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The University of Arizona.

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Introduction

The Antarctic Treaty System, which evolved out of the Antarctic Treaty of 1959, has provided a largely successful governance regime over economic resource utilization in the Antarctic polar region for over half a century. Meanwhile, at the top of planet earth, the Arctic polar region is experiencing a rapidly changing resource use pattern that will present significant challenges to its largely unstructured governance regime during the years ahead.

Given such dramatic recent changes in the dimensions of Arctic economics, this study examines the possible relevance of the Antarctic Treaty System as a model for the development of a governance regime in the Arctic that can efficiently guide the future utilization of its rich and largely untapped natural resources. Although this topic is both large and complex, the author believes that an organized synopsis of the main issues, based upon known facts and their economic underpinnings, may contribute to the growing dialogue on the subject. It is with this modest intent that the following paper is written.

SECTION 1

Climate Change, Economic Change, and Challenges to Arctic Governance

Defining the circumpolar regions

The polar sectors of the planet consist of the areas surrounding its two geographical poles. The North Pole, which is located in the Arctic Ocean, is the center of the Arctic circumpolar region—defined as the area north of 60 degrees north latitude (figure 1). The South Pole, which is located on the continent of Antarctica, is the center of the Antarctic circumpolar region—defined as the area south of 60 degrees south latitude (figure 2). Both regions are dominated by polar ice caps.

Climate change and economic change in the Arctic circumpolar region

At the present time, due to the phenomenon of climate change and global warming, the Arctic Ocean is transforming from a continuously ice-covered state to a body of water that will become seasonally ice free sometime during the next several decades. During the summer of 2012, the amount of ice in the Arctic Ocean reached its lowest level on record (Gillis 2012). In the meantime, the increase in surface temperatures in the region is generally melting ice and glaciers and, moreover, causing tundra ecosystems to transition from sinks to sources of carbon emissions (greenhouse gases)—the consequence being a worsening of the global warming problem (Arctic Governance Project 2010). A number of significant economic effects are resulting from this epic environmental transition (Arctic Governance Project 2010; Bellona 2008; Conway 2008; Dodds 2010; *The Economist* 2012).

One major economic outcome from this huge natural (albeit, human-caused) Arctic economic transformation is that the melting ice will create new accessibility to rich deposits of oil, gas, and other minerals in the Arctic region. Also, increased access to timber deposits has the potential of a large output increase in the forestry industry. Moreover, the fisheries industry will have increased access to a much larger area of water for its marine harvesting

Figure 1. The Arctic region
Source: CIA World Factbook
https://www.cia.gov/library/publications/the-world-factbook/docs/refmaps.html

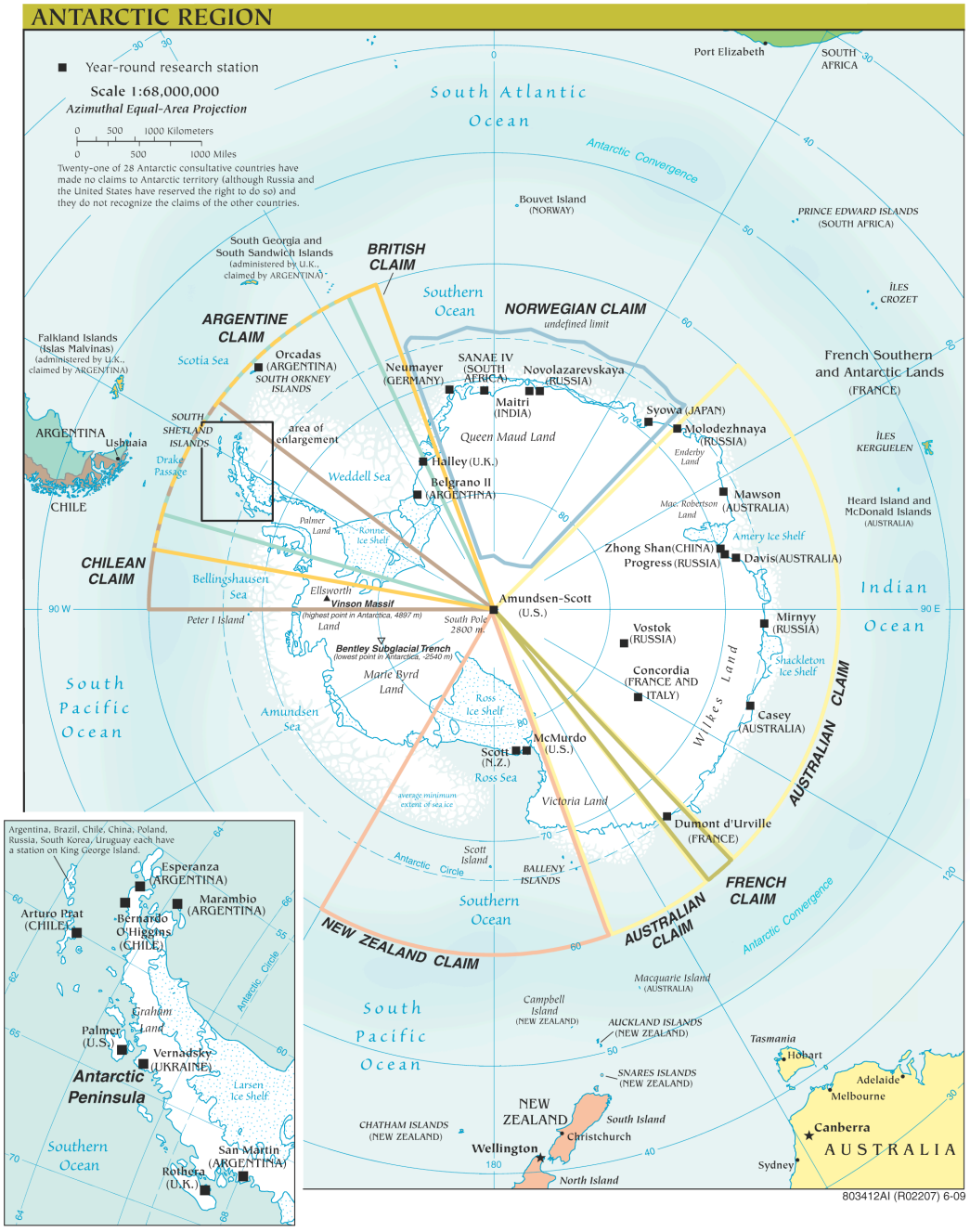

Figure 2. The Antarctic region
Source: CIA World Factbook
https://www.cia.gov/library/publications/the-world-factbook/docs/refmaps.html

activities. Furthermore, the tourism industry will be enhanced by both increased access to tourist sites as well as by the overall increase of economic activity in the region.

In the meantime, the melting ice will make possible new trans-Arctic shipping routes, which will sharply reduce the ocean shipping distance between Europe and Asia (Seibt 2012). Significantly, the continued growth of economic globalization will reinforce these potent changes in the economic parameters of the Arctic region, especially by increasing the demands for the outputs of the Arctic industries, which have been directly impacted by global warming and the melting ice that has resulted.

New challenges to Arctic governance

Inevitably, such crucial changes in the dimensions of Arctic economics raise fundamental questions regarding the adequacy of the existing Arctic governance structure to deal with these important changes. Moreover, as will be emphasized in the discussion below, whatever occurs in the Arctic region not only directly affects the landscapes and human inhabitants of Arctic nations but, also, indirectly affects all world nations via the presence of important economic externalities between nations. Meanwhile, the early years of this momentous economic change in the Arctic have been politically stable under the existing, though unwieldy, supranational governance structure of the Arctic region. Nonetheless, it is prudent to ask whether these existing political institutions are capable of dealing effectively with the difficult challenges that lie ahead.

An early warning signal of emerging challenges to the existing Arctic governance regime—which hereafter in the paper is referred to as the Arctic Government[1]—is reflected by the recent increase in military interests shown by the eight nations officially associated with the current governmental regime. These nations are: Canada, Denmark (also, representing Greenland and the Faroe Islands), Finland, Iceland, Norway, Russia, Sweden, and the United States.

For example, during early-to-mid 2012: Norway led one of the largest Arctic maneuvers ever undertaken, involving more than 16,000 troops from fourteen nations, who trained on ice for a wide variety of purposes ranging from

[1] The institutions and structure of the existing Arctic Government will be described in Section 2, pages 11–14.

preparation for high intensity warfare to terrorist threats; Denmark, Canada, and the United States conducted a major exercise during the first half of 2012; and the top military officers of the eight Arctic nations met to discuss security issues in the region (Talmadge 2012). Further evidence that military interests in the Arctic region are increasing is indicated by such events as the decision by Canada to purchase ice-breaking patrol vessels, the rebuilding by Russia of its northern fleet, and the increasing interest in the Arctic region shown by the North Atlantic Treaty Organization (NATO; *The Economist* 2012).

Thus, despite the political stabilization accomplishments of the Arctic Government to this point of time, fears of Arctic military clashes remain a long-run concern. For example, in 2010, the top officer of NATO in Europe warned, for now, the disputes in the north have been dealt with peacefully, but climate change could alter the equilibrium.[2] In addition, the Russian ambassador to NATO has observed that the development of the Arctic region will involve a rebalancing of large interests.[3] In the wake of such concerns, it may be observed that the centerpiece of the existing Arctic Government, the Arctic Council,[4] was not designed to be a comprehensive regional decision-making forum but, instead, its primary mission is to promote natural resource conservation, scientific research, and sustainable economic development in the Arctic region.

Moreover, given the scenario of large increases in the number of ships and workers in the Arctic region resulting from the oncoming economic expansion—leading to an increased possibility of such catastrophic events as the sinking of a cruise ship or a major oil spill—can the present Arctic Government be expected: (1) to provide the level of regulatory authority that would reduce the risks of such events, or (2) to effectively respond to such events, if they do occur? While much remains to be done in this regard, the Arctic Council did take an important proactive step in this direction in 2011.[5]

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[2] Statement made by James Stavridis, an American admiral, in *The Economist*, June 16, 2012.

[3] Statement made by Dmitry Rogozin in *The Economist,* June 16, 2012.

[4] The Arctic Council will be described in greater detail in Section 2, pages 11–12.

[5] The first binding agreement between member nations of the Arctic Council, the Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic (or Arctic Search and Rescue Agreement), was signed on May 12, 2011, in Nuuk, Greenland.

SECTION 2

Comparisons Between the Arctic and Antarctic Regions

A detailed comparison of the major features of the Arctic and Antarctic circumpolar regions will be useful to answer the fundamental question posed in this paper, namely: *Can the existing Antarctic Government serve as a valuable model for helping the existing Arctic Government deal with the momentous economic changes that are now occurring in the Arctic region?*

In that regard, the following discussion presents the major similarities and differences that exist between the two regions in reference to their physical, demographic, economic, and government characteristics.[6]

Physical comparisons

Several important physical (natural) differences exist between the two circumpolar regions. One such difference is that Antarctica is a continent surrounded by an ocean (the Southern Ocean), while the Arctic is an ocean (the Arctic Ocean) surrounded by land (the northern edges of North America, Asia, and Europe). As observed above, there are eight nations in the Arctic region. Seven of these nations lie on the periphery of the region and only Iceland is totally within the region. The Arctic and Antarctic are roughly the same size (approximately 5.4 million square miles), but the land surface of the Antarctic is much greater since it is an ice-covered continent while the Arctic is largely an ice-covered oceanic basin (Dawson 1998). Meanwhile, Antarctica is the fifth largest of the earth's seven continents. Another important difference between the two circumpolar regions is that Antarctica is an integral part of the global natural systems that comprise the global commons, via its strategic interaction with the global atmosphere and oceans.[7]

Meanwhile, in terms of physical similarities. both the Antarctic and Arctic regions have surface temperatures that are consistently below freezing. Yet, Antarctica, with an average temperature of minus-58 degrees Fahrenheit at the

[6] These attributes are summarized in Table 1 (see page 17).

[7] Regarding Antarctica as "an integral part of global natural systems," see Drewry (1988) and Joyner (1998).

South Pole, is much colder than the Arctic, which has an average temperature of 0 degrees Fahrenheit at the North Pole. Not surprisingly, both regions have glaciers and icebergs. Regarding precipitation, both regions are generally dry and include locations that are among the most arid places on earth. Importantly, the climate change and global warming phenomenon—a topic vital to the analysis of the present paper—exerts significant effects on both circumpolar regions.

Demographic comparisons

There are two major demographic differences between the circumpolar regions that have significant implications for the present discussion. First, Antarctica has no permanent residents and, thus, has no Indigenous population. On the other hand, the Arctic has four million permanent residents, 350,000 (about 10 percent) of whom are Indigenous peoples. Meanwhile, the only inhabitants of Antarctica are temporary inhabitants, consisting of scientists and their support personnel.

A second major difference between the two regions is that Antarctica has no sovereign nations nor recognized national sovereignty in its continental territory; while, by contrast, the Arctic is home to eight sovereign nations in the region. Although it is true that seven nations (Argentina, Australia, Chile, France, New Zealand, Norway, and the United Kingdom) have historic territorial claims in Antarctica, these claims were neutralized by Article IV of the Antarctic Treaty. Article IV states that the treaty, while it is in force, does not recognize, dispute, nor establish territorial sovereignty claims and that no new claims shall be asserted.

Economic comparisons

One important economic similarity between the Antarctic and Arctic circumpolar regions is the nature of the production mix between the three fundamental economic inputs or factors of production—land (natural resources), labor, and capital. In this case, each region is characterized by the dominance of the land (natural resources) input relative to the labor and capital inputs. In other words, the primary industries of the two circumpolar regions are land-intensive, rather than labor-intensive or capital-intensive, in their production of economic outputs.

Another economic similarity between the two regions is that the commercial fishing (fisheries) and tourism industries are part of the economies of each region. These industries are heavily dependent upon natural resources as a primary input for their economic outputs. More than 40 percent of global commercial fisheries are located in the Arctic, which includes the harvesting of such fish as cod, pollock, and whitefish. Fishing is generally less important as a commercial industry in Antarctica, but various species are harvested in the Southern Ocean. Meanwhile, both regions have an active tourist industry, the larger of the two being that of the Arctic region.

In the terminology of economics, the type of economic good (product) provided by the aforementioned industries (fisheries and tourism) is classified as a private good since its primary benefits are subject to market pricing. Yet, economic goods of this type are not considered to be pure private goods because their production often results in significant negative externalities in the form of harmful impacts on the environment. Such environmental externality costs tend to escape market pricing, which leads to allocation inefficiencies in economic output. Therefore, the economic output of the fisheries and tourism industries may be more precisely defined as quasi-private goods.

Meanwhile, an important economic difference between the two regions is the fact that the Arctic region supplies four additional, quasi-private, economic goods, which goods are not produced in Antarctica. These additional Arctic commercial industries are: forestry, mining, oil and gas production, and international shipping routes.

For example, the Arctic has considerable forests and an active forestry industry producing wood products. By contrast, there are no forests in Antarctica. Secondly, even though both regions have deposits of various types of minerals (with the Arctic having a greater amount of such deposits), only the Arctic has an active mining industry that is exploiting these natural resources. In sharp contrast, mining is prohibited in Antarctica.[8] Thirdly, the Arctic has a very active oil and gas production industry, but this economic activity is prohibited in Antarctica, as part of the mining ban in that region. Furthermore, a fourth quasi-

[8] A 50-year ban on mining was instituted in Antarctica as part of the Environmental Protocol to the Antarctic Treaty (signed in 1991; ratified in 1998).

private economic good that is an active part of the present Arctic economy, but which has no similar presence in the economy of Antarctica, is that of major international and intercontinental maritime shipping routes. At the present time, the Arctic region has one noteworthy shipping route—the Northwest Passage in Canada. However, the massive ice melting now underway in the Arctic region gives promise for the development of several new and important trans-Arctic shipping routes in the years ahead.

Since their benefits can be priced, the private sector plays an important role in the production of these quasi-private goods in the circumpolar regions: fisheries and tourism in Antarctica; fisheries, tourism, forestry, mining, oil and gas production, and international shipping routes in the Arctic. Nonetheless, the presence of considerable unpriced negative externalities in their production, stemming primarily from their natural resources link, suggests the need for some form of government involvement in their supply in order to internalize such externalities in an efficient manner. Government involvement in the supply of a quasi-private good may take a variety of forms, including influence on the price and/or output of the good produced by the private sector or, in some cases, actual production of the good by the public sector.

Next, turning our discussion to the output of public goods, it may be observed that both the Antarctic and Arctic regions presently supply two important, collectively consumed, public goods.[9] One such public good is political stability or peace. Another public good supplied by the two regions is science. However, the degree and manner of involvement by which the Arctic and Antarctic regions are involved in the supply of the public goods, peace and science, varies greatly—an important point that will be considered in Section 3 of the paper.[10] Finally, as observed earlier, though the Arctic is important in terms of its contributions and effects on the global environmental system, Antarctica is a more crucial natural component of the global commons and, as such, participates

[9] A public good is characterized by benefits that can be consumed by individuals in a nonrival manner, that is, the benefits of the good can be consumed collectively or jointly by two or more individuals, with consumption by one individual not excluding consumption by one or more other individuals. The result of this feature of a public good is an incentive for free-rider behavior by each consuming individual and, thus, making it difficult or impossible to price the good and produce it for a profit. Hence, government involvement in its supply is normally forthcoming, especially if the good is of a necessary (non-luxury) nature.

[10] See also the detailed discussion and disntinctions of public goods, private goods, and the commons of Antarctica in Herber (2007), pages 17–29.

in a vital physical interface with the other two, fundamental, global natural systems—the global atmosphere and global oceans.

Government comparisons

The Arctic government

At the present time, the primary components of the Arctic Government consist of the Arctic Council and the United Nations Convention on the Law of the Sea (Law of the Sea Treaty). Also, various other governmental entities perform important roles—such as the International Maritime Organization, which establishes voluntary guidelines for ships operating in the Arctic Ocean.

The Arctic Council[11] is an intergovernmental body created in 1996 by the eight Arctic nations via an international agreement of the non-treaty variety. Thus, it is a form of international law that does not possess direct or binding legal authority. In addition to members from the eight founding nations, six organizations representing Indigenous peoples have Permanent Participant status on the Council with full consultation rights with regard to Council negotiations and decisions.[12]

The Council has been successful in generating policy-relevant knowledge about the Arctic region and in bringing Arctic issues to worldwide attention (Berkman and Young 2009). Even though the Council is the most comprehensive (wide-ranging) component in the current Arctic Government, it does not provide umbrella coverage of all major governmental functions and responsibilities and, moreover, it lacks the level of authority that would be provided by international treaty-status. Nonetheless, in 2011, it did demonstrate the indirect ability to help establish a binding international treaty relevant to the Arctic region, namely, the Arctic Search and Rescue Agreement, which requires Arctic Council nations to coordinate with each other in the event of a catastrophic event such as a cruise ship sinking or major oil spill.[13]

[11] The Ottawa Declaration established the Arctic Council in 1996.

[12] The Permanent Participants of the Arctic Council include the Arctic Athabaskan Council, Aleut International Association, Gwich'in Council International, Inuit Circumpolar Council, Russian Arctic Indigenous Peoples of the North, and Saami Council; for more information, see www.arctic-council.org.

[13] See footnote 5.

The Arctic Council has for its membership the eight Arctic nations, a condition for membership being the sovereign ownership of territory in the Arctic region. Hence, the Council, exclusively, is a northern circumpolar body since no other nation would meet this geographical criterion. It addresses a wide spectrum of Arctic-related issues, especially those concerned with such matters as environmental protection, sustainable economic development, and shipping routes. Meetings of the Council convene every six months. Representatives at these meetings are high-level officers of the eight member nations. At the end of each two-year period, a ministerial-level meeting is held, which concludes the work of the Council for that period. Then, a Declaration is released, which summarizes the past work and future plans of the Council. Such a declaration is non-binding, unlike the binding status of an agreement reached under an international treaty.

As mentioned earlier, the Arctic Council provides representation for the Indigenous population of the region, though not on an equal basis with that of the eight sovereign member nations. Also, Permanent Observer status to the proceedings of the Council is open to non-Arctic nations, intergovernmental and inter-parliamentary organizations, and non-government organizations that the Council determines can contribute to its work. At the present time, six non-Arctic nations (France, Germany, the Netherlands, Poland, Spain, and the United Kingdom), nine intergovernmental and inter-parliamentary organizations, and 12 non-government organizations have been granted this status.

In addition, twelve nations and organizations have applied for Permanent Observer status, including China, India, Italy, Japan, Singapore, South Korea, and the European Union. Ad hoc observer status, which requires specific permission to attend each Council meeting, may be granted to such applicants and to other interested nations and organizations. The Council does not have a permanent secretariat, but it is presently working toward that goal.

Meanwhile, the second major component of the present Arctic Government, the global Law of the Sea Treaty,[14] has been ratified by all Arctic nations, except the United States.[15] This treaty significantly modifies the geographical coverage of

[14] United Nations Convention on the Law of the Sea, signed in 1982; ratified in 1994.

[15] However, the United States, in general, subscribes to its provisions.

the historic freedom of the seas tenet in 36 percent of the global oceans by granting sovereign property rights to coastal nations over waters extending 200 (nautical) miles offshore.[16] This 200-mile zone of sovereignty for coastal nations is designated as an Exclusive Economic Zone (EEZ).

This EEZ provision is in sharp contrast to the policy provided by the Law of the Sea Treaty for the remaining 64 percent of the global oceans—known as the high seas. Under the treaty, no sovereign nation can hold property rights on the high seas to either marine resources (above the deep seabed), nor to mineral resources (beneath the deep seabed). However, the treaty does provide: (1) a framework for the negotiation of separate international treaties directed toward the efficient harvesting of marine resources above the deep seabed, and (2) creates a supranational government body—the International Seabed Authority—to manage the exploitation of mineral resources beneath the deep seabed of the high seas. These provisions of the Law of the Sea Treaty have significant implications for the utilization of natural resources in the Arctic region.

Hence, the Law of the Sea Treaty—though global rather than regional in scope—is highly relevant in determining property rights over the waters of the Arctic Ocean and, as such, provides an important, though noncomprehensive, cog in the Arctic governance regime. In other words, it grants sovereignty to Arctic coastal nations over marine and mineral resources in the Arctic Sea, within their adjacent 200-mile Exclusive Economic Zones—inclusive of their continental shelves.[17] The EEZ coastal nations in the Arctic region are: Canada, Denmark, Norway, Russia, and the United States. Meanwhile, the treaty retains the historic tenet of free access by all world nations to the marine resources of the high seas (above the deep seabed), while granting a shared global ownership of the mineral resources below the deep seabed.[18]

Indeed, the existing Arctic Government is complex in that two, highly differentiated, governmental institutions possess the primary regulatory

[16] Under the Law of the Sea Treaty, all nations retain the traditional high seas freedoms of navigation, overflight, and the right to conduct military exercises within the EEZ of a coastal nation.

[17] The delimiting of continental shelves, under the authority of the Law of the Sea Treaty, is currently a matter under intense discussion.

[18] At times, especially in the latter half of the twentieth century, such global ownership of shared or collectively consumed natural resources has been referred to as the common heritage of mankind principle.

authority[19] over the use of its economic resources: (1) the weaker, non-treaty-based, wider-ranging, authority of the Arctic Council, and (2) the stronger, treaty-based, specialized, authority of the Law of the Sea Treaty over oceanic policies. However, the Law of the Sea Treaty does clarify the issue of sovereign property rights to the 200-mile EEZs of the Arctic Ocean by granting such rights to the five coastal nations in the Arctic region—as it does for all other coastal nations in the world. Meanwhile, before reaching conclusions as to whether the existing Arctic Government could benefit by using the government of its counterpart circumpolar region in Antarctica as a model, it is important to review the major features of this supranational government regime at the bottom of the planet—the Antarctic Treaty System.

The Antarctic Treaty System

A coordinated group of international treaties, known as the Antarctic Treaty System (ATS), is the nucleus of the present governance regime for the southern circumpolar region. The foundation agreement for this supranational government body is the Antarctic Treaty, which was adopted in 1959 and ratified in 196l. Subsequent additions or protocols to this treaty have resulted in the formation of the present treaty system.[20] These are:

- Convention for the Conservation of Antarctic Seals (ratified in 1978)
- Agreed Measures for the Conservation of the Antarctic Fauna and Flora (ratified in 1982)
- Convention on the Conservation of Antarctic Marine Living Resources (ratified in 1982)
- Protocol on Environmental Protection to the Antarctic Treaty (ratified in 1998)

At the time of its origin, the Antarctic Treaty had twelve signatory nations: Argentina, Australia, Belgium, Chile, France, Japan, New Zealand, Norway, South Africa, the Soviet Union, the United Kingdom, and the United States—

[19] There are a number of other lesser agreements, international treaties, and organized entities, which bear upon overall Arctic government policies that are not described in this paper. However, if these were itemized, they would reveal an even more unwieldy and complex governance regime than is described herein.

[20] For a more details about the components of the Antarctic Treaty System, see Herber (2007), pp. 13 and 33–40.

[21]with seven of these nations having territorial claims on the continent that were neutralized, and placed in moratorium status, by the treaty.[22] Presently, ATS has 50 member nations, which together comprise more than 80 percent of the world's population and include all of its major industrial and developing nations. As a result, the ATS is a truly global supranational government.

The Antarctic Treaty designates Antarctica as a region of peace, while emphasizing scientific research and the preservation of the Antarctic environment. It prohibits military activity, nuclear explosions, and the disposal of radioactive wastes in Antarctica. Unlike the other six continents, Antarctica has neither sovereign territories nor citizens of permanent residence. The absence of such commonplace, socio-political features is consistent with the inherent natural resource characteristics of Antarctica, which incorporate it into the global commons due to its strategic interaction with the global atmosphere and global oceans.

The principal environmental management policies carried out by ATS are those derived from (1) the Convention for the Conservation of Antarctic Marine Living Resources (CAMLR Convention), and (2) the Protocol on Environmental Protection to the Antarctic Treaty (Environmental Protocol). Fishing in the Southern Ocean is managed under the CAMLR Convention by an international commission (CCAMLR) that utilizes an arrangement of annual fishing quotas, licenses, inspectors on fishing vessels, and satellite surveillance. In addition, CCAMLR coordinates, in a highly successful manner, the extensive scientific research activities undertaken in Antarctica via its Scientific Committee on Antarctic Research (SCAR). Meanwhile, the Environmental Protocol provides a comprehensive mandate for protecting the environment. This mandate includes the regulation of tourism in Antarctica, which has been somewhat successful to this point of time. The Committee for Environmental Protection (CEP), an entity of the Environmental Protocol, plays a key role in the functioning of the overall environmental mandate.

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[21] The source for this is Wikipedia at http://en.wikipedia.org/wiki/Antarctica_(region); see also the CCAMLR website at http://www.ccamlr.org/en/organisation/camlr-convention.

[22] See the description of these neutralized sovereignty claims in Section 1, page 8; see also Herber (2007), pages 10–12.

The Antarctic Treaty System holds annual meetings for the administration and management of the region. These meetings are known as Antarctic Treaty Consultative Meetings (ATCMs), with only sixteen of the nations—known as Consultative Parties—having the right to participate in actual decision making at the meetings. However, all 50 member nations may attend the meetings and participate, indirectly, in the decision-making process. The attainment by sixteen nations of Consultative Party status, which gives them voting power at the ATCMs, is based upon a nation being either (1) a signatory nation to the original Antarctic Treaty, and/or (2) the demonstration of having accomplished substantial scientific research in Antarctica. The Antarctic Treaty System has a permanent secretariat in Buenos Aires, Argentina.

For over fifty years, the Antarctic Treaty System has provided a politically stable, scientifically successful, and environmentally friendly, governance regime in the southern circumpolar region. Even though various policy problems remain, especially in environmental areas such as fisheries and tourism, the overall performance of the Antarctic Treaty System in governing an entire continent has been impressive. It provides an integrated and comprehensive governance umbrella for Antarctica that is based upon the highest level of authority offered under the prevailing tenets of international law—the international treaty mechanism.

However, even at this highest level of supranational government, the treaty system is constrained in its overall decision-making authority—as is any treaty-established government—by the fact that a treaty government is a nonsovereign decision-making body, which does not possess the equivalent, direct, decision-making authority that is held by a sovereign nation. In other words, there is no sovereign decision-making authority above the nation-state level of government on the planet.

SECTION 3

The Antarctic Treaty System as a Model for Arctic Government

Similarities and differences between the Arctic and Antarctic regions

The comparisons between the two circumpolar regions made in Section 2 are summarized in Table 1. Obviously, a knowledge of these major similarities and differences between the Arctic and Antarctic regions will prove helpful in reaching conclusions regarding the relevance of the Antarctic Treaty System for the formation of an Arctic Government that can deal effectively with the considerable economic changes now occurring in the Arctic region. Most of these comparisons reveal that important differences exist between the two regions.

Table 1. Comparative characteristics of the Arctic and Antarctic regions

CATEGORY	ARCTIC REGION	ANTARCTIC REGION
PHYSICAL	Water (Arctic Ocean) surrounded by land (parts of three continents)	Land (continent) surrounded by water (Southern Ocean)
	Not part of global commons	Part of global commons
	Significant global warming effects	Significant global warming effects
DEMOGRAPHIC	4 million permanent residents	No permanent residents
	350,000 Indigenous people	No Indigenous people
ECONOMIC	Land-intensive production mix	Land-intensive production mix
	Quasi-private goods: fisheries, tourism, forestry, oil & gas production, mining, international shipping routes	Quasi-private goods: fisheries, tourism
	Public goods: peace, science	Public goods: peace, science
GOVERNMENT	8 sovereign nations	No recognized sovereignty
	Non-comprehensive regional government	Comprehensive regional government
	Non-treaty regional government	Treaty-based regional government

In terms of physical characteristics, the two regions are very different in that the Arctic region consists of water (the Arctic Ocean) surrounded by land (the peripheries of three continents), while the Antarctic region consists of land (a Continent) surrounded by water (the Southern Ocean). Another notable difference between the regions is that the Antarctic region is an integral part of the global commons, via its strategic natural interaction with the global atmosphere and oceans, while the Arctic region—though environmentally important to global natural systems—is not considered to be an integral part of the natural systems of earth that comprise the global commons. Meanwhile, the two regions share the important physical similarity that finds each region to be significantly impacted by the climate change and global warming phenomenon.

In terms of demographic characteristics, the two regions, also, are very different. The Arctic region has four million permanent residents, but the Antarctic region has no permanent residents. Moreover, the Arctic region has a population of 350,000 Indigenous residents, including more than thirty different groups of Indigenous people, while the Antarctic region has no Indigenous residents.

In terms of economic characteristics, the two regions exhibit an interesting mixture of major similarities and differences. One similarity is that the mix of production inputs is land-intensive in both the Arctic and Antarctic regions, due to the plentitude of natural resources in each region. Moreover, both regions are similar in that their regional economies produce a number of private, market-type, economic goods. These goods, technically, are classified as quasi-private goods because of the important environmental externalities that their outputs entail. However, an important economic difference between the regions is that the Arctic is much more involved than the Antarctic in the output of these quasi-private goods. While the fisheries and tourism industries are found in both the Arctic and Antarctica, the Arctic region, in addition, is host to the forestry, oil and gas production, mining, and international shipping industries.

Meanwhile, in terms of public goods, the benefits of which are collectively or jointly consumed by many people in a nonrival consumption manner, the Arctic and Antarctic regions are similar in that each supplies the public goods: peace (political stability) and science (scientific research). However, the two regions are very different in terms of the manner and degree to which each of these public goods is involved in the economies of the respective regions.

For example, the Antarctic Treaty System has both peace and science as primary reasons for its existence. Article I of the treaty stipulates that the area is to be used for peaceful purposes only, and prohibits both military activity and weapons testing. Thus, Antarctica is a demilitarized continent. In addition, Article V of the treaty prohibits nuclear explosions and the disposal of radioactive wastes. Thus, Antarctica is a denuclearized continent, as well. By contrast, even though the present Arctic Government has successfully maintained political stability, the Arctic remains a region that is both highly militarized and highly nuclearized.

Also, there is a major difference between the two regions in terms of the manner and degree to which the respective regions are involved in the production of the public good, science. In Antarctica, science has received strong emphasis within the treaty system from its very beginning.[23] Antarctic scientific research covers a wide area of subjects[24] and, in particular, the emergence of the climate change and global warming phenomenon has resulted in major scientific accomplishments in research pertaining to this problem.

Ice-core studies, though also present in the Arctic, have been especially important for this purpose in Antarctica. In addition, the ratification of the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR) in 1982 established a highly efficient body, the Scientific Committee on Antarctic Research (SCAR), which coordinates and promotes scientific research in Antarctica. In contrast, the Arctic region, though engaged in important scientific research, devotes fewer resources toward this end than does Antarctica.

In terms of government characteristics, there are several major areas of difference between the two regional governments. For example, the present Arctic Government has a membership of eight sovereign nations, each of which holds

[23] Article II of the Antarctic Treaty stipulates that the freedom of scientific investigations and cooperation, which were already underway, should continue. In addition, Article III calls for the free exchange of scientific information and personnel in cooperation with the United Nations and other international agencies. Moreover, the International Geophysical Year, 1957–58, a creation of the global scientific community, played a meaningful role in bringing about a political consensus for the adoption (1959) and ratification (1961) of the Antarctic Treaty itself.

[24] These include climate, astrophysics, marine biology, geology, and ecology.

recognized sovereign territory in the Arctic region. On the other hand, under the Antarctic Treaty System, there are no nations that hold recognized sovereign territory in Antarctica. Article IV of the Antarctic Treaty stipulates that the treaty does not recognize any existing sovereign territorial claims and, further, that no new claims to territorial sovereignty shall be made while the treaty is in force.

A second important area of difference between the existing Arctic Government and the Antarctic Treaty System centers upon the fact that the Arctic governmental structure—in contrast to its Antarctic counterpart—is not comprehensive since it is not an umbrella government that has authority over all major governmental functions and responsibilities. Moreover, the Arctic Government, unlike that of Antarctica, is not based upon the highest echelon of international law—the treaty system. In contrast, the Antarctic Treaty System governs the Antarctic region by means of a cohesive set of international treaty agreements, which comprise a comprehensive government structure.

Thus, having considered the major causes and implications of the massive economic changes now emerging in the Arctic region (Section 1), and the major similarities and differences that exist between the Arctic and Antarctic regions (Section 2), this final section of the paper will draw conclusions regarding the relevancy of using the Antarctic Treaty System as a model for the formation of an Arctic Government structure that can effectively deal with the rapidly challenging parameters of the Arctic regional economy.[25]

Suggestions for Arctic Governance from the Antarctic Treaty System Model

It is argued herein that the Antarctic Treaty System can serve, in several important ways, as a valuable reference for the design of an Arctic Government that can effectively deal with its difficult future challenges. Significantly, however, there is no basis, whatsoever, to advocate a close replication of the Antarctic model in the Arctic region. As observed above, there are a number of fundamental differences between the two circumpolar regions—which differences extend across the spectrum of physical, demographic, economic, and government characteristics—and which preclude any good rationale for a close

[25] For a discussion of Antarctic Treaty System policy directed toward the global warming/climate change problem, see Herber 2012.

adaptation of the Antarctic Treaty System model to the design of a future Arctic Government.[26]

However, at this point, it is important to recognize the difference between using the Antarctic Treaty System as a valuable reference source for recommending certain features of a reconfigured Arctic governance regime, on the one hand, and the mistake it would be to advocate a close application of that model to Arctic Government, on the other. Indeed, some references or guidelines may prove to be useful, even though a close transfer of the Antarctic model to Arctic Government would be inadvisable. Moreover, it should be emphasized that some components of the existing Arctic Government are capable institutions that could be retained, in some form, as part of any new Arctic Government. The task, at hand, is to improve that government—not to replace it in its entirety.

Meanwhile, since governance responsibilities in the Arctic cover a wide and varied spectrum of complex, interacting, areas of responsibility and decision making, such improvements in the Arctic Government would include the need for a comprehensive Arctic Government, which can formulate effective policies for dealing with the many disparate problems that confront the northern circumpolar region. Importantly, the existing governance regime in the southern circumpolar region—the Antarctic Treaty System—can offer the important guideline of being a comprehensive governance regime, with authority that extends over all major functional areas of responsibility in the Antarctic. Moreover, the Antarctic model is a treaty-based governance regime that carries the binding legal authority that is bestowed at the highest level of international law.

Accordingly, it is recommended that the Arctic nations pursue a comprehensive, wide-ranging, regional government based, preferably, on an international treaty agreement. Such an agreement would be designed to encompass all major functional areas of governmental responsibility in the Arctic region. However, it is not within the scope of this paper to propose the specific institutional features, which such a new Arctic Government might include. Yet, during recent years, there have been a number of competent studies undertaken by various

[26] For example, see Keil 2011, which describes the Arctic as a region of shared resources and ecosystems with a complex institutional system and actors that demand different questions and answers than the "global common Antarctica" with its one overarching treaty system and a limited number of state actors involved.

professional individuals and groups that have addressed the more specific nature of this important agenda.[27]

In addition to the recommended adoption of a comprehensive, treaty-based, Arctic Government, there are other suggestions to be taken from the Antarctic government model that may be helpful in the design of a new Arctic Government. Some of these additional suggestions focus upon the specific economic goods, both quasi-private goods and public goods, which constitute the outputs of the two regions. Significantly, these economic goods, to varying degrees, provide benefits and costs that escape market pricing. Such non-priced benefits and costs tend to require some form of government involvement in their allocation—if optimal production efficiency is to be attained. In the present situation, we are asking what may be learned from the structure of the Antarctic Treaty System that might help the Arctic Government supply these economic goods in an economically efficient manner.

First, considering the two quasi-private goods that are produced in each region—fisheries and tourism—it is evident that the Antarctic Treaty System provides superior oversight of their production efficiency at the present time. Fisheries in the Southern Ocean, for example, are under the sustainable-oriented management of a comprehensive regulatory commission[28]—an entity that operates under the authority of the Convention on the Conservation of Antarctic Marine Living Resource (CAMLR Convention). On the other hand, the Arctic Government has no similar treaty-based, centralized, authority in its management of fisheries in the Arctic Ocean. Moreover, Antarctic tourism is managed under the centralized authority of the Committee for Environmental Protection, an entity created by the Antarctic Protocol (Treaty) for Environmental Protection. Meanwhile, the tourism industry in the Arctic is not managed by a centralized, treaty-based, government entity.

The other four quasi-public goods produced in the circumpolar regions—forestry, mining, oil and gas production, and major international shipping

[27] For example, see Arctic Governance Project 2010; Le Cercle Polaire 2008; Cava, Monsma, and Young 2011; French and Scott 2009; Koivurova 2008; Struzik 2010; Triggs 2010; and Young 2002, 2005, 2009.

[28] For greater detail regarding this commission, see pages 17–18 above; see also the website of the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) at http://www.ccamlr.org.

(routes)—are produced only in the Arctic region. Yet, despite the absence of their production in the Antarctic, there does appear to be a useful suggestion from the Antarctic government model, for inclusion in any new Arctic Government, which may improve output efficiency in the production of these four quasi-private goods in the Arctic. That is, the fact that one of the fundamental components of the Antarctic Treaty System, the Protocol for Environmental Protection, provides a wide-ranging and treaty-based authority for implementing environmental management regarding all aspects of natural resource use in the Antarctic region. Hence, if a new Arctic Government were to include a similar, centralized, and (preferably) treaty-based, environmental protection agreement, it would comprise a major step forward in addressing the need for the efficient management of all major natural resource uses in Arctic industries.

Next, it may be asked whether the Antarctic Treaty System can provide any helpful guidelines for use by the Arctic Government in relationship to the production of the two collectively consumed public goods—peace (political stability) and science—that are provided by both the Arctic and Antarctic regional economies.

At the present time, the public good, peace, is supplied in a satisfactory manner by both regional governments. Yet, the emphasis on peace as a primary political objective is much greater in the present Antarctic Government than it is in the present Arctic Government. The Antarctic Treaty clearly establishes peace as one of its primary goals via several articles in the treaty itself. This treaty-based emphasis on peace is a powerful tool in behalf of political stability in the Antarctic circumpolar region. Ideally, any future restructuring of the Arctic Government, preferably a treaty-based adjustment, would add various articles, provisions, or entities that would strengthen the commitment to peace as a major goal of Arctic Government.

Moreover, provision of the public good, science (scientific research), constitutes another primary goal of the Antarctic Treaty that is designated in the treaty structure itself. Also, the Scientific Committee on Scientific Research (SCAR), as described above, is an important entity within the treaty system, which coordinates and promotes Antarctic scientific research. While there is no reason to expect that Arctic science will develop in the foreseeable future to the

magnitude attained by Antarctic science, it nonetheless remains a viable and important economic activity in the Arctic region. Consequently, the adoption of a meaningful set of science-oriented components in any future Arctic government would be of considerable value to the Arctic region.

Finally, the fact that Antarctica—unlike the Arctic—is recognized as an integral part of the global commons, by way of its strategic natural interface with the global atmosphere and global oceans, places it in a fundamentally different position than the Arctic in terms of this pervasive global natural resource. However, even though there is no comparable recognition for the Arctic region, protection of the Arctic environment, as well as the sustained economic management of its natural resources, are goals of considerable global significance. Accordingly, the global perspective is a relevant point of discussion in the overall dialogue pertaining to the formation of any new Arctic Government.

An Arctic and global environmental policy interface

Thus, even though the Arctic region is not a global commons per se, the importance of the Arctic region in the global economy, especially as related to its plentiful and varied natural resources, should not be underestimated. International environmental externalities provide an important link between the Arctic region and all other nations.

The late twentieth and early twenty-first centuries have witnessed a potent movement toward globalization, in a number of different dimensions, in response to rapid advances in technology and communications. All 200 world nations have become increasingly interdependent, with significant interactive and worldwide effects taking on greater importance. These effects have ranged from economic globalization to massive environmental changes, such as climate change and global warming. In fact, it is the latter that has been the primary force behind the large changes in the dimensions of Arctic economics, which present the emerging challenges to Arctic governance that are the subject of the present paper.

Furthermore, the powerful effect of the climate change and global warming phenomenon on the Arctic has made this region one of the earliest major

examples of the need for adaptation to significant global warming effects that have already occurred. The carbon mitigation policies initiated by the United Nations Framework Convention on Climate Change (UNFCCC) have only realized modest success in their efforts to mitigate carbon emissions. In turn, that failure has brought to the forefront the need for adaptation policies to offset the major effects of global warming, such have already occurred in the Arctic region.

Hence, the presence of significant international environmental externalities suggests a legitimate global interest in the supranational government decisions made by the nations of the Arctic region and, especially, those decisions that pertain to natural resources and the environment. Such transnational externalities are not only extensive, but they are increasing in both magnitude and importance. Furthermore, the forces of economic globalization, which forces have been generated largely by the aforementioned global technological advances, reinforce these externalities. Thus, it seems inevitable that any future changes that might be made in the institutions of the Arctic Government would exert significant global effects—whether intended or not—between the Arctic region and the rest of the planet.

One scenario that should not be ignored regarding this issue is that the remarkably plentiful magnitude of the newly accessable Arctic natural resources might encourage the Arctic nations to follow a laissez-faire approach to natural resource exploitation, while downplaying boundary disputes and other contentious issues—the result being the negative externality costs of inadequate conservation practices in the exploitation of these resources. If this scenario would prevail, the remainder of world nations would have been left out of the decision-making process, even though these nations would receive significant negative externality effects from the failure of the Arctic region to follow sustainable economic practices.

Undoubtedly, there are vital global interests at stake in the development of any future Arctic Government. Ideally, political decision makers would reconcile the regional interests of the Arctic with global interests in an interactive world that is characterized by the pervasive presence of international environmental externalities, global commons resources, and economic globalization.

Accordingly, in addition to recognizing the direct need for a comprehensive Arctic Government that will meet the requirements of the Arctic region itself, there is also an important indirect need for an Arctic government that will take into account global interests as well. Indeed, what is needed is an Arctic Government that seeks to achieve, simultaneously, both what is good for the Arctic and what is good for the world. It is obvious that any movement toward the establishment of such a government in the Arctic region would be a very complex, difficult, and time-consuming assignment. However, even a long-term, but steady, movement toward such an Arctic Government would be a worthwhile effort in the interests of both the Arctic and global communities.

In the meantime, it would seem that, ultimately, an effective form of supranational political globalization must, in some way, accompany supranational economic globalization—if the best of all worlds, in terms of economic efficiency, is to be attained. While the Arctic region cannot be expected to attain this goal by itself, hopefully, it can move in the direction of this challenging goal by designing a supranational Arctic Government that gives serious attention to the inevitable global effects that will accompany Arctic decisions in this interactive world society.

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