Feb. 20).

42 *E.g.*, United Ass'n of Journeymen & Apprentices of Plumbing & Pipe Fitting Indus., Local Union No. 412 v. Barr, 981 F.2d 1269, 1270 (D.C. Cir. 1992); *see also* Convention on the Continental Shelf, Apr. 29, 1958, 15 U.S.T. 473, 499 U.N.T.S. 311.

43 According to Keith F. Miller, the "Third Conference resulted from a need expressed by Arvid Parvo, Malta's ambassador to the UN, for 'an effective international regime over the seabed and the ocean floor beyond a clearly defined national jurisdiction."' Miller, *supra* note 13, at 351.

44 In addition to new technologies created for the purpose of exploration, new technologies were being created or contemplated as a result of the conflict between the United States and the then Soviet Union, including "nuclear submarines charting deep waters never before explored" and "antiballistic missile systems to be placed on the seabed." DIVISION FOR OCEAN AFFAIRS AND THE LAW OF THE SEA, UNITED NATIONS, THE UNITED NATIONS CONVENTION ON THE LAW OF THE SEA (A HISTORICAL PERSPECTIVE) (1998), *available at* http:// www.un.org/Depts/los/convention_agreements/convention_historical_ perspective.htm.

45 Miller, *supra* note 13, at 351.

46 UNCLOS has been signed and ratified by Iceland (on June 21, 1985) Norway (on June 24, 1996) the Russian Federation (on March 12, 1997) Canada (on November 7, 2003) and Denmark (on November 16, 2004). DIVISION FOR OCEAN AFFAIRS AND THE LAW OF THE SEA, UNITED NATIONS, CHRONOLOGICAL LISTS OF RATIFICATIONS OF, ACCESSIONS AND SUCCESSIONS TO THE CONVENTION AND THE RELATED AGREEMENTS AS OF 08 JANUARY 2010 (2010), *available at* http:// www.un.org/Depts/los/reference_files/chronological_lists_of_ratifications.htm #The%20United%20Nations%C20Convention%C20*o*n%C20the%C20Law%C20the%20Sea.

47 Elferink, *supra* note 12, at 143.

48 Statement by the President: United States Oceans Policy, 19 Weekly Comp. Pres. Doc. 383, 383 (Mar. 14 1983).

49 MARJORIE ANN BROWNE, CONGRESSIONAL RESEARCH SERVICE, THE U.N. LAW OF THE SEA CONVENTION AND THE UNITED STATES: DEVELOPMENTS SINCE OCTOBER 2003 2 (2007), *available at* http://www.fas.org/sgp/crs/row/RS21890.pdf.

50 John E. Noyes, *U.S. Policy and the United Nations Convention on the Law of the Sea*, 39 GEO. WASH. INT'L L. REV. 621, 628 (2007).

51 *See, e.g.*, U.S. v. Alaska, 503 U.S. 569, 588 n.10 (1992) (indicating that the United States conceded that the coastal 'baseline provisions' of UNCLOS reflect customary international

law); U.S. v. Jho, 534 F.3d 398, 406 (5th Cir. 2008) ("The United States is not a party to UNCLOS as the Senate has not ratified the treaty. As such, the 'international law' referred to in § 1912 incorporates UNCLOS only to the extent that UNCLOS reflects customary international law."); Mayaguezanos por la Salud y el Ambiente v. U.S., 198 F.3d 297, 304 n.14 (1st Cir. 1999) ("The Convention has been signed by the President, but it has not yet been ratified by the Senate. Consequently, we refer to UNCLOS only to the extent that it incorporates customary international law, though we also note that the United States 'is obliged to refrain from acts that would defeat the object and purpose of the agreement."').

52 UNCLOS, *supra* note 14.

53 *Id.* art. 5.

54 *Id.*

55 *Id.* art. 6.

56 *Id.* art. 7.

57 *Id.* arts. 2-16.

58 A nautical mile is a distance of approximately 1.15 standard miles or 1.852 kilometers.

59 UNCLOS, *supra* note 14, art. 3.

60 *Id.* arts. 2, 17.

61 *Id.* art. 33.

62 *Id.*

63 *Id.* art. 57.

64 *Id.* art. 56.

65 *Id.* art. 76.

66 *Id.* art. 76, para. 5.

67 Miller, *supra* note 13, at 357.

68 UNCLOS, *supra* note 14, Annex II.

69 *Id.* Annex II, art. 4.

70 *Id.* Annex II, art. 3.

71 *Id.* Annex II, art. 7. As a nonparty to the Convention, there is a dispute over whether the United States may submit data to the CLCS. *See* Elferink, *supra* note 12, at 143-44. However, both the United States and Canada-before Canada's adoption of UNCLOS in 2003-submitted "comments on the Scientific and Technical Guidelines of the CLCS prior to their final adoption." *Id.* at 144 (citing UN Doc. A/54/429 of 30 Sept. 1999, para. 53). This indication of American interest in an involvement in the CLCS, combined with repeated indications of an American intent to be bound by the CLCS (noted above) seem to auger in favor of American participation in the Convention to some extent.

72 UNCLOS, *supra* note 14, art. 288.

73 Joint Communiqué and Declaration on the Establishment of the Arctic Council, Sept. 19, 1996, 35 I.L.M. 1382 [hereinafter Joint Communiqué]; Arctic Council Secretariat, *About Arctic Council*, Oct. 22, 2007, http://arctic-council.org/article/about.

74 VanderZwaag et al., *supra* note 34, at 154; *see also* Evan T. Bloom, *Establishment of the Arctic Council*, 93 AM. J. INT'L L. 712, 718 (1999) (explaining "The programs of the Arctic Council are funded voluntarily by individual Arctic states. Under current practice, states propose projects or identify working groups they wish to support, and those governments that are interested take the lead in implementing and paying for them.").

75 VanderZwaag et al., *supra* note 34, at 156.

76 The Declaration on the Establishment of the Arctic Council states that the "Arctic Council is established as a high level forum to: (a) provide a means for promoting cooperation, coordination and interaction among the Arctic States, with the involvement of the Arctic indigenous communities and other Arctic inhabitants on common Arctic issues, in particular issues of sustainable development and environmental protection in the Arctic." Joint Comminiqué, *supra* note 73, 35 I.L.M. at 1388.

77 VanderZwaag et al., *supra* note 34, at 156.

78 The Arctic Council, *Statement on Climate Change in the Arctic Region*, at 2, COP 11 and COP/MOP1 (Dec. 9, 2005), *available at* http://arctic-council.org/filearchive/AC%20statement%C20CoP11%20Montreal_final.pdf.

79 Elferink, *supra* note 12, at 139.

80 *Id.*

81 *Id.* For instance, the seabed of the Loophole is made up entirely of continental shelf, and thus it appears that all of the Loophole can be claimed by the surrounding nations by action of Article 76. *Id.* at 146. The application of Article 76 to this region is sufficiently clear that it will probably only be necessary for Norway and Russia to submit to the CLCS bathymetric data placing the foot of the continental slope outside the Barents Sea. *Id.*
The region between Greenland and Norway, on the other hand, is more complex. Alex Oude Elferink, relying in part on V. Prescott's 1998 chapter on *Natural Rights to Hydrocarbon Resources of the Continental Margin beyond 200 Nautical Miles*, claims that the Arctic nations' sovereignty will be limited to "two or three separate continental shelf areas in the high seas enclave in the Norwegian Sea." *See id.* at 147. This claim, however, is undercut by recent hydrographic data which places the *entirety* of the Norwegian Sea within the sovereignty of Denmark, Iceland, and Norway. INT'L BOUNDARIES RESEARCH UNIT OF DURHAM UNIV., MARITIME JURISDICTION AND BOUNDARIES IN THE ARCTIC REGION 1 (2008), http://www.dur.ac.uk/resources/ibru/arctic.pdf; Martin Jakobsson et al., *An Improved Bathymetric Portrayal of the Arctic Ocean: Implications for Ocean Modeling and Geophysical and Oceanographic Analyses*, 35 GEOPHYSICAL RES. LETTERS L07602, at 2 (2008). This difference between current and historical maps of the Arctic is important, because it underscores the fact that the evolving picture of the Arctic is not the one that was originally understood by the drafters and signatories of the Convention.
Recent hydrographic exploration places only two small regions of the Arctic Ocean beyond the sovereignty of the Arctic Coastal states: one small area above the United States and Canada, and another larger region above Norway and Russia. INT'L BOUNDARIES RESEARCH UNIT OF DURHAM UNIV., *supra*, at 1. The pole itself, although disputed under Article 76, is now imagined to be within the jurisdiction of at least one of the Arctic states. *Id.*

82 Christopher Mark Macneil, Note, *Gaining Command and Control of the Northwest Passage: Strait Talk on Sovereignty*, 34 TRANSP. L.J. 355, 356-59 (2007). "The NWP was alternatively known as the Strait of Anián, which was a sixteenth century Spanish name for a passage that was believed to connect the Pacific Ocean and the Atlantic Ocean in the temperate regions of North America. Such a strait does not in fact exist, but for centuries European explorers searched for such a route while at the same time attempting to find an eastern bound passage north of Russia such as a Northeast Passage." *Id.* at 359.

83 This claim has been repeatedly and favorably compared to that at issue in the Anglo-Norwegian Fisheries Case, decided by the ICJ in 1951. *See, e.g.*, Jarashow, *supra* note 13, at 1597-99.

84 *Id.* at 1613-15.

85 Macneil, *supra* note 82, at 366.

86 *Id.*

87 Jarashow, *supra* note 13, at 1594.

88 *See* David A. Colson, *The Delimitation of the Outer Continental Shelf Between Neighboring States*, 97 AM. J. INT'L L. 91, 97 (2003).

89 *Id.*

90 Sean D. Murphy, Contemporary Practice of the United States Relating to International Law Law of the Sea and International Waterways: *U.S. Reaction to Russian Continental Shelf Claim*, 96 AM. J. INT'L L. 969, 969-70 (2002).

91 Jarashow, *supra* note 13, at 1595.

92 *E.g.*, Hjálmar Vilhjálmsson et al., *Fisheries and Aquaculture, in*ARCTIC CLIMATE IMPACT ASSESSMENT 691, 696, 710 (Carolyn Symon et al. eds., 2005).

93 *See* Lee Clark, *Canada's Oversight of Arctic Shipping: The Need for Reform*, 33 TUL. MAR. L.J. 79, 80 (2008).

94 According to the United States Energy Information Administration, Alaska produced 263.6 million barrels of oil in 2007. ENERGY INFORMATION ADMINISTRATION, CRUDE OIL PRODUCTION (2009), http://tonto.eia.doe.gov/dnav/pet/pet_crd_crpdn_adc_mbbl_a.htm.

95 *See* U.S. Geological Survey, *supra* note 5.

96 ENERGY INFORMATION ADMINISTRATION, TABLE 5.2 CRUDE OIL PRODUCTION AND CRUDE OIL WELL PRODUCTIVITY, 1954-2007, http://

www.eia.doe.gov/emeu/aer/txt/ptb0502.html (last visited Nov. 2, 2009).

97 *Id.*

98 ENERGY INFORMATION ADMINISTRATION, STATE ENERGY PROFILES: ALASKA, http://tonto.eia.doe.gov/state/state_energy_profiles.cfm?sid=AK (last visited Nov. 2, 2009).

99 *See*ENERGY INFORMATION ADMINISTRATION, INTERNATIONAL ENERGY STATISTICS, http://tonto.eia.doe.gov/cfapps/ipdbproject/IEDIndex3.cfm?tid=5&pid=53&aid=1 (last visited Nov. 2, 2009).

100 *Id.*

101 *See id. See also* Arne Instanes et al., *Infrastructure: Buildings, Support Systems, and Industrial Facilities, in*ARCTIC CLIMATE IMPACT ASSESSMENT 907, 936-37 (Carolyn Symon et al. eds., 2005).

102 For evidence of popular interest in the USGS Circum-Arctic Appraisal Report, *see, e.g.*, Eoin O'Carroll, *Bright Green Blog: USGS: Arctic Circle Chock Full of Oil and Gas*, CHRISTIAN SCI. MONITOR, July 25, 2008, http://features.csmonitor.com/environment/2008/07/25/usgs-arctic-circle-chock-full-of-oil-and-gas/; Andrew C. Revkin, *Dot Earth Blog: Arctic Gas and Oil Bonanza, but No Energy Fix*, N.Y. TIMES, July 24, 2008, http://dotearth.blogs.nytimes.com/2008/07/24/arctic-gas-and-oil-bonanza-but-no-energy-fix/

103 U.S. Geological Survey, *supra* note 5. The USGS ordinarily uses "discovery process modeling, prospect delineation, and deposit simulation" as opposed to the methodology applied in the 2008 report. *Id.* at 1.

104 *Id.* at 1.

105 *Id.* at 4.

106 *Id.* at 4.

107 *See* Jason C. Nelson, *The Contemporary Seabed Mining Regime: A Critical Analysis of the Mining Regulations Promulgated by the International Seabed Authority*, 16 COLO. J. INT'L ENVTL. L. & POL'Y 27, 69 (2005).

108 *Id.*

109 Samuel Stanke, Note & Comment, *Like Wilderness, but Need Oil? Securing America's Future Energy Act Puts Little Between Accident-Prone Oil Companies and the Arctic National Wildlife Refuge*, 32 ENVTL. L. 905, 909 (2002).

110 *Id.* at 916-18.

111 *See generally* Vilhjálmsson et al., *supra* note 92.

112 *Id.*

113 *Id.*

114 *Id.* at 700-01.

115 *Id.* at 702.

116 *Id.* at 703.

117 Vilhjálmsson et al., however, contend that these statistics "understate the real contribution of the fishing industry to the Icelandic economy" because they do not take into account the "so-called 'backward linkages,' and the various secondary uses of fish products, the so-called 'forward linkages."' Included in these shadow industries are "shipbuilding and maintenance, fishing gear production, the production of fishing industry equipment and machinery, the fish packaging industry, fisheries research, and education" as well as "the transport of fish products, the production of animal feed from fish products, the marketing of fish products, and the retailing of fish products." *Id.* at 723. According to Vilhjálmsson et al., the Arctic fishery, including these additional industries, makes up at least a third of Icelandic GDP. *Id.* Moreover, because of its high export value, Arctic fishing plays an additional and important role in capturing foreign currency, which is necessary for trade. *Id.* Perhaps not surprising given the proximity of the two islands, Arctic fishing plays a similarly crucial role in the Greenland economy. *Id.* at 724.

118 *Id.* at 762.

119 *Id.* at 763. Vilhjálmsson et al. note, however, that "production and value data must be treated with caution until a more robust accounting system is developed." *Id.*

120 *Id.* at 770.

121 *Id.*

122 *Id.* at 741.

123 *E.g.,* Macneil, *supra* note 82, at 359.

124 *Id.* at 360; Jarashow, *supra* note 13, at 1591-92.

125 Jarashow, *supra* note 13, at 1592.

126 Peter Tyson, *Future of the Passage*, NOVA, Feb. 2006, http://www.pbs.org/wgbh/nova/arctic/passage.html.

127 *Id.*

128 *Id.*

129 Macneil, *supra* note 82, at 362.

130 Tyson, *supra* note 126.

131 Jarashow, *supra* note 13, at 1595.

132 *Id.* at 1595 & n.38.

133 Holmes, *supra* note 36, at 323.

134 Murphy, *supra* note 90, at 969-70.

135 In July 2007, Prime Minister Harper announced plans to build eight new ships to patrol the Arctic, as well as a new Canadian port. Press Release, Office of the Prime Minister, Prime Minister Stephen Harper Announces New Arctic Offshore Patrol Ships (July 9, 2007), http://pm.gc.ca/eng/media.asp? id=1742.

136 *See*NORWEGIAN PETROLEUM DIRECTORATE, CONTINENTAL SHELF SUBMISSION OF NORWAY IN RESPECT OF AREAS IN THE ARCTIC OCEAN, THE BARENTS SEA, AND THE NORWEGIAN SEA: EXECUTIVE SUMMARY (2006), http://www.un.org/Depts/los/clcs_ new/submissions_files/nor06/nor_exec_sum.pdf.

137 *See* Stuart B. Kaye, *Legal Approaches to Polar Fisheries Regimes: A Comparative Analysis of the Convention for the Conservation of Antarctic Marine Living Resources and the Bering Sea Doughnut Hole Convention*, 26 CAL. W. INT'L L.J. 75, 97-98 (1995).

138 Lourene Miovski, *Solutions in the Convention on the Law of the Sea to the Problem of Overfishing in the Central Bering Sea: Analysis of the Convention, Highlighting the Provisions Concerning Fisheries and Enclosed and Semi-Enclosed Seas*, 26 SAN DIEGO L. REV. 525, 527 (1989).

139 Kaye, *supra* note 137, at 100.

140 Convention on the Conservation and Management of Pollock Resources in the Central Bering Sea, June 16, 1994, S. TREATY DOC. 103-27, 34 I.L.M. 67.

141 *See* Kaye, *supra* note 137, at 97.

142 *See* Vilhjálmsson et al., *supra* note 92, at 694.

143 *See, e.g.*, Franklyn Griffiths, *The Northwest Passage in Transit*, 54 INT'L J. 189, 190 (1999).

144 *E.g.*, Jarashow, *supra* note 13, at 1596, 1613, 1618-20.

145 *See* Clark, *supra* note 93, at 85-86 (describing the Arctic Waters Pollution Protection Act (AWPPA) as a response by the Canadian legislature to a challenge to Canadian authority over the Northwest Passage by the U.S. oil tanker *Manhattan* when it navigated the Strait of Anián without prior consent).

146 *Id.* at 94-95 (discussing AWPPA and the Canada Shipping Act).

147 David Hest claims that the "Northern Corn Belt is a clear winner under major climate change scenarios that play out through the middle of the century. As the climate warms, this region will be able to successfully support the growing of longer-season corn hybrids and soybean varieties. In general, precipitation will be adequate to allow these more productive cultivars to produce higher yields compared with crops grown in this region

today." David Hest, *Climate Change Winners and Losers*, FARM INDUSTRY NEWS, Dec. 1, 2006, *available at* http://farmindustrynews.corn/mag/farming_climate_change_winners. *See also* Alister Doyle, *News in Science: The Winners and Losers of Climate Change*, AUSTRALIAN BROADCASTING CORP., Apr. 2, 2007, http://www.abc.net.au/science/news/stories/2007/1887303.htm. Doyle leads by noting that "northern nations such as Russia or Canada may be celebrating better harvests and less icy winters in coming decades even as rising seas are washing away Pacific island states." This claim has been recognized by the United Nations: "longer growing seasons and increased rains may boost yields in many temperate regions; records show that the season has already lengthened in the UK, Scandinavia, Europe and North America." United Nations Framework Convention on Climate Change, *Climate Change Information Kit, Sheet 10, Agriculture and food security* (July, 2002), *available at* http://unfccc.int/essential_background/background_publications_htmlpdf/climate_change_information_kit/items/288.php.

148 For a discussion of the irreversibility of climate change, *see*SUSAN SOLOMON ET AL., IRREVERSIBLE CLIMATE CHANGE DUE TO CARBON DIOXIDE EMISSIONS (2008), *available at* http://www.pnas.org/content/106/6/1704.full.

149 *See* Gregg Easterbrook, *Global Warming: Who Loses - and Who Wins?*, ATLANTIC, Apr. 2007, *available at* http:// www.theatlantic.com/doc/print/200704/global-warming. *See also* Thomas Wagner, *Rising Sea Levels Threaten Cities*, ASSOCIATED PRESS, Mar. 28, 2007, *available at* http://dsc.discovery.com/news/2007/03/28/sealevel_pla.html?category=earth&guid=20070328100030.

150 *See* Easterbrook, *supra* note 149.

151 Philippe Cullet, *Liability and Redress for Human-Induced Global Warming: Towards an International Regime*, 26A STAN. ENVTL. L.J. 99, 106-07 (2007).

152 *See generally* U.N. Int'l Law Comm'n, *Draft Articles on Responsibility of States for Internationally Wrongful Acts*, U.N. Doc. A/56/10 (Nov., 2001), *available at* http://untreaty.un.org/ilc/texts/instruments/english/commentaries/9_6_2001.pdf.

153 *See, e.g.*, UNCLOS, *supra* note 14, art. 61.

154 *See, e.g., id.* art. 145.

155 *See, e.g., id.* art. 146.

156 *Id.* art. 288.

157 MOX Plant (No. 10) (Ir. v. U.K.), 126 I.L.R. 259 (Int'l Trib. L. of the Sea 2001).

158 Ved P. Nanda, *International Environmental Norms Applicable to Nuclear Activities, with Particular Focus on Decisions of International Tribunals and International Settlements*, 35 DENV. J. INT'L L. & POL'Y 47, 63 (2006).

159 Agreement regarding compensation for personal and property damage as a result of nuclear tests in the Marshall Islands, U.S.-Japan, Jan. 4, 1955, 6 U.S.T. 1.

160 Nanda, *supra* note 158, at 64.

161 ATOMIC AUDIT: THE COSTS AND CONSEQUENCES OF U.S. NUCLEAR WEAPONS SINCE 1940 409 (Stephen I. Schwartz ed., 1998) [hereinafter ATOMIC AUDIT].

162 *Id.* at 410.

163 Trail Smelter (U.S. v. Can.), 3 R.I.A.A. 1905 (Arb. Trib. 1941).

164 *Id.* at 1965.

165 *Id.* at 1907.

166 *See generally* Megan L. Wagner, *Jurisdiction by Estoppel in the International Court of Justice*, 74 CAL. L. REV. 1777 (1986) (discussing specific instances and negative consequences of the ICJ exerting jurisdiction by estoppel).

167 *See, e.g.*, Tomimaru (No. 15) (Japan v. Russ.), 46 I.L.M. 1185, at para. 24 (Int'l Trib. L. of the Sea, 2007); Juno Trader (No. 13) (Saint Vincent and the Grenadines v. Guinea-Bissau), 128 I.L.R. 267, at para. 38 (Int'l Trib. L. of the Sea 2004); Hoshinmaru (No. 14) (Japan v. Russ.), at para. 29 (Int'l Trib. L. of the Sea 2007), *available at* http://www.itlos.org/case_documents/2007/document_en_295.pdf. The judgments and other case materials of the International Tribunal for the Law of the Sea are available online at the Tribunal's website, http://www.itlos.org.

168 Southern Bluefin Tuna (Nos. 3 and 4) (N.Z. v. Japan; Austl. v. Japan), 117 I.L.R. 148, at para. 72 (Int'l Trib. L. of the Sea 1999).

169 *Id.* at para. 90. Specifically, the Tribunal ordered that Australia, New Zealand, and Japan (1) take no action to aggravate the situation, (2) limit their future catches, (3) cease their

"experimental fishing program[s]," and (4) resume negotiations to reach a permanent treaty. *Id.*

170 Volga (No. 11) (Russ. v. Austl.), 42 I.L.M. 159, at para. 32 (Int'l Trib. L. of the Sea 2002).

171 *Id*.

172 *Id*. at paras. 35, 38.

173 *Id*. at paras. 1,44,46.

174 *Id*. at para. 95.

175 *See generally* Adrienne J. Oppenheim, *The Plight of the Patagonian Toothfish: Lessons from the* Volga *Case*, 30 BROOK. J. INT'L L. 293 (2004) (arguing that ITLOS' interpretation of UNCLOS articles 73(2) and 292 in the *Volga* case will impede conservation efforts).

176 Volga, 42 I.L.M. 159, at para. 83.

177 Oppenheim, *supra* note 175, at 304.

178 PHEOBE N. OKOWA, STATE RESPONSIBILITY FOR TRANSBOUNDARY AIR POLLUTION IN INTERNATIONAL LAW 192 (2000).

179 *See*ATOMIC AUDIT, *supra* note 161, at 409. *See also*XUE HANQIN, TRANSBOUNDARY DAMAGE IN INTERNATIONAL LAW 87 n.50 (2003).

180 ATOMIC AUDIT, *supra* note 161, at 409-11.

181 Churchill, *supra* note 10, at 108-09.

182 *Id*. at 109-10.

183 *See, e.g.*, Macneil, *supra* note 82.

184 Churchill, *supra* note 10, at 116.

185 *Id.*

186 *Id.* at 116-17.

187 Cullet, *supra* note 151, at 107.

188 *See, e.g.*, UNCLOS, *supra* note 14, art. 61.

189 *See, e.g., id.* art. 61.

190 *See, e.g., id.* art. 145.

191 *See North American Free-Trade Agreement (NAFTA) and Supplemental Agreements to the NAFTA: Hearing on H.R. 1403 before the Subcomm. on Trade of the H. Comm. on Ways and Means*, 103d Cong. 368 (1993) (statement of Stewart J. Hudson, Legislative Representative, National Wildlife Federation) (describing as "unprecedented" the fact that NAFTA would make lax enforcement of environmental laws actionable).

192 Convention on International Liability for Damage Caused by Space Objects, Mar. 29, 1972, 24 U.S.T. 2389, 2392, 961 U.N.T.S. 187, 189.

193 Van C. Ernest, *Third Party Liability of the Private Space Industry: To Pay What No One Has Paid Before*, 41 CASE W. RES. L. REV. 503, 518 (1991).

194 Okowa, *supra* note 178, at 113.

195 JUTTA BRUNNEE ET AL., INTERNATIONAL LAW: CHIEFLY AS INTERPRETED AND APPLIED IN CANADA 642 (Hugh M. Kindred & Phillip M. Saunders eds., 7th ed. 2006).

196 *Id.*

197 Nanda, *supra* note 158, at 62.

198 Canada: Claim against the Union of Soviet Socialist Republics for Damage Caused by Soviet Cosmos 954, 18 I.L.M. 899, 907 (1979).

199 *See* Nanda, *supra* note 158, at 63.

200 Stephen A. Mirmina & David J. Den Herder, *Nuclear Power Sources and Future Space Exploration*, 6 CHI. J. INT'L L. 149, 155 (2005).

201 *Id*.

202 *See id.* at 156.

203 *Id*. at 153.

204 *Id.* at 152.

205 *But cf.* Michael W. Taylor, *Trashing the Solar System One Planet at a Time: Earth's Orbital Debris Problem*, 20 GEO. INT'L ENVTL. L. REV. 1, 46-47 (2007) (warning that "the Liability Convention is ineffective at preventing and providing redress for the damages caused by orbital debris.").

206 Justin L. Koplow, Note, *Assessing the Creation of a Duty Under International Customary Law Whereby the United States of America Would be Obligated to Defend a Foreign State Against the Catastrophic but Localized Damage of an Asteroid Impact*, 17 GEO. INT'L ENVTL. L. REV. 273, 290-91 (2005).

207 *See, e.g.*, Ernest, *supra* note 193, at 507-14.

208 *See* Nanda, *supra* note 158, at 63.

209 *Id. See also* Taylor, *supra* note 2055 (discussing the prevalence of liability rules in international space law).

210 Sean Cumberlege, *Multilateral Environmental Agreements: From Montreal to Kyoto - A Theoretical Approach to an Improved Climate Change Regime*, 37 DENV. J. INT'L L. & POL'Y 303, 304, 326 (2009).

211 Scott Barrett, *International Cooperation and the International Commons*, 10 DUKE ENVTL. L. & POL'Y F. 131, 142-44 (1999); David G. Victor, *Enforcing International Law: Implications for an Effective Global Warming Regime*, 10 DUKE ENVTL. L. & POL'Y F. 147, 161 (1999).

212 *See* VanderZwaag et al., *supra* note 34, at 156.

213 *See* U.S. Geological Survey, *supra*, note 5.

214 According to the U.S. Energy Information Administration, 90 billion barrels of oil is an amount nearly equal to the total of three years of oil consumption at 2007 levels. *See*ENERGY INFORMATION ADMINISTRATION, INTERNATIONAL PETROLEUM (OIL) CONSUMPTION, WORLD PETROLEUM CONSUMPTION, ANNUAL ESTIMATES, 1980-2008, Oct. 6, 2009, http:// www.eia.doe.gov/emeu/international/RecentPetroleumConsumptionBarrelsperDay..

215 The Arctic is already becoming a legal battlefield over global warming issues. In February of 2008, the city of Kivalina, Alaska, sued ExxonMobil and a group of power and coal producers in a San Francisco federal court. Associated Press, *Alaska Town Sues Over Global Warming*, USA TODAY, Feb. 27, 2008, *available at* http://www.usatoday.com/news/nation/2008-02-26-alaska-lawsuit_N.htm. The Alaskan native town claims that erosion caused by global climate change will incur relocation costs of more than $400 million. *Id.* Similar suits have been brought or threatened by the Inuit Circumpolar Conference before the Inter-American Commission on Human Rights and by the Pacific Island of Tuvalu. *See* Richard Black, *Inuit Sue U.S. Over Climate Policy*, BBC NEWS, Dec. 8, 2005, *available at* http:// news.bbc.co.uk/2/hi/sci/tech/4511556.stm; S. Fred Singer, *Island Nation May Sue U.S. Over Global Warming*, ENV'T. & CLIMATE NEWS, Jul. 1, 2002, *available at* http://www.heartland.org/publications/environment%20climate/article/904/Island_ nation_may_sue_US_over_global_warming.html.

216 *See* Black, *supra* note 215.

217 *E.g.*, TIM FLANNERY, THE WEATHER MAKERS: HOW MAN IS CHANGING THE CLIMATE AND WHAT IT MEANS FOR LIFE ON EARTH 30 (2005).