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Arctic Sustainability Law: Almost Sufficient

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Arctic Sustainability Law: Almost Sufficient

Joseph F. C. DiMento[†], Melissa L. Kelly^{††}, and Kaitlin O'Donnell^{††}

Abstract

We review the existing regime of Arctic governance addressing environmental protection, and more generally, sustainability. We identify gaps in the regime and make recommendations for initiatives to fill those gaps. These initiatives include many being considered at the international level. Preliminarily, we describe present and predicted conditions in the region going beyond traditional environmental indicators to include understandings of sustainability and incorporating various cultures.

Our work is multidisciplinary. In addition to legal research and analysis, we incorporate environmental science and environmental policy findings from our UCI survey [n~220] on Arctic experts' priorities on environmental governance strategies in the region, an ongoing series of international and U.S. convenings on Arctic governance, attendance at Arctic organization meetings, and site visits.

Our analysis of gaps in Arctic sustainability law requires returning to the questions of "what is the goal of sustainability?" Because the Arctic is not one Arctic state but encompasses the many interests of all the Arctic states, indigenous peoples, and non-Arctic states, our analysis is based on a policy position that Arctic law and governance and its future must accommodate to more than any individual interest group.

Abstract.....	247
A. Introduction.....	249

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B.	The Arctic Introduced and Described.....	252
C.	The Arctic Conditions Addressed by Law:	
	Environment Broadly Appreciated.....	257
	1. The Physical Landscape.....	258
	a. Biodiversity.....	258
	b. The Arctic Ocean.....	260
	c. Arctic Landscape and Climate Change.....	264
	d. Arctic Atmosphere.....	269
	2. The Cultural and Socio- Economic Landscape	271
D.	The Law	276
	1. UNCLOS	280
	2. High Seas	284
	a. Some Fisheries' Rules	287
	b. Other Resources Beyond National Jurisdiction.....	288
	3. Interpreting the Rules.....	290
	4. Law Beyond the Law of the Sea.....	291
	a. Ozone depletion.....	293
	b. Species protection.....	294
	c. The Arctic Council-cooperation and influencing rules	296
	d. Soft Law.....	298
	e. No more major rules?	299
	f. National Law	299
	g. Indigenous law.....	300
	i. Understandings of this term.....	300
	h. Arctic Rules from the Courts.....	301
	i. A Public Trust?.....	303
	j. International Tribunals.....	304
	k. Adaptation based actions	306
	5. Effectiveness	306
E.	Future Rules; More to Be Done.....	307
	1. More Fully Protect the Central Arctic Ocean from Unregulated Fishing.....	308
	2. Protect Biodiversity in Areas beyond National Jurisdiction.....	308
	3. Establish Additional Marine Protected Areas	310
	a. Particularly Sensitive Sea Areas.....	314
	4. Create an Active Arctic Regional Seas Programme with Treaty-Making Goals	317
	5. More Fully Protect Cultural Resources.....	320
	6. More Fully Incorporate Indigenous Knowledge and Perspectives in Law and	

	Policy-Making	321
7.	Stricter Liability Assignment to Regulate Offshore Energy Installations	322
8.	Mandate Environmental Studies in More Cases	324
9.	Incorporate Elements of Ecosystem-based Management in Existing Rules	325
10.	Other Future Actions	327
F.	Conclusion	328

A. Introduction

The Arctic is a region of remarkable beauty, diversity, history, and complexity. Diversity is found in its climate, economic conditions, demographics, the physical and mental health of its citizens, and the nature of its governing structures. Environmental conditions and characteristics, from the quality of its lands and waters to the resilience of its flora and fauna, also vary within the Arctic. This is a region whose ocean covers fourteen million square kilometers (almost five and a half million square miles). Including land, it is thirty-seven million square kilometers (over fourteen million square miles). Four million people, including members of dozens of indigenous peoples groups, live in the Arctic. Although small, the population is made up of hundreds of distinct peoples including indigenous peoples who have called it home for centuries.¹

To different degrees the Arctic has been the object of global interest over the centuries. Today it is a major focus of global peace and security in the countries that constitute it and more generally in the global community. Its geopolitical importance is great. Also, and the subject of this article, against rapid environmental, social, economic, and political change, a major world concern is its sustainability. Here we address whether the existing Arctic governance regime is sufficient to reach that goal, understood in varying ways by Arctic inhabitants, stakeholders, and followers.

In the sections that follow, we review the existing regime of Arctic governance addressing environmental protection and, more

¹ Throughout the article, we mainly use the term indigenous. Where appropriate, we employ native or aboriginal. The histories and politics of first peoples are complex. We attempt to use the terms that they and the documents which describe them employ.

generally, sustainability. This includes an expansive array of laws, rules, and practices from international laws to local agreements among indigenous peoples groups, governments, and businesses. Despite this multi-layered legal regime, there are gaps in protections of the Arctic seas, particularly in areas beyond national jurisdiction and from offshore energy installations. Protections of cultural resources are insufficient, environmental impact assessments need to be strengthened, and indigenous knowledge and perspectives are still missing from important aspects of law and policymaking. Many of these protections need to be grounded in an ecosystem-based approach, one that links social and ecological strategies. To fill these gaps, we offer recommendations surrounding existing agreements, treaties, and other laws. These pertain to fisheries, oil pollution, biodiversity, environmental impact assessment, and human rights. They address also establishment of marine protected areas and a regional seas agreement and greater incorporation of indigenous perspectives and ecosystem-based management in Arctic sustainability law. Many of these ideas are currently being considered at the international level. Our analysis of the gaps in Arctic sustainability law requires returning to the question of “what is the goal of sustainability?” Because the Arctic is not one Arctic state, but rather encompasses many interests in all of the Arctic states, indigenous peoples, and non-Arctic states, our analysis is based on a policy position that Arctic law and governance and their future must accommodate to more than any individual interest group.

Our review of existing Arctic sustainability law and governance is based on traditional means of legal research. It is guided by an expansive understanding of what governs attempts at Arctic sustainability and environmental protection.² We also undertook a survey of experts on the Arctic,³ and convened workshops with the

² See *infra* Section D.

³ We undertook a survey soliciting the views of experts on Arctic governance with a focus on analysis that can advance policy consideration. We address our recommendations for Future Rules, Section F, based in part on general trends in expert answers. Because of the nature of the responding group, no statistical significance is attributed to quantitative results. We used “judgment sampling” (or purposive sampling). Judgment sampling is a common nonprobability method of obtaining a sample based on an assessment of what best represents the population of interest. Judgment sampling requires expert knowledge of the specific subject matter.

The population of individuals with sufficient expertise to answer the questions proposed

University of California Irvine (UCI) School of Law Center for Land, Environment, and Natural Resources and the UCI Newkirk Center for Science and Society on specific strategies for Arctic governance.⁴ We attended and participated in Arctic organization meetings on law and governance, and undertook site visits in the Arctic regions of each of the Arctic nations.

Sections B and C describe present and predicted conditions in the region, going beyond traditional environmental indicators to include understandings of sustainability in terms of the cultural and socio-economic landscape. Section D lays out the most important aspects of Arctic sustainability law and summarizes their

in the Arctic Environmental Governance Survey was created using a combination of approaches. We first compiled a list of all government officials at the federal level in 21 countries who focused on or whose work is relevant to Oceans and Arctic policy within state or foreign affairs agencies, as well as within any separate agency that contained a special focus on the oceans, such as a national oceanic and atmospheric administration. The countries were Canada, the United States, Russia, Finland, Norway, Iceland, Sweden, Denmark/Greenland, France, Germany, the Italian Republic, Japan, the Netherlands, the People's Republic of China, Poland, the Republic of India, the Republic of Korea, the Republic of Singapore, Spain, Switzerland, and the United Kingdom. We then extracted contact information for agencies where available.

The second parallel round of sample selection involved identifying organizations with foci on the oceans and/or Arctic regions, irrespective of organization size. We also selected research units within universities and individuals whose specific research interests fit within Arctic environmental governance. In addition, we identified potential survey respondents through searches of relevant Arctic related publications (the authors) and conference programs and presentations on relevant topics. Some of these were identified through our direct participation in Arctic programs and through travels to Arctic regions where we interviewed policymakers, scientists, indigenous peoples, and academics.

We incorporated helpful suggestions related to communication, and clarity, and the probability of a response.

After our pre-tests, we invited contacts to participate in the online survey and to suggest names of colleagues who may have interest in the subject matter of the survey.

The survey was administered through the University of California's survey system. It opened for response on August 29, 2018; results here reflect comments through late October 2019. We sent 1,440 requests and we received 220 completed responses. To maximize participation, we sent individually addressed email letters to contacts, once for the initial contact, and a second time as a reminder within 1-3 weeks from the initial contact question.

⁴ See *Environmental Governance and Management in the Arctic*, U.C. IRVINE SCH. L. CTR. LAND, ENV'T, & NAT. RES., <https://www.law.uci.edu/centers/cleanr/events/workshops.html> [<https://perma.cc/3776-7MKA>] (last visited Oct. 8, 2021); *Legal Strategies to Address Climate Change in the North American Arctic*, U.C. IRVINE SCH. L. CTR. LAND, ENV'T, & NAT. RES., <https://www.law.uci.edu/centers/cleanr/events/workshops.html> [<https://perma.cc/3776-7MKA>] (last visited Oct. 8, 2021).

effectiveness. Section E identifies gaps in this vast legal regime and corresponding recommendations for addressing those gaps, and Section F is our Conclusions.

B. The Arctic Introduced and Described

The Arctic Ocean, about the size of Antarctica, if superimposed on the United States, would overlap it one and a half times. The Arctic encompasses every time zone. Walrus, seals, reindeer, caribou, seabirds, and 150 species of fish live within the region. In total, 21,000 known species of all kinds are found there, some new and invasive.

The Arctic includes tens of thousands of islands, some of which have zero population, some of which have seasonal populations, and some of which have populations year-round. New land areas, mainly islands, are regularly discovered in the Arctic.⁵

Only .00051% of humanity calls the Arctic home, yet there are cities in the Arctic, some of which are very industrial, where thousands of people live.⁶ North of the Arctic Circle there are ten cities with 30,000 or more people, but many Arctic communities are very small.⁷ The most northern settlement in the world is there.

Permafrost—the once thought forever-frozen layer under the Earth's surface made up of soil, gravel, and sand bound together by ice—covers large parts of the Arctic, in some places up to one thousand meters, or more than six tenths of a mile.⁸ Some wetlands sparsely dot the immense region, as do boreal forests made up of

⁵ See Audrey Ramming, *Russian Navy Confirms Emergence of Five New Islands in the Arctic Ocean*, GLACIERHUB (Nov. 21, 2019), <https://glacierhub.org/2019/11/21/russian-navy-confirms-emergence-of-five-new-islands-in-the-arctic-ocean> [<https://perma.cc/5C2E-7CKS>]. In recent years, the Russian Navy has discovered over thirty islands, bays, capes, straits, and new islands in the archipelagos of Novaya Zemlya and Franz Josef Land. *See id.* One of these islands is 54,500 square meters or about 65 thousand square yards. *See id.*

⁶ Author calculation is based on world population data and various sources including the National Snow and Ice Data Center. *See All About Arctic Climatology and Meteorology*, NAT'L SNOW & ICE DATA CTR. (May 4, 2020), <https://nsidc.org/cryosphere/arctic-meteorology/arctic-people.html> [<https://perma.cc/B53A-9WP2>].

⁷ See SUSAN JOY HASSOL, *IMPACTS OF A WARMING ARCTIC: ARCTIC CLIMATE IMPACT ASSESSMENT 6* (2004).

⁸ *Permafrost*, NAT'L GEOGRAPHIC, <https://www.nationalgeographic.org/encyclopedia/permafrost/> [<https://perma.cc/6BKT-T3CX>] (last visited Mar. 19, 2021).

coniferous trees.⁹ Further, the Arctic is home to important minerals: gemstones, nickel, copper, platinum, apatite, tin, diamonds, gold, lead, zinc, and copper.¹⁰ One fifth of the world's oil and gas resources are in the Arctic.¹¹ There is much sand and gravel.

Unlike Antarctica, which is land surrounded by water, the Arctic is more than a sea surrounded by land: it is a region. There is no universally accepted definition of what the region includes. It may be demarcated by the tree line: the northernmost boundary where trees grow. It may be defined by temperatures: the southernmost location where the mean temperature of the warmest month of the year is below 10° C (50° F).¹² The Arctic Circle currently begins at 66°33'43" N (its precise coordinates depend on the tilt of the Earth's axis which changes with time). The North Pole is at 90° N, 0° E.¹³ For certain purposes, the Arctic is defined by memberships in international or regional organizations.

To understand the environment of the sea and to think about its future requires knowing about the land that touches that sea. That land is, first, the territory of the Arctic Five—the countries that have Arctic coastline. These are the littoral states: Norway, Greenland (through its relationship with Denmark),¹⁴ the United States, Canada, and Russia. The three other Arctic nations are Sweden, Iceland, and Finland, whose economies and cultures are heavily

⁹ See *Percent Forest Cover in the Boreal Forest Biome*, DATA BASIN, <https://databasin.org/maps/new#datasets=d842914b159244e8829677eaf5ea62eb> [<https://perma.cc/US3S-5BSJ>] (last visited Mar. 19, 2021).

¹⁰ See HASSOL, *supra* note 7, at 83.

¹¹ U.S. GEOLOGICAL SURVEY, USGS FACT SHEET 2008–3049 (2008).

¹² See Lorna Inness & Alan Simcock et al., *The First Global Integrated Marine Assessment: World Ocean Assessment I*, UNITED NATIONS 28, <https://www.un.org/regularprocess/sites/www.un.org.regularprocess/files/woacompileation.pdf> [<https://perma.cc/BEA6-DSF5>] (last visited Oct. 27, 2021).

¹³ Ashley Strickland, *Earth's Magnetic North Pole is Heading for Russia and Scientists Are Puzzled*, CNN (Dec. 18, 2019), <https://www.cnn.com/2019/12/18/world/magnetic-north-pole-drift-scen-trnd/index.html> [<https://perma.cc/6H5K-U8W8>] (“Unlike its geographical poles, Earth’s magnetic poles that serve as the foundation of our navigation are actively moving. The north magnetic pole has been slowly moving across the Canadian Arctic toward Russia since 1831 Since its discovery in 1831, the pole has traveled 1,400 miles. The magnetic field reverses its polarity every several hundred thousand years.”).

¹⁴ At 62°00'N, the Faroe Islands between Norway and Iceland are about 4° south of the official boundary of the Arctic Circle. But its government has an Arctic policy, and the Faroe Islands is part of a delegation called Denmark/Greenland/Faroe Islands.

influenced by the Arctic, its weather, its climate, its indigenous and at least some nomadic peoples. These nations also have legal power over activities in the Arctic Sea under international law.¹⁵ The larger group is known as the Arctic Eight.

The Arctic coastline is about 45,000 kilometers or about 28,000 miles long.¹⁶ One starting point for thinking about the ocean element of the region is to realize that it is part of “one single interconnected ocean system: the Arctic Ocean, the Atlantic Ocean, the Indian Ocean and the Pacific Ocean.”¹⁷ The Arctic itself is the world’s smallest and most shallow ocean: its average (mean) depth is 1,205 meters, just shy of 4,000 feet.¹⁸ The deepest point in the Arctic is the Molloy Deep at 5,607 meters or 18,400 feet.¹⁹ The ocean element of the Arctic are the waters semi-enclosed by the North American and Eurasian landmasses. What is called the Arctic Ocean includes many water bodies; which are not exactly agreed upon by all experts. Generally, they include the Baffin Bay, the Barents Sea, the Beaufort Sea, the Chukchi Sea, the East Siberian Sea, the Greenland Sea, Hudson Bay, Hudson Strait, the Kara Sea, the Laptev Sea, the White Sea, the Northwest Passage, and other tributary water bodies.²⁰

The shortest distance between Russia’s mainland and mainland Alaska, the Bering Strait of the Pacific, is about fifty-five miles (88.5 kilometers). In the Bering Strait are two small islands: Big Diomedes and Little Diomedes. Big Diomedes is Russian, Little Diomedes is part of the United States; two and a half miles, or about four kilometers, separate these small places. A good snowmobiler could move from one nation to the other in a minute and a half.²¹ In Lapland—the region in the Arctic including Norway, Sweden,

¹⁵ See *infra* Section D.

¹⁶ See Inniss & Simcock, *supra* note 12, ch. 1, at 2.

¹⁷ See *id.* Recently, some have been identifying the waters around Antarctica as the Southern Ocean. See *id.*, ch. 4, at 7.

¹⁸ See *id.*, ch. 36G, at 1.

¹⁹ Jason Daley, *American Becomes First to Visit the Five Deepest Spots in World’s Oceans*, SMITHSONIAN MAG. (Sept. 10, 2019), <https://www.smithsonianmag.com/smart-news/american-descends-five-deepest-spots-worlds-oceans-180973094> [<https://perma.cc/A4W4-X6RZ>].

²⁰ See Inniss & Simcock, *supra* note 12, ch. 36G, at 1.

²¹ See *How Close is Alaska to Russia?*, ALASKA PUB. LANDS INFO. CTRS., <https://www.alaskacenters.gov/contact/faq/how-close-alaska-russia> [<https://perma.cc/UQM7-XWSL>] (last visited Mar. 19, 2021).

Finland and parts of Russia—the distance from Northern Finland to Sweden or Norway or Russia is no more than several miles. Twenty-five kilometers, or about sixteen miles, separate Franklin Island in Greenland and Ellesmere Island in Canada.

Distances are also great in the Arctic. Shipping routes include the Northeast Passage which goes along the coasts of Norway, Russia, and Alaska, including, from west to east, the Barents Sea, Kara Sea, Laptev Sea, East Siberian Sea, and Chukchi Sea. The Northern Sea Route (NSR) is the Russian section between the Atlantic Ocean and the Pacific Ocean. Along the Russian coast, the route extends from Siberia and the Far East, from the Atlantic to the Pacific. Another route is the Northwest Passage along the northern coast of North America which spans nine-hundred miles.

The Arctic has remained persistently cold, and its temperature has not ranged greatly in modern history.²² For some parts of the Arctic, there have been eras of warming and cooling. Twentieth century shifts in atmospheric circulation patterns contributed to effecting warm decades in the 1930s and 1940s, and cool decades in the 1950s and 1960s.²³ Recently, the Arctic has been less cold than usual in certain places. For example, in northern Russia, mean temperatures in January almost everywhere are below -10 °C (14 °F), and as low as -45 °C (-49 °F) in the Eastern inland areas.²⁴ Significant differences exist. Parts of Canada and Greenland surrounding the Labrador Sea have seen cooling in recent years. In the Canadian Arctic, summer temperatures over the last century were the highest they have ever been in tens of thousands of years.

Precipitation varies. Fairbanks, Alaska gets about eleven inches of rain per year and about sixty-five inches of snow (1651 mm).²⁵ Greenland experiences light snow in the North and Center and a little more south of the Arctic Circle, along the coasts, and at high altitudes on the ice sheet.²⁶ In some parts of the Arctic, including Canada, snowfall can be over 120 inches, or about three meters. Many places experience considerable fog and are damp.

²² Over geological time, there were periods of tropical conditions, which explain the existence of gas and oil deposits.

²³ HASSOL, *supra* note 7, at 32.

²⁴ *See id.* at 112.

²⁵ *See id.* at 53.

²⁶ *See Climate–Greenland*, CLIMATES TO TRAVEL, <https://www.climatestotravel.com/climate/greenland> [<https://perma.cc/2GRD-FVFT>] (last visited Mar. 19, 2021).

The Arctic can be divided into four sub regions. East Greenland, northern Scandinavia, northwestern Russia and the Barents Sea constitute region one. The second region is the area from the Urals to Chukotka in Central Siberia, the Barents, Laptev, and East Siberian Seas. Region three is Chukotka, Alaska, the western Canadian Arctic to the Mackenzie River, and the Bering, Chukchi, and Beaufort Seas. Eastern Canada and West Greenland make up the fourth region.²⁷

The Arctic Sea is ice, averaging about three meters thick, four to five meters (twelve to fifteen feet) at its thickest. In the summer, parts of the sea are open, increasingly so in recent years.

A high percentage of the ocean floor is continental shelf, that is, the edge of the land area that extends underwater. The remainder of the ocean consists of two principal deep basins that are subdivided into four smaller basins. The central of these ridges extends 1,100 miles (1,770 km) from the continental shelf off Ellesmere Island to the New Siberian Islands—Eastern Siberia to Nunavut Canada.²⁸ This gigantic mountain range in the sea was discovered around 1950.

Currents in the ocean influence its climate and diversity. The Arctic has a clockwise movement or drift pattern in the Beaufort Gyre in the western part of the Arctic Ocean.²⁹ A nearly straight-line Transpolar Drift Stream moves eastward across the ocean from the New Siberian Islands to the Fram Strait, between Greenland and Svalbard.³⁰

Arctic places are continuously dark in the winter and light in the summer. Above the Arctic Circle, there are twenty-four hours of daylight in the summer and twenty-four hours of darkness in the winter.³¹

²⁷ HASSOL, *supra* note 7, at 113.

²⁸ *See id.* at 89.

²⁹ *See* Lawrence A. Mysak, *Patterns of Arctic Circulation*, 293 SCI. MAG. 1269, 1269–70 (2001).

³⁰ *See id.*

³¹ *See Daylight, Darkness and Changing Seasons at the North Pole*, NOAA: PAC. MARINE. ENV'T LAB'Y ARCTIC ZONE, https://www.pmel.noaa.gov/arctic-zone/gallery_np_seasons.html [<https://perma.cc/4MJQ-C82Y>] (last visited Nov. 12, 2021).

C. The Arctic Conditions Addressed by Law: Environment Broadly Appreciated

Environmental concerns lie at the heart of the laws governing the Arctic. The Arctic environment includes physical aspects of the land such as water, air, plants, and animals, but also the people and cultures that inhabit the land. The focus at both national and international levels is to increase sustainability efforts for the Arctic environment so that the qualities that make the Arctic unique are not lost to a range of stressors including, but not limited to, the effects of climate change.

Whether actions and development are sustainable depends on the definition of sustainability. In its report, the World Commission on Environment and Development stated “[s]ustainable development requires meeting the basic needs of all and extending to all the opportunity to satisfy their aspirations for a better life” and also “requires the promotion of values that encourage consumption standards that are within the bounds of the ecological possible and to which all can reasonably aspire.”³² Sustainable Arctic development has three goals: “economic development, social development, and environmental protection.”³³

The broader understanding of sustainable Arctic development includes the sustainability of Arctic cultures; cultural sustainability is a touchstone that distinguishes the Arctic peoples’ goals. Sustaining people, cultures, and traditions is entirely compatible with protecting the Arctic’s physical environment, yet pursuing these goals can come into tension with some of the classic views of environmental protection. Industrial projects, such as construction of infrastructure, highways, energy facilities, and mining, can damage the environment and disrupt lifestyles and traditions; however, they also generate employment and funds to improve education, provide healthcare, and make daily life more comfortable for many of the Arctic’s inhabitants. In addition, pursuing some environmental objectives, such as the protection of species, at times, leads to clashes with traditional practices of hunting, herding, and whaling.³⁴

³² U.N. Secretary-General, *Report on the World Commission on Environment and Development: Our Common Future*, §§ 15, 27, A/42/427 (Aug. 4, 1987).

³³ Arctic Council, Fairbanks Declaration, May 11, 2017, 13 I.L.M. 6.

³⁴ See *infra* Section D (discussing these tensions, including with regards to hunting of seals).

While the understanding of environmental sustainability may differ in various regions of the Arctic, a common goal is abundantly clear: maintaining the aspects that make the Arctic so special requires laws that protect physical and cultural landscapes.

1. The Physical Landscape

The Arctic is on the front line of climate change. Arctic climate change is occurring at a pace twice as intense as in other regions in the world: the Arctic is getting warmer; ice on land and in the sea is receding; permafrost is no longer permanent; weather patterns are shifting; shores are eroding; some native plants and animals are being lost, and new plants and animals are being gained; fire season is becoming longer; there is a hole in the ozone layer; and waters are becoming more acidic and polluted in parts, and more radioactive in others due to the circulation of industrial and agricultural chemicals. The manner and speed at which the Arctic environment is changing is one of the primary concerns in the region.

a. Biodiversity

The Arctic is less rich in biodiversity than lower regions, and specialists say it is “patchy,” meaning the variety of biological resources differs with the subregion.³⁵ Biodiversity also increases with higher altitudes.³⁶

Arctic ecosystems are rather young. Still, over 21,000 species of fungi, plants, and animals find their homes in the Arctic.³⁷ Since some Arctic species have survived in extreme conditions over the years, they are quite resilient to environmental change. Added to this strength is the absence of major habitat disruptions caused by human activity.

The Arctic is home to three dozen species of marine mammals: the iconic narwhal, beluga, bowhead whale, ringed seal, bearded seal, harp seal, and hooded seal which uses sea ice for pupping in the winter and spring.³⁸ These marine mammals move in open

³⁵ See Andrei Boltunov, *An Updated Look at Polar Bears in the Russian Arctic*, THE CIRCLE, Sept. 2018, at 14, 15.

³⁶ See Cynthia Jacobson & Liisa Rohweder, *2018 Arctic Biodiversity Congress: Working Together for a Better Future*, THE CIRCLE, Sept. 2018, at 4, 5.

³⁷ Arctic Council, *Arctic Biodiversity Assessment*, May 2013, 128 I.L.M. 9.

³⁸ See generally Inniss & Simcock, *supra* note 12, at 1301–47.

waters of the Arctic and sub-Arctic the rest of the year.³⁹ Many marine mammals depend on ice for at least some of the year, namely for reproduction, molting, resting, and feeding.⁴⁰ Arctic and subarctic regions yield a tenth of the global commercial fish catch, and subsistence fisheries provide support to Arctic residents.⁴¹

Warming temperatures are changing the landscape of the Arctic. Shrubs are expanding in the tundra, making it greener and decreasing vegetation in some areas. There are also more severe fire years and more insect disturbances.⁴² Bark beetles are a species that causes a great deal of damage in the Arctic.⁴³ In southcentral Alaska, the area where bark beetles attacked grew from 33,000 acres in 2015 to 593,000 acres in 2018.⁴⁴ Tree lines in northern Sweden have moved up to eighty meters higher in the last decades. But not every region has seen this movement. Forest decline has been accelerated in some areas; in other places, forests have “pop[ped] up.”⁴⁵

Despite the increase of vegetation available for grazing in some places, herd populations of caribou and wild reindeer across the Arctic tundra declined by nearly 50% in the two-decade period through 2018.⁴⁶ Caribou die-offs occur in part because the animals do not have access to food.

³⁹ *See id.*

⁴⁰ *See id.*

⁴¹ *Reports to Arctic Council Confirm Rapid Warming, Ocean Acidification*, WORLD METEOROLOGICAL ORG. (May 7, 2019), <https://public.wmo.int/en/media/news/reports-arctic-council-confirm-rapid-warming-ocean-acidification> [<https://perma.cc/XY3M-SJWB>].

⁴² *See* Emily Osborne et al., *Arctic Report Card: Update for 2018*, NOAA (2018), https://arctic.noaa.gov/Portals/7/ArcticReportCard/Documents/ArcticReportCard_full_report2018.pdf [<https://perma.cc/7MY4-6MSJ>] [hereinafter *Arctic Report Card*].

⁴³ *See What's Bugging Alaska's Forest? Spruce Beetle Facts and Figures*, ALASKA DEP'T NAT. RES. DIV. FORESTRY, <http://forestry.alaska.gov/insects/sprucebeetle> [<https://perma.cc/H7VM-GJM3>] (last visited Oct. 27, 2021).

⁴⁴ *See id.*

⁴⁵ Bryan Walsh, *How Climate Change Is Growing Forests in the Arctic*, TIME (June 4, 2012), <https://science.time.com/2012/06/04/how-climate-change-is-growing-forests-in-the-arctic> [<https://perma.cc/X74L-SJ34>].

⁴⁶ *See* Cody Sullivan, *2018 Arctic Report Card: Reindeer and Caribou Populations Continue to Decline*, NOAA CLIMATE (Dec. 11, 2018), <https://www.climate.gov/news-features/featured-images/2018-arctic-report-card-reindeer-and-caribou-populations-continue> [<https://perma.cc/8ZFU-RAJ9>].

The Red List of the International Union for Conservation of Nature gives information on threatened species worldwide.⁴⁷ The Red List includes thirteen Arctic or seasonal mammalian inhabitants and twenty-one Arctic or Arctic-breeding seabirds as threatened species.⁴⁸ Eight fish stocks and five Arctic fish species meet the Red List criteria.⁴⁹ The Polar bear and walrus are “vulnerable,” affected by, among other threats, residential and commercial development.⁵⁰ The Greenland shark is nearing threatened status.⁵¹ But some species are increasing in population, including the humpback whale, the harp seal, and the bowhead whale.⁵²

In the Bering Sea region, ocean primary productivity levels (algae’s actions in changing inorganic carbon into organic things), have sometimes been 500% higher than normal levels.⁵³ Scientists linked this to the low sea ice extent for the 2017/2018 season.⁵⁴

b. *The Arctic Ocean*

Much of the Arctic region is ocean, but knowledge about oceans in general is limited. In 2016, the United Nations published the World Ocean Assessment,⁵⁵ a comprehensive check of the marine environment. This report pointed to several disturbing trends in oceans generally and noted major gaps in how oceans are understood.⁵⁶ The report noted that the Central Arctic Ocean and

⁴⁷ *The IUCN Red List of Protected Species*, INT’L UNION FOR CONSERVATION OF NATURE & NAT. RES. (2021), <https://www.iucnredlist.org/> [<https://perma.cc/SD7U-GDHV>] [hereinafter *IUCN*].

⁴⁸ *Id.*

⁴⁹ *Id.* See also Jorgen Christiansen, Catherine W. Mecklenburg, & Oleg V. Karamushko, *Arctic Marine Fishes and their Fisheries in Light of Global Change*, 20 *GLOB. CHANGE BIOLOGY* 2, 352–59 (Sep. 17, 2013).

⁵⁰ *Polar Bear*, INT’L UNION FOR CONSERVATION OF NATURE & NAT. RES. (2021), <https://www.iucnredlist.org/species/22823/14871490> [<https://perma.cc/B2N6-8UUD>].

⁵¹ *Greenland Shark*, INT’L UNION FOR CONSERVATION OF NATURE & NAT. RES. (2021), <https://www.iucnredlist.org/species/60213/124452872> [<https://perma.cc/2RT7-333U>].

⁵² *IUCN*, *supra* note 47.

⁵³ *Arctic Report Card*, *supra* note 42.

⁵⁴ *Id.*

⁵⁵ See Inniss & Simcock, *supra* note 12. There were a few substantive additions to understanding of the Arctic from Assessment II. See Renison Ruwa & Alan Simcock et al., *The Second World Ocean Assessment: World Ocean Assessment II*, UNITED NATIONS (2021).

⁵⁶ Inniss & Simcock, *supra* note 12.

marginal seas “are among the least-known basins and bodies of water in the world ocean, because of their remoteness, hostile weather, and the multi-year (i.e., perennial) or seasonal ice cover.”⁵⁷ What is known about the Arctic oceans has led experts to conclude that they are stable and generally in good health.⁵⁸

Arctic ice is disappearing at a dramatic rate. Since 1979, the average period with sea ice cover dropped ten to twenty days every decade; in some areas, the drops were much greater.⁵⁹ In 2015, 2016, 2017, and 2018, Arctic winter sea ice maximums were at record low levels.⁶⁰ In September 2018, the volume of Arctic sea ice saw a decline of 75% from its 1979 levels.⁶¹ The United States National Oceanic and Atmospheric Administration reported that the twelve lowest sea ice extent levels in the satellite record occurred in the past twelve years.⁶² Sea ice has been melting at a rate of 9% per decade since the 1970s.⁶³ There is a lot of variation in the sea levels: in 2013 and 2014, the ice was relatively higher, but still much lower than the levels in the 1980s and 1990s.⁶⁴

This melting ice is hurting Arctic coastal areas in places like Alaska where ice serves as a protection against waves that are driven by winds and cause flooding.⁶⁵ The Pacific sector of the Arctic Ocean, Hudson Bay, and Baffin Bay all experience more open water from August through December.⁶⁶ In Alaska, ice levels in the summer are about one tenth of what it was in the 1980s.⁶⁷ In early fall, the Chukchi Sea ice edge is now regularly hundreds of

⁵⁷ *Id.* at ch. 36G, at 1.

⁵⁸ *Id.*

⁵⁹ ARCTIC MONITORING & ASSESSMENT PROGRAMME, ARCTIC CLIMATE CHANGE UPDATE 2019: AN UPDATE TO KEY FINDINGS OF SNOW, WATER, ICE, AND PERMAFROST IN THE ARCTIC 5 (2019) [hereinafter ARCTIC CLIMATE CHANGE UPDATE 2019].

⁶⁰ *Id.*

⁶¹ *Id.*

⁶² *Arctic Report Card*, *supra* note 42, at 2.

⁶³ *Id.*

⁶⁴ *Id.* at 47.

⁶⁵ Dr. Steven Katona, *The Big Melt: Global Warming and Sea Ice in the Arctic*, OCEAN HEALTH INDEX (Aug. 2, 2013), http://www.oceanhealthindex.org/news/The_Big_Melt [https://perma.cc/L82N-YNKF].

⁶⁶ Jason E. Box et al., *Key Indicators of Arctic Climate Change: 1971-2017*, 14 ENV'T. RSCH. LETTERS 1, 11 (2019).

⁶⁷ *Id.*

miles northwest of the Alaska coast.⁶⁸ The Bering Sea is a particular area of loss, and the remaining sea ice tends to be younger, thinner, and more susceptible to melting.⁶⁹

In 2019, Alaska saw the lowest levels of sea ice ever.⁷⁰ Younger and thinner seasonal ice leads to harm or loss of some species. Other species are expanding their ranges or are present during a longer portion of the year. The expanded open water season, which is about three months longer than it was in the 1970s, promotes shipping, commercial activities, resource development, and tourism.⁷¹

The loss of sea ice changes how much heat is in the ocean, which creates cascading effects on fisheries and ecosystems. Among the people affected are more than seventy indigenous communities in Alaska, including the Inupiat, Central Yupik, Cupik, St. Lawrence Island Yupik, and Unangan peoples.

Compared to other seas and ocean areas, the Arctic is clean. But there is much that we do not know about the Arctic Ocean, and there are areas that are polluted in one or more forms. Until recently, ice coverage hindered scientific exploration of the Arctic. Even now, this vast entity is not mapped for pollution in any comprehensive or sizable way. What we do know is that the waters are becoming more acidic, common pollutants are present,⁷² spilled oil is present,⁷³ plastics are in the water,⁷⁴ and radioactivity remains.⁷⁵

Acidification is the reduction of the pH of seawater caused by

⁶⁸ *Id.*

⁶⁹ *Id.*

⁷⁰ *Id.*

⁷¹ Box et al., *supra* note 66, at 11.

⁷² *Id.*

⁷³ Jackie Northam, *The Oil Spill From Russian Nickel Mine Is Moving Toward the Arctic Ocean*, NPR, <https://www.npr.org/2020/06/16/878852931/the-oil-spill-from-russian-nickel-mine-is-moving-towards-the-arctic-ocean> [https://perma.cc/UJ7F-YCDP] (last visited Oct. 30, 2021).

⁷⁴ Helen Regan, *From Norway to Canada, the Arctic Ocean is Being Polluted by Tiny Plastic Fibers from Our Clothes*, CNN, <https://www.cnn.com/style/article/arctic-polyester-fibers-study-intl-hnk-trnd/index.html> [https://perma.cc/FS9T-4MXR] (last visited Oct. 30, 2021).

⁷⁵ *Radioactivity in the Arctic*, ARCTIC MONITORING & ASSESSMENT PROGRAMME, <https://radioactivity.amap.no> [https://perma.cc/9K4M-H6XG] (last visited Feb. 25, 2022) [hereinafter *Arctic Radioactivity*].

the increased absorption of carbon dioxide from the atmosphere.⁷⁶ Arctic acidity levels have been increasing at twice the rate of the Pacific and Atlantic oceans.⁷⁷ The change is rapid, but getting a true sense of where change is occurring and what the stability of the change is has been difficult.⁷⁸ In some parts of the Arctic, acidification has damaged fisheries.⁷⁹ Yields of Norwegian kelp, sea urchins, and sea cod are affected, and other subsistence fisheries have been damaged.⁸⁰

As in oceans generally, marine pollution is heavily caused by activity on land. Stain repellants, flame retardants, and pharmaceuticals are found in the Arctic.⁸¹ Permafrost thaws and its contents make their way to the ocean. In 2016, people started worrying about plastics with the discovery of the massive Great Pacific Garbage Patch. The world was both amazed and disgusted. That “island” is not in the Arctic, but plastics have made their way into Arctic waters. Compared with the amounts in the Mediterranean, there is not much plastic now, although abundant concentrations are found in Greenland and the Barents Sea. Ocean currents bring plastic there from faraway places. But part of the plastic pollution is homemade.⁸²

In some areas, the Arctic is contaminated by radioactive material.⁸³ Between 1945 and 1980, 520 atmospheric nuclear

⁷⁶ LISA ROBBINS ET AL., MONITORING AND ASSESSMENT OF OCEAN ACIDIFICATION IN THE ARCTIC OCEAN: A SCOPING PAPER 1 (2010).

⁷⁷ *Id.* See also DI QI ET AL., INCREASE IN ACIDIFYING WATER IN THE WESTERN ARCTIC OCEAN 195 (2017).

⁷⁸ *Arctic Ocean Acidification*, NAT'L PARK SERV. (July 30, 2019), <https://www.nps.gov/articles/oceanacidification.htm> [<https://perma.cc/W7ME-EFA3>].

⁷⁹ *Press Release: Studies Explore Socio-Economic Implications of Ocean Acidification in the Arctic*, ARCTIC MONITORING & ASSESSMENT PROGRAMME (Oct. 10, 2018) <https://www.amap.no/documents/download/3057/inline> [<https://perma.cc/KMK9-S87D>].

⁸⁰ *Id.*

⁸¹ Bob Weber, *Report Says Mercury, PCBs Still Threaten Arctic; New Chemicals Emerging*, CANADIAN PRESS (Oct. 15, 2018), <https://www.ctvnews.ca/sci-tech/report-says-mercury-pcbs-still-threaten-arctic-new-chemicals-emerging-1.4134844> [<https://perma.cc/C6UQ-C3DJ>].

⁸² See Claudia Halsband & Dorte Herzke, *Plastic Litter in the European Arctic: What Do We Know?*, 5 EMERGING CONTAMINANTS 308, 308 (2019).

⁸³ See ARCTIC MONITORING & ASSESSMENT PROGRAMME, AMAP ASSESSMENT 2002: RADIOACTIVITY IN THE ARCTIC 9 (2004). See also DAVID P. STONE, THE CHANGING ARCTIC ENVIRONMENT: THE ARCTIC MESSENGER 47 (2015).

weapon tests were carried out by the United States, France, China, and the Soviet Union.⁸⁴ Dozens originated on the Arctic island of Novaya Zemlya, and their fallout remains.⁸⁵ Nuclear waste sunk in the ocean included reactors, waste containers, and a submarine.⁸⁶ Between 2007 and 2015, radioactive radium-228 concentration grew in the Arctic.⁸⁷ Contamination in the forms of thorium isotopes is found in sediments on the massive Arctic continental shelves, and while levels are not now threatening, some scientists see them as a sign of negative trends.⁸⁸

c. Arctic Landscape and Climate Change

Temperatures have varied in the Arctic throughout the twentieth century. In the 1940s, the Arctic experienced a warm period with annual surface temperature increases. Overall, the Arctic has been warming more than twice as fast as the world as a whole for the past fifty years.⁸⁹ In the decades since 1971, the annual surface air temperatures rose two and a half times faster than the average temperature increase in the Northern Hemisphere.⁹⁰

The Arctic warms faster than lower latitudes because the land is darker, and the ocean surfaces absorb more solar energy when ice and snow melt.⁹¹ This additional trapped energy increases warming of the Arctic atmosphere, which is already shallower and less effective in transporting energy than the atmosphere at lower latitudes.⁹² Black carbon, a significant percentage of which

⁸⁴ *General Overview of the Effects of Nuclear Testing*, COMPREHENSIVE NUCLEAR-TEST-BAN TREATY ORG., <https://www.ctbto.org/nuclear-testing/the-effects-of-nuclear-testing/general-overview-of-the-effects-of-nuclear-testing/> [<https://perma.cc/Z3GG-294U>] (last visited Oct. 30, 2021) [hereinafter *Nuclear Testing*].

⁸⁵ *Id.*

⁸⁶ *Id.*

⁸⁷ Lauren E. Kipp et al., *Increased Fluxes of Shelf-Derived Materials to the Central Arctic Ocean*, 4 *SCI. ADVANCES* 1, 2 (2018).

⁸⁸ Stephen Luntz, *Global Warming is Increasing the Radioactivity of the Arctic Ocean*, *IFL SCIENCE* (Jan. 3, 2018), <https://www.iflscience.com/environment/global-warming-is-increasing-the-radioactivity-of-the-arctic-ocean/> [<https://perma.cc/A9EA-VBY9>].

⁸⁹ ARCTIC CLIMATE CHANGE UPDATE 2019, *supra* note 59, at 2.

⁹⁰ Box et al., *supra* note 66, at 2.

⁹¹ HASSOL, *supra* note 7, at 20.

⁹² *Id.*

originates in Europe, further exacerbates this dynamic.⁹³

Alaska, Canada, and Central Arctic Russia are warming more than other Arctic regions. The polar parts of Russia have become almost 2.3C (4.14F) warmer over the past thirty years. In part of the region, including the Kara Sea, average air temperatures from 1998–2018 were as much as 4.77C (8.59F) above normal.⁹⁴ In October 2019, the Russian archipelagos of Franz Joseph Land and Severnaya Zemlya experienced the warmest month ever on record.⁹⁵ There, average temperatures were up to 8C (14.4F) higher than normal.⁹⁶ In the winter, temperatures are up to 4C (7.2F) warmer in Siberia and the western Canadian Arctic.⁹⁷

An updated 2019 report confirmed that Arctic warming is continuing unabated.⁹⁸ Arctic annual surface air temperatures in 2014–2018 exceeded those of any year since 1900.⁹⁹ Over the last half century, the temperature of permafrost in parts of Alaska has increased 2.5°C (4.5°F).¹⁰⁰ In the Bering Sea, recent winters have experienced marine heat waves. In one area of Alaska, on July 4, 2019, the temperature reached 32°C (90°F) for the first time on record. In June 2020, the temperature in Verkhoyansk in Siberia hit 37.8C (100F).¹⁰¹

Not all Arctic regions were warmer. Norwegian meteorologists concluded that October 2019 was the coldest month in the country since 2009 and 2003.¹⁰² There has also been reported cooling in

⁹³ Factsheet: Climate Change in the Arctic, Arctic Centre, FACTSHEET: CLIMATE CHANGE IN THE ARCTIC, ARCTIC CENTRE (2014).

⁹⁴ Atle Staalesen, *Arctic Islands 8 Degrees Warmer than Normal*, BARENTS OBSERVER (Nov. 4, 2019), <https://thebarentsobserver.com/en/2019/11/arctic-islands-8-degrees-warmer-norma> [<https://perma.cc/47GV-84F9>].

⁹⁵ *Id.*

⁹⁶ *Id.*

⁹⁷ HASSOL, *supra* note 7, at 113.

⁹⁸ Arctic Climate Change Update 2019, *supra* note 59.

⁹⁹ *Id.*

¹⁰⁰ *Id.*

¹⁰¹ Anton Troianovski, *A Historic Heat Wave Roasts Siberia*, N.Y. TIMES (July 23, 2021), <https://www.nytimes.com/2020/06/25/world/europe/siberia-heat-wave-climate-change.html> [<https://perma.cc/48S3-P9RV>].

¹⁰² Atle Staalesen, *Arctic Islands 8 Degrees Warmer than Normal*, THE BARENTS OBSERVER (Nov. 4, 2019), <https://thebarentsobserver.com/en/2019/11/arctic-islands-8-degrees-warmer-norma> [<https://perma.cc/G692-RXFJ>].

Northwest Russia and Scandinavia.¹⁰³

Precipitation is increasing in the Arctic by an estimated 1.5–2% per decade.¹⁰⁴ The increase from 1971 to 2017 in annual total precipitation for areas north of 50°N latitude has been greatest in the cold season.¹⁰⁵ The forms of precipitation are also changing. Snow cover continues to decline in the Arctic; its annual duration has dropped by two to four days per decade.¹⁰⁶ In recent years, the June snow area in the North American and Eurasian Arctic has been about half the values observed before 2000.¹⁰⁷ Overall, Arctic spring snow cover extent on land has now decreased by more than 30% since 1971.¹⁰⁸ Alaska now becomes half snow-covered a week later in October than it used to in the 1990s; the snow is gone almost two weeks earlier than a few decades ago.¹⁰⁹ In Greenland and in the Baltic Sea Basin, the loss in snowfall comes with a gain in rain.¹¹⁰ However, this is not constant. In 2018, the snowfall in Northern Greenland was twice as deep as it was in some earlier years, and the snow did not melt until summer's end.¹¹¹

Land-based ice is also disappearing rapidly. Since 1971, Arctic land ice loss accounted for almost half of sea-level rise during 2003 to 2010 and almost a third of the total sea-level rise since 1992.¹¹² The Greenland ice sheet is a major source of sea level rise: on average it has lost 375 gigatons of ice per year in recent years.¹¹³ This is about two times the rate of loss from the period of 2003 to

¹⁰³ *See id.*

¹⁰⁴ Arctic Climate Change Update 2019, *supra* note 59, at 4.

¹⁰⁵ Box et al., *supra* note 66, at 7.

¹⁰⁶ *Id.* at 10.

¹⁰⁷ *See id.*

¹⁰⁸ *Id.*

¹⁰⁹ Rick Thoman & John Walsh, *Alaska's Changing Environment: Documenting Alaska's Physical and Biological Changes Through Observations*, H.R. MCFARLAND, ED. INT'L ARCTIC RSCH. CTR. 7 (2019).

¹¹⁰ *Id.* at 8.

¹¹¹ Adam Aton, *Extreme Snows in Greenland Caused Ecosystem's "Reproductive Collapse"*, SCI. AM. (Oct. 16, 2019), <https://www.scientificamerican.com/article/extreme-snows-in-greenland-caused-ecosystems-reproductive-collapse/> [<https://perma.cc/BTX6-W3DF>].

¹¹² *See* Box et al., *supra* note 66, at 11.

¹¹³ Paolo Colosio et al., *Surface Melting Over the Greenland Ice Sheet Derived from Enhanced Resolution Passive Microwave Brightness Temperatures (1979–2019)*, 15 CRYOSPHERE 2623, 2623–24 (2021).

2008.¹¹⁴ However, in 2017 and 2018, Greenland may have added a small amount of mass.¹¹⁵

Permafrost, ground that stays frozen for at least two successive years, is an important carbon sink and is critical to climate. However, when it thaws, permafrost releases more carbon than it absorbs. Various studies have found that carbon escape from permafrost in the Arctic has been accelerating,¹¹⁶ although one study found no rise in emissions since 2003.¹¹⁷ Melting has led to what scientists call a positive feedback cycle, meaning an initial disturbance causes effects that return to cause some increase in the magnitude of the initial disturbance.¹¹⁸ Since the period of 2007 to 2009, the near-surface permafrost in the High Arctic has warmed by more than 9°F or more than 2°C.¹¹⁹ Furthermore, the layer of the ground that thaws in the summer has deepened.¹²⁰

Abrupt thaw, as scientists call this process, drastically changes the landscapes. Abrupt thawing causes landslides, creating massive ground slumps in some areas. Forests are affected by flooding, which destabilizes tree trunks and roots.¹²¹ Trees get “drunk”—they tip over and are swallowed by new wetlands.¹²² The effect on buildings can be dramatic; in parts of Siberia in the past several decades, the bearing capacity of some foundations has declined by 40–50%.¹²³ In Yakutsk, hundreds of buildings have been damaged

¹¹⁴ See L. S. Sørensen et al., *Mass Balance of the Greenland Ice Sheet (2003–2008) from ICESat Data – The Impact of Interpolation, Sampling and Firn Density*, 5 CRYOSPHERE 173, 184 (2011).

¹¹⁵ Arctic Climate Change Update 2019, *supra* note 59, at 8.

¹¹⁶ Paul Voosen, *Global Impacts of Thawing Arctic Permafrost May be Imminent*, SCIENCE (Oct. 21, 2019), <https://www.sciencemag.org/news/2019/10/global-impacts-thawing-arctic-permafrost-may-be-imminent> [<https://perma.cc/7HCF-JZMB>].

¹¹⁷ *Id.*

¹¹⁸ See Torben Windirsch, *Organic Matter Characteristics in a Changing Permafrost Environment: Yukechi Alas Landscape, Central Yakutia*, EPIC 7 (Aug. 2018), https://epic.awi.de/id/eprint/48337/1/Windirsch_Yukechi_mt.pdf.

¹¹⁹ See Box et al., *supra* note 66, at 6.

¹²⁰ *See id.*

¹²¹ See Ian McDermod, *The Drunk Trees of Climate Change*, MEDIUM (Aug. 20, 2020), <https://medium.com/climate-conscious/the-drunk-trees-of-climate-change-3b96cfc38ef> [<https://perma.cc/V9HX-UFRW>].

¹²² *See id.*

¹²³ ARCTIC MONITORING & ASSESSMENT PROGRAMME, SNOW, WATER, ICE AND PERMAFROST IN THE ARCTIC (SWIPA) xii (2017) [hereinafter AMAP ARCTIC REPORT].

as they subside.¹²⁴ Earth movements sink wooden houses and concrete and steel infrastructure in pipelines, airports, and factories. Coastal archeological sites are also rapidly deteriorating. The results are eerie and dark, but their true environmental meaning is a matter of some speculation. Surely lakes will appear and be filled with new sediments, melting will release more climate change gases, and mammoth skeletons will rise on the horizon.

In 2003, 86% of 213 Alaska Native villages were affected by flooding or erosion.¹²⁵ In 2009, the U.S. Army Corps of Engineers identified 178 communities as at risk from erosion alone (flooding was not addressed).¹²⁶ That same year, other government reports concluded that many Native villages would need to relocate.¹²⁷ Houses are falling into the sea and land mass is shrinking in parts of Alaska.¹²⁸

These new environmental conditions make for other characteristics of the Arctic: there were several wildfires in Greenland in 2017, including one that burned 1200 hectares of tundra.¹²⁹ The following year, Sweden experienced a heavier than usual wildfire season. In the last half century, the number of wildfires has risen in Canada's Northwest Territories and interior Alaska. In 2019, 2.6 million acres burned in Alaska, leading to the first ever dense smoke advisory for particles in Anchorage.¹³⁰ Relatively recently in 2006, fire managers in the state pushed up the "start date" for wildfire response from May 1 to April 1.¹³¹

¹²⁴ Aristos Georgiou, *Siberia Heatwave Sees Buildings Split in Two as Permafrost Thaws*, NEWSWEEK (June 25, 2020), <https://www.newsweek.com/siberia-heatwave-buildings-split-permafrost-thaws-1513455> [<https://perma.cc/QC4L-S5ZH>].

¹²⁵ See Thoman & Walsh, *supra* note 109, at 14.

¹²⁶ CONG. RES. SERV., R41153, *Changes in the Arctic: Background and Issues for Congress*, at 81 (Oct. 12, 2021), <https://sgp.fas.org/crs/misc/R41153.pdf>.

¹²⁷ *Id.*

¹²⁸ See *id.*

¹²⁹ *Ice and Fire: Large Blaze Burns in Greenland for Two Weeks*, GUARDIAN (Aug. 19, 2017), <https://www.theguardian.com/world/2017/aug/20/ice-and-fire-large-blaze-burns-in-greenland-for-two-weeks> [<https://perma.cc/29UX-FC7U>].

¹³⁰ Maddie Stone, *Want to Know What Climate Change Feels Like? Ask an Alaskan*, GRIST (Oct. 8, 2019), <https://grist.org/article/want-to-know-what-climate-change-feels-like-ask-an-alaskan/> [<https://perma.cc/S4JN-FLAP>].

¹³¹ Alison York, *Alaska Fire Science Consortium Addresses Management Information Needs*, ARCTIC RES. CONSORTIUM U.S. (Feb. 28, 2020), <https://www.arcus.org/witness-the-arctic/2020/2/highlight/3> [<https://perma.cc/93MQ-W4MC>].

d. Arctic Atmosphere

The history of international concern with the environment has focused greatly on the atmosphere. Before the crucial attention to climate change, the worry was about the “hole” in the ozone. The hole was most dramatically described over Antarctica, but in the Arctic, ultraviolet radiation has long been a concern.

Depletion of ozone over the region has been noted since the early 1980s. For several years, particularly from 1979 to 2000, the spring and yearly average ozone levels declined by 11% and 7% respectively, and there have been years with dramatic losses of up to 45%.¹³² The harmful effects of this change are numerous. A weakened ozone layer induces cataracts, suppresses the human immune system, and in some instances, causes cancer.¹³³ It can harm species of phytoplankton and disrupt agricultural productivity.¹³⁴

Scientists at the University of California, Irvine and elsewhere discovered that the hole in the ozone was caused by substances such as chlorofluorocarbons and other chemicals commonly used in refrigerants, air conditioners in homes and automobiles, flame retardants, and spray cans for products such as hair products.¹³⁵ A worldwide legal ban on the manufacture, use, and trade in such substances followed.¹³⁶

The status of the recovery of the ozone layer and its permanency in the Arctic is difficult to determine with precision. In the Arctic, mini ozone holes develop where, unlike at the South Pole, weather pattern circulations rearrange the ozone.¹³⁷ The process can last for as little as a few days.¹³⁸ Annual variations in the Arctic are making

¹³² Betsy Weatherhead et al., *Ozone and Ultraviolet Radiation in ARCTIC CLIMATE IMPACT ASSESSMENT REPORT* 151, 152, 159 (2005).

¹³³ *See id.* at 153.

¹³⁴ *See generally id.* at 421, 812 (discussing the effects of climate change on aquatic ecosystems and agriculture).

¹³⁵ *See* James W. Elkins, *Chlorofluorocarbons (CFCs)*, in *ENCYCLOPEDIA OF EARTH SCIENCE* (1999).

¹³⁶ *See* Montreal Protocol on Substances that Deplete the Ozone Layer, Sep. 16, 1987, S. TREATY DOC. NO. 100-10, 1522 U.N.T.S. 29 [hereinafter Montreal Protocol].

¹³⁷ Andrej Flis, **Polar Watch* An Ozone Hole (Mini) has Formed over the North Pole and Scandinavia! Ozone Levels have Dropped to over 50 Dobson Units Below Normal*, SEVERE WEATHER EUR. (Nov. 22, 2019), <https://www.severe-weather.eu/global-weather/polar-watch-scandinavia-arctic-ozone-hole-fa/> [<https://perma.cc/WB4R-2743>].

¹³⁸ *Id.*

the hole larger, making it hard to confirm whether there has been a definite recovery in the layer since 2000.¹³⁹ Anomalies do occur: in 2020, NASA and the European Space Agency (ESA) reported the largest hole of its kind ever detected, perhaps related to extreme temperatures and unusual weather during the winter.¹⁴⁰

The Arctic is contaminated by persistent organic pollutants (POPs). These are industrial polychlorinated biphenyls (PCBs), dichlorodiphenyltrichloroethane (DDT), other pesticides such as aldrin, chlordane, dieldrin, endrin, heptachlor, mirex, toxaphene, dioxins, and furans.¹⁴¹ Levels of these chemicals are high in some Arctic predator species, and other organisms including fish are exposed to significant amounts of mercury and polychlorinated biphenyls.¹⁴² Mercury in polar bears compromises their ability to reproduce; a third of bears in the Beaufort Sea are at high risk.¹⁴³ Their relatives in the Hudson Bay have unhealthy levels of PCB, as do killer whales off the coast of northern British Columbia.¹⁴⁴ Killer whales are among the most high at risk species of PCB contamination on earth.¹⁴⁵

Some Arctic people are dependent on the marine environment for their diet. Traditional indigenous diets include locally harvested fish, birds, and marine mammals. Contaminants that are transported to the Arctic by winds and ocean currents, including some that are

¹³⁹ *Ozone Layer is Healing, but Maybe Not in the Arctic Ozone Hole, UN Says*, CBC NEWS (Nov. 5, 2018), <https://www.cbc.ca/news/technology/ozone-healing-1.4794803> [<https://perma.cc/D3HE-95SU>].

¹⁴⁰ *See Unusual Ozone Hole Opens Over the Arctic*, EUR. SPACE AGENCY (June 4, 2020), http://www.esa.int/Applications/Observing_the_Earth/Copernicus/Sentinel-5P/Unusual_ozone_hole_opens_over_the_Arctic [<https://perma.cc/54WR-9G58>].

¹⁴¹ *See* ARCTIC MONITORING & ASSESSMENT PROGRAMME, BIOLOGICAL EFFECTS OF CONTAMINANTS ON ARCTIC WILDLIFE & FISH: SUMMARY FOR POLICY-MAKERS (2018) [hereinafter *BIOLOGICAL EFFECTS OF CONTAMINANTS*]; *see also Persistent Organic Pollutants: A Global Issue, a Global Response*, U.S. EPA, <https://www.epa.gov/international-cooperation/persistent-organic-pollutants-global-issue-global-response> [<https://perma.cc/H652-3GMU>] (last updated Dec. 2009) [hereinafter *Persistent Organic Pollutants*].

¹⁴² *BIOLOGICAL EFFECTS OF CONTAMINANTS*, *supra* note 141.

¹⁴³ Bob Weber, *Report Says Mercury, PCBs Still Threaten Arctic; New Chemicals Emerging*, CANADIAN PRESS (Oct. 15, 2018), <https://www.ctvnews.ca/sci-tech/report-says-mercury-pcbs-still-threaten-arctic-new-chemicals-emerging-1.4134844> [<https://perma.cc/KJ8J-8ZAC>].

¹⁴⁴ *Id.*

¹⁴⁵ *Id.*

now globally banned, pose serious threats. Some POPs are no longer declining in response to use restrictions. By the 1990s, human exposure to them had reached unhealthy levels.¹⁴⁶

2. *The Cultural and Socio-Economic Landscape*¹⁴⁷

The cultural and socio-economic landscape of the Arctic is integral to any discussion of Arctic sustainability. While Arctic people differ on more than what they have in common, some individual and social characteristics are shared. Arctic communities share spaces such as the Arctic Ocean, whose resources and services they all benefit from and affect. Except for Iceland, each Arctic country has been home to indigenous peoples for thousands of years.¹⁴⁸ Many of these people still live traditionally by hunting, fishing, herding, and gathering plants for food.¹⁴⁹ Crossing what are now defined as country boundaries, or within them, are the Saami in the circumpolar areas of Finland, Sweden, Norway, and Northwest Russia; the Nenets, Khanty, Evenk, and Chukchi in Russia, Aleut, Yupik, and Inuit (Inupiat) in Alaska; Inuit (Inuvialuit) in Canada, and Inuit (Kalaallit) in Greenland—in all, about forty ethnic groups.¹⁵⁰ Tragically, the majority of the Arctic shares a history of domination, abuse and disrespect of many native peoples by majoritarian or colonizing peoples.

Indigenous peoples are increasingly involved in determining the

¹⁴⁶ See *Persistent Organic Pollutants*, *supra* note 141 (implying the assertion in the section titled “The DDT Dilemma”).

¹⁴⁷ Greater detail about the characteristics of the region and its peoples, beyond what can be included in this short summary geared to present the existing legal framework for sustainability and to advocate the need for its further development, is found in a massive literature on conditions of the Arctic and characteristics and demographics of its peoples; elsewhere we have made efforts to encapsulate that information. See JOSEPH F. C. DiMENTO, *POLAR SHIFT: THE ARCTIC SUSTAINED* (Anthem Press, forthcoming 2022).

¹⁴⁸ See *Arctic Indigenous Peoples*, U. LAPLAND ARCTIC CENTRE, <https://www.arcticcentre.org/EN/arcticregion/Arctic-Indigenous-Peoples> [<https://perma.cc/2KHP-2CNJ>] (last visited Nov. 1, 2021) [hereinafter *Arctic Indigenous Peoples*] (“Arctic indigenous peoples include for example Saami in circumpolar areas of Finland, Sweden, Norway and Northwest Russia, Nenets, Khanty, Evenk and Chukchi in Russia, Aleut, Yupik and Inuit (Inupiat) in Alaska, Inuit (Inuvialuit) in Canada and Inuit (Kalaallit) in Greenland. All of the above-mentioned countries except Iceland have indigenous peoples living within their Arctic territory.”).

¹⁴⁹ NORDIC COUNCIL OF MINISTERS, *ARCTIC SOCIAL INDICATORS: A FOLLOW-UP TO THE ARCTIC HUMAN DEVELOPMENT REPORT 110* (Joan Nymand Larsen, Peter Schweitzer, & Gail Fondahl eds., 2010) [hereinafter *ARCTIC SOCIAL INDICATORS*].

¹⁵⁰ *Arctic Indigenous Peoples*, *supra* note 148.

fate of the Arctic and defining sustainability. They do not think with one mind, and they do not act in the same ways. Meanings and indicators of environmental quality and sustainability differ among Arctic people, including some indigenous peoples. Oil exploration is as controversial inside as it is outside native communities. Oil companies generate revenue, and this creates wealth; however, oil drilling challenges subsistence life. Also, some native traditions are threatened by environmentalists' challenges, including to the fur industry and interpretations of whaling law.¹⁵¹

In the Arctic region, common across boundaries are certain social characteristics.¹⁵² Creating useful social indicators for the Arctic peoples is not an easy task because of lack of information in some sub areas, distinct views of what constitutes successful and sustainable human development, and different ideas of which groups should be compared.¹⁵³

Some characteristics relevant to concerns about sustainability nonetheless are evident. Incomes among Arctic people, generally lower than for the overall population of the countries in which they are situated, vary.¹⁵⁴ For some sectors, immigrant labor dominates and can command high wages; in places and sectors where the policy is to pay whatever is necessary. However, for some indigenous peoples there is considerable poverty and life can be precarious. Also relevant is the nature of jobs and the economy in parts of the Arctic. Boys in more rural areas have options available because of their backgrounds in traditional work, such as herding reindeer.

The life expectancy of Arctic peoples—those who live in the Arctic parts of Arctic nations— from 2012 to 2016 was 74.7 years.¹⁵⁵ The average for the Arctic countries themselves is about

¹⁵¹ See *infra* Section D with regard to seals hunting, including of the seal pup.

¹⁵² See Birger Poppel, *Well-Being of Circumpolar Arctic Peoples: The Quest for Continuity in the Pursuit of Human Well-Being* 565–605 (2017). See generally NORDIC COUNCIL OF MINISTERS, ARCTIC HUMAN DEVELOPMENT REPORT: REGIONAL PROCESSES AND GLOBAL LINKAGES (Joan Nymand Larsen & Gail Fondahl eds., 2014) (discussing the cultures and identities of Arctic peoples).

¹⁵³ See ARCTIC SOCIAL INDICATORS, *supra* note 149, at 25.

¹⁵⁴ Matthew Berman, *Resource Rents, Universal Basic Income, and Poverty Among Alaska's Indigenous Peoples*, 106 WORLD DEV. 161, 169–70 (2018). See generally Elena N. Bogdanova et al., *Demographic trends in Russian Arctic in the Context of Sustainable Development*, 39 REVISTA ESPACIO 3 (2018).

¹⁵⁵ *Life Expectancy in the Arctic*, NORDREGIO (Mar. 19, 2019),

82 years. Russia is an exception at about 73 years. Education levels are high in the nations that make up the Arctic; however, that is not the case for some of the Arctic parts of those countries. In remote areas, many students do not complete upper secondary school and there are self-reported functional difficulties at school, home, and in leisure activities. Some of these difficulties are linked to mental health problems.¹⁵⁶

There are some shared patterns of mental health. Arctic regions of the USA, Canada, and Russia have considerably higher suicide rates than the non-Arctic regions of those countries.¹⁵⁷ In Canada, indigenous communities have rates higher than the general Canadian population.¹⁵⁸ For the Inuit, suicide rates rank among the world's highest. In one studied period (1999–2003), suicides in Inuit regions averaged 135 per 100,000, which is more than ten times that of Canada generally.¹⁵⁹ The Inuit situation has gotten considerably worse in recent years, due in major part to dramatic increases of suicides by younger people.¹⁶⁰ Suicide in some Arctic regions is highest among teenagers, and young women are more often its victim in Canada.¹⁶¹ These rates are not fully understood, but they have been the subject of some social science research. Suicide in the Arctic is linked to the loss of cultural continuity and consumption of large quantities of alcohol.

In some Arctic places, primarily outside of the European Arctic, the high price of food and the changes in diets of indigenous peoples have made for food insecurity: people, especially children, do not

<https://nordregio.org/maps/life-expectancy-in-the-arctic/> [<https://perma.cc/Z77B-RLDV>].

¹⁵⁶ Elizabeth V. Bania et al., *Non-completion of Upper Secondary School Among Female and Male Young Adults in an Arctic Sociocultural Context: The NAAHS study*, 16 *BMC PUB. HEALTH* 1, 8 (2016).

¹⁵⁷ Eduardo Chachamovich et al., *Suicide Among Inuit: Results From a Large, Epidemiologically Representative Follow-Back Study in Nunavut*, 60 *CAN J. PSYCH.* 268, 273-74 (2015). See Veronique Beaudoin et al., *Protective Factors in the Inuit Population of Nunavut: A Comparative Study of People Who Died by Suicide, People Who Attempted Suicide, and People Who Never Attempted Suicide*, 144 *INT'L J. ENV'T RSCH. PUB. HEALTH* 1, 1 (2018).

¹⁵⁸ Chachamovich et al., *supra* note 157, at 273.

¹⁵⁹ *Id.* at 269.

¹⁶⁰ *Id.*

¹⁶¹ See generally Jason George, *The Suicide Capital of the World*, *SLATE* (Oct. 9, 2009, 9:39 AM), <https://slate.com/news-and-politics/2009/10/why-do-so-many-greenlanders-kill-themselves.html> [<https://perma.cc/BJR4-VZHM>].

have adequate nutrition.¹⁶² For example, the costs of feeding a family in Inuit Canada are much higher than a shopping cart of the same foods in the southern part of the country, such as Ottawa.¹⁶³

Climate change is a major factor in Arctic people's lives. As temperatures continue to rise, glaciers melt, the environment changes, and economic sector development shifts with major growth in some arenas. Tourism is increasing; depending on its forms, it can bring economic goods and environmental recognition or damage. Non-Arctic visitors are already the main source of human presence in the Arctic: the region receives about 10.2 million visits annually. Although many parts of the Arctic are not easily accessible and traveling conditions can be extreme, tourism continues to grow. Limited management of tourism makes for environmental challenges: some are aesthetic, others can be more significant. For example, harm occurs to culturally significant and traditionally sacred places and demands on energy sources, which then need to be expanded in vulnerable landscapes.

Tourists, investors, entrepreneurs, and businesses—both established and new—matter both politically and as major contributors to the Arctic economy. Where and how they invest, how they travel, what they do in the Arctic, how they prioritize sustaining traditions, cultures, and environmental quality will in some part determine the future of the Arctic. Non-Arctic countries and their industries are investing considerably in the region, but not evenly. Some countries and regions are sought over others.¹⁶⁴

¹⁶² Catherine Huet et al., *Food Insecurity and Food Consumption by Season in Households with Children in an Arctic City: A Cross-Sectional Study*, 17 BMC PUB. HEALTH 1, 11 (2017).

¹⁶³ See Gigi Veeraraghavan et al., *Paying For Nutrition A Report on Food Costing in the North*, FOOD SECURE CAN. 1, 4 (2016).

¹⁶⁴ China has invested in a major way: billions of dollars in assets, cooperative agreements, financing agreements, and particularly heavy investment in the energy and minerals industry and infrastructure. China accounts for about half of the demand for Canada's minerals, buys significant amounts of timber, and has important mining investments. China has also invested in Norway and the United States. In 2012, China began investing in Greenland, which now receives almost 11% of the country's GDP from China. Among the investments are for a mine for rare earth elements and uranium. Greenlanders generally welcome the contribution to the economy; however there have been a few controversial investment attempts. In Iceland, the Chinese government has invested \$1.2 billion from 2012 to 2017, about 6% of the country's average GDP. Ties Dams et al., *Presence Before Power: China's Arctic Strategy in Iceland and Greenland*, CLINGENDAEL REP. NETH. INST. INT'L REL. 1, 34 (2020).

Also shared in the Arctic is more accessible natural resource exploitation. Not managed well, it has deleterious impacts on the environment. However, it is also an economic engine, as the Arctic is rich in natural resources. In 2003, natural resource exploitation accounted for about 31% of Arctic GDP, including even higher levels in Russian and North American areas and contributing 5–10% of the work force in the European Arctic.¹⁶⁵

About 25% of the world's natural gas and 10% of oil are produced in the Arctic.¹⁶⁶ According to a 2008 estimate, undiscovered or untapped resources could amount to ninety billion barrels of oil, fifty trillion cubic meters of natural gas, and forty-four billion barrels of natural gas liquids.¹⁶⁷ Approximately 13% of the world's undiscovered technically recoverable oil and up to 30% of its gas are estimated to be in the Arctic, with 84% offshore.¹⁶⁸ Most of the region's oil reserves are in Alaska, whereas natural gas is more concentrated in Russia's seas. Exploitation in the seas remains a new frontier, but onshore oil and gas have been produced for decades. Of great interest to the future of Arctic sustainability are planned activities of oil exploration and possible exploitation.

In the Russian Arctic, state-backed firms have dominated development of energy. However, industry analysts expect Western petroleum companies to provide needed technology and management expertise, as demonstrated by the partnership of ExxonMobil and Rosneft, a very large global public oil and gas company. In 2020, the Russian government created \$300 billion in new incentives for ports, factories, and oil and gas developments on the shores and in the waters of the Arctic Ocean. These investments are to double maritime traffic in the Northern Sea Route and to give a boost to energy companies. As part of the program, Russia's government is offering tax breaks for offshore oil and gas developments. John Last, *What Russia's \$300B Investment in Arctic Oil and Gas Means for Canada*, EYE ON THE ARCTIC, (Feb. 17, 2020), <https://www.rcinet.ca/eye-on-the-arctic/2020/02/17/what-russias-300b-investment-in-arctic-oil-and-gas-means-for-canada/> [<https://perma.cc/8M82-FK57>].

¹⁶⁵ Gerard Duhaime & Andree Caron, *The Economy of the Circumpolar Arctic*, ECONOMY N. STATISTICS NORWAY 17, 18 (2006).

¹⁶⁶ Arnfinn Jørgensen-Dahl, *Arctic Oil and Gas*, ARCTIC KNOWLEDGE HUB (2010), <http://www.arctis-search.com/Arctic+Oil+and+Gas> [<https://perma.cc/9EY2-BHZZ>].

¹⁶⁷ Kenneth J. Bird et al., *Circum-Arctic Resource Appraisal: Estimates of Undiscovered Oil and Gas North of the Arctic Circle*, U.S. GEO. SURVEY (2008). There are 47.2 trillion cubic meters in 1669 trillion cubic feet of natural gas. HOUMAN PEIMANI, ENERGY SECURITY AND GEOPOLITICS IN THE ARCTIC 109 (2013).

¹⁶⁸ *Huge Amount of Fossil Fuels in Arctic: 90 Billion Barrels Of Oil And 1,670 Trillion Cubic Feet Of Natural Gas*, SCIENCEDAILY (July 24, 2008), <https://www.sciencedaily.com/releases/2008/07/080724115043.htm> [<https://perma.cc/5YZK-5ET8>].

Similar questions are raised for some mining projects.

Fish have a central place throughout Arctic economies. Fisheries represent about 90% of the export earnings of Greenland, 33% in Iceland, and about 6% in Norway. In Russia and the United States, which have more diversified and larger economies, fish sales are about 1% of export earnings. Global warming will create conditions for the arrival of new fish species.

Both the similarities and differences—whether individual, group, or societal—among peoples in the Arctic influence the prioritization of elements of sustainability. Most, if not all, will agree that climate change needs to be addressed. That agreement will be less likely when determining *how* to address the challenges. Similarly, not all people in Arctic zones, Arctic nations, and outside regions more generally will agree on whether resources extraction or wildlife management, for example, enhance Arctic sustainability or threaten it.

D. The Law

The volume of Arctic sustainability law is vast. In this section, we lay out the most important components of the law and summarize views on its effectiveness. We do so with perspectives of the classical environmental goals of protection of the physical environmental and pollution control, and with the goal of cultural sustainability.

The rules come from many sources, such as general international law and treaties with a direct focus on the Arctic, or with great relevance to the Arctic environment.¹⁶⁹ Customary international law and general principles are applicable to any region. Rules also include the Arctic nations' own federal or national laws and sub-national laws within the Arctic countries, like those of provinces, states, territories, municipalities, and cities. The laws, rules, and practices of indigenous, aboriginal, or native peoples not linked to any country's law-making institutions are also included in our accounting. There are also important rules that cover a region

¹⁶⁹ Here *rules* encompass the wide range of formal, even if not written, social actions addressed at protection of the Arctic. This is similar to the definition in the World Ocean Assessment of the United Nations but in a more encompassing way. Inmiss & Simcock, *supra* note 12, Part I, at 4 (“[T]he social rules that have developed to control human activities—including national legislation, the law of the sea, international agreements on particular human uses of the sea and broader international agreements that apply to both land and sea.”).

or a part of the Arctic, such as the marine environment of the Northeast Atlantic or an agreement among some Arctic countries on the protection of a particular fish species or mammal.

However, these laws represent the tip of the iceberg. Agreements, with many different names, number in the hundreds. They include memoranda of understanding (agreements that give the terms of a commitment among parties) and diplomatic letters between or among nations or local governments and indigenous peoples in the Arctic. We also include influential sources such as customary international law and the opinions and decisions of courts or other tribunals. Other sources of soft law that are influential in the Arctic are the declarations and principles made at international meetings, such as those of the United Nations General Assembly, conferences, and as preliminary statements to later legally binding agreements. Also important are local agreements between or among tribes, governments, and businesses.

The overall combination of components is like a Russian doll. The layers influence, touch on, and cover a region that is not a legally defined place: the Arctic. One summary of rules that target the environment of some or all of the Arctic countries fills 350 pages,¹⁷⁰ and that does not include separate sections on the Law of the Sea, Fisheries, Indigenous Peoples, and Shipping, among other topics, in a tome that numbers 1,484 pages.

A focus on conditions of human beings, the poor, and the indigenous leads to a broad investigation of additional rules. Rules govern both the physical environment, the cultural and human environment, sustainability, and human rights. The rules cover health effects on people and wildlife, in addition to, and sometimes in tension with, effects on the atmosphere, the water, and the land.

What to include here is not a matter of consensus among academics, policymakers and stakeholders. However, for our purposes, conclusions are necessary if wise decisions are to be made about what, if any, new rules are necessary. We conclude that the results of decades of Arctic rulemaking have been good but have not yet provided sufficient protection. Therefore, in the next section, we analyze leading candidates for new legal initiatives for the Arctic.

¹⁷⁰ See e.g., KRISTINA SCHÖNFELDT, *THE ARCTIC IN INTERNATIONAL LAW AND POLICY* (2017). See also Arctic Policy & Law: References to Selected Documents, *THE INT'L COUNCIL OF ENV'T L.* (2011).

Attempting to present the law on the environmental quality of the Arctic and its sustainability risks being overinclusive or underinclusive in instruments included and short on specifics or much too long on detail of each. Nonetheless, there are several major agreed upon components. It is visually useful to lay out some of the inventory of environmental rules that apply to the Arctic—as in Table A. These are important because all or most Arctic countries have formally committed to complying with them.¹⁷¹

Table A: International Laws that Apply to the Arctic – By Media Type

Biological	Water/ Ocean	Atmo- spheric	Mixed	Other	Procedures
International Convention for the Regulation of Whaling	United Nations Law of the Sea (UNCLOS)	International Convention on Persistent Organic Pollutants (POPS)	Convention on Fishing and Conservation of Living Resources of the High Seas ¹⁷²	Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (Basel Convention) ¹⁷³	Espoo Convention on Environmental Impact Assessment
Agreement on the Conservation of Polar Bears	Agreement for the Implementation of the Provisions of the Convention on	UN Framework Convention on Climate Change (UNFCCC)		Convention on Wetlands of International Importance, especially as Waterfowl	Convention on Environmental Impact Assessment in a Transboundary Context

¹⁷¹ See *International Agreements*, ARCTIC PORTAL, <https://arcticportal.org/arctic-governance/international-agreements> [<https://perma.cc/NA34-D82H>] (last visited Nov. 4, 2021).

¹⁷² See Convention on Fishing and Conservations of the Living Resources of the High Seas, Apr. 29, 1958, 559 U.N.T.S. 285 (listing arctic countries as signing parties).

¹⁷³ See Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, May 5, 1992, 1673 U.N.T.S. 57 (listing arctic countries as signing parties).

	the Law of the Sea ¹⁷⁴			Habitat (RAMSAR Convention) ¹⁷⁵	
Convention on the Conservation on Migratory Species of Wild Animals (Bonn Convention) ¹⁷⁶	Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (The London Convention) ¹⁷⁷	Kyoto Protocol to the United National Framework Convention on Climate Change		Convention on International Trade in Endangered Species (CITES)	Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters ¹⁷⁸
Convention on the Conservation of European Wildlife and Natural Habitats (Bern)	Convention on the Protection and Use of Transboundary Watercourses and International Lakes	Paris Agreement ¹⁸⁰		Global Programme of Action for the Protection of the Marine Environment from Land-Based	

¹⁷⁴ See The United Nations Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Stocks and Highly Migratory Fish Stocks, GA 164/37 (Sept. 8, 1995).

¹⁷⁵ See U.N. Director-General of the United Nations Educational Scientific, and Cultural Organization, *Protocol to amend the Convention of 2 February 1971 on wetlands of international importance especially as waterfowl habitat*, 1437 U.N.T.S. 3 (Oct. 1, 1986) (listing arctic countries as signing parties).

¹⁷⁶ See Convention on the Conservation of Migratory Species of Wild Animals, CMS, <https://www.cms.int/en/parties-range-states> [<https://perma.cc/PX8W-F7Y7>] (last visited Nov. 4, 2021) (listing arctic countries as signing parties).

¹⁷⁷ See Convention on the prevention of marine pollution by dumping of wastes and other matter, Aug. 30, 1975, 1046 U.N.T.S. 120 (listing arctic countries as signing parties).

¹⁷⁸ See Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters, Oct. 30, 2001, 2161 U.N.T.S. 447 (listing arctic countries as signing parties).

¹⁸⁰ See Paris Agreement to the United Nations Framework Convention on Climate Change, Dec. 12, 2015, T.I.A.S. No. 16-1104 (listing arctic countries as signing parties).

Convention) 179				Activities	
		Convention on Long- range Transboundar y Air Pollution		The 1990 International Convention on Oil Pollution Preparedness, Response and Co-operation	
		The Montreal Protocol on Substances That Deplete the Ozone Layer ¹⁸¹		The Convention on Biological Diversity	
		Convention on the Transboundar y Effects of Industrial Accidents ¹⁸²		Convention for the Protection of the World Cultural and Natural Heritage	

1. UNCLOS

The United Nations Convention on the Law of the Sea (“UNCLOS”),¹⁸³ the “constitution” for the seas, is central to the way the world protects or fails to protect the Arctic. UNCLOS governs activities of the 168 parties that have ratified it, including all of the Arctic states except the United States. The United States follows the main provisions of UNCLOS as customary international law.

UNCLOS “zones” the oceans. Nations have agreed to create

¹⁷⁹ See Convention on the Conservation of European Wildlife and Natural Habitats, Sept. 19, 1979 (listing arctic countries as signing parties).

¹⁸¹ See Montreal Protocol, *supra* note 136.

¹⁸² See Convention on the Transboundary Effects of Industrial Accidents, Mar. 17, 1992, 2105 U.N.T.S. 457 (listing arctic countries as signing parties).

¹⁸³ United Nations Convention on the Law of the Sea, Dec. 10, 1982, 1833 U.N.T.S. 397 [hereinafter UNCLOS].

demarcations of the waters, regulating what can be done and by which countries within each of these limited areas. Varying amounts of sovereignty exist in the zones, areas which extend from the internal waters to the high seas.

As one moves away from a country's shoreline, the degree of authority or control that a country has decreases to zero (see Figure 1).

Figure 1:¹⁸⁴



In the internal waters, states have complete sovereignty except for limitations created by other treaties or obligations existing under customary international law.¹⁸⁵ Therefore, because activities on land and in waters that flow to the Arctic affect the Arctic environment, the strength of an individual country's environmental protection law of its own waters is crucial to overall Arctic environmental quality. Most Arctic nations have strong national environmental laws with good enforcement and records of compliance.¹⁸⁶

¹⁸⁴ Carlson et al., *Scramble for the Arctic: Layered Sovereignty, UNCLOS, and Competing Maritime Territorial Claims*, 33 SAIS REV. 21, 24 (2013).

¹⁸⁵ UNCLOS, *supra* note 183, at Part II, § 1, art. 2(3).

¹⁸⁶ There is some variability depending on the category of protection, such as for biodiversity, conservation of natural resources, and control of black carbon. This is a strong

The Territorial Seas, where ships have rights of innocent passage and transit passage,¹⁸⁷ extend twelve nautical miles, measured from “baselines” determined by the Treaty.¹⁸⁸ Here, the coastal states act to conserve living resources in the zone. These states have authority to prevent violations of their fishing rules and to, generally, preserve the environment and control pollution in that part of the sea.¹⁸⁹ Most Arctic nations have highly developed management systems in this area although there are gaps.¹⁹⁰

The Territorial Seas are followed by the Contiguous Zones, extending twelve to twenty-four nautical miles from the baseline. In this zone, the coastal state can regulate many activities, including management of wastes.¹⁹¹ The UNCLOS language includes “prevent[ing] infringement of its . . . sanitary laws.”¹⁹²

Beyond these areas are the Exclusive Economic Zone (EEZ) and the Continental Shelf. The EEZ, generally extending over the same space as the Continental Shelf, governs the resources and activities in the water and on the ocean surface. It can extend up to two hundred nautical miles from the shore. Here, the coastal nation has authority to conserve and manage natural resources, both living and non-living, and to protect the marine environment.¹⁹³ The coastal states can exploit or conserve resources found within the water, on the sea floor, or under the sea floor’s subsoil.¹⁹⁴ These resources include fish, oil, and natural gas. Land-locked and geographically disadvantaged states can take some of the surplus of the living resources of this zone of the coastal states in their region.¹⁹⁵ Coastal states may manage treatment of marine mammals more strictly than the requirements noted in the Treaty.¹⁹⁶

contributor to climate change formed when combustion of fuels and organic material is incomplete.

¹⁸⁷ UNCLOS, *supra* note 183, at Part II § 3 art. 17, 37.

¹⁸⁸ *Id.* at Part II, § 2, art. 3. They may be straight lines or other forms depending on the nature of a country’s shoreline, its islands, and reefs. *Id.*

¹⁸⁹ *Id.* at Part II, § 3, art. 21.

¹⁹⁰ *See id.*

¹⁹¹ *See* UNCLOS, *supra* note 183, at Part II, § 4, art. 33(1)(a).

¹⁹² *Id.*

¹⁹³ *Id.* at Part V, art. 56(1)(a).

¹⁹⁴ *Id.*

¹⁹⁵ *Id.* at Part V, art. 69.

¹⁹⁶ *Id.* at Part V, art. 65 (“Nothing in this Part restricts the rights of a coastal state . . . to prohibit, limit or regulate the exploitation of marine mammals more strictly than

The Continental Shelf extends along the natural prolongation of a country's land to the outer edge of the continental margin, which is two hundred miles or more in some circumstances. Here, the coastal states have the right to explore and exploit the non-living natural resources, sedentary species, and activities of the seabed, and subsoil under the ocean.¹⁹⁷ Oysters, clams, and mussels are among the sedentary species: those of "constant physical contact with the seabed."¹⁹⁸ Countries have fought over whether crabs and lobsters are included.¹⁹⁹

Because the extent of the Continental Shelf for Arctic nations remains an unsettled matter, the rules which govern beyond two hundred miles are not fully determined. The process for demarcating the zone involves recommendations made by the Commission on the Limits of the Continental Shelf. As of mid-2021, several Arctic state petitions are before the Commission and their substantive requests cannot all be met.²⁰⁰ The Commission does not decide; rather it analyzes and judges the science presented by the petitioning state.²⁰¹ This situation leaves uncertain which rules will apply to some of the sea bottom and resources below it in the Arctic, as explained further below.

Rules under The Law of the Sea direct countries to cooperate and protect those fish which come and go in their waters.²⁰²

provided for in this Part."); *see id.* at Part VII, §1, art. 117 ("All States have the duty to take, or to cooperate with other States in taking, such measures for their respective nationals as may be necessary for the conservation of the living resources of the high seas.").

¹⁹⁷ *See id.* at Part VI, art. 77(1), (4).

¹⁹⁸ *Id.* at Part VI, art. 77(4); *see Bivalves*, WATER ENCYCLOPEDIA (2021), <http://www.waterencyclopedia.com/Bi-Ca/Bivalves.html> [<https://perma.cc/KF67-MTX2>].

¹⁹⁹ Joanna Mossop, *The Relationship Between the Continental Shelf Regime and a New International Instrument for Protecting Marine Biodiversity in Areas Beyond National Jurisdiction*, ICES J. MARINE SCI. 444, 445 (2017).

²⁰⁰ *See infra* text accompanying note 366 (discussing strict no-take zones when it comes to the goal of protecting and restoring marine biodiversity).

²⁰¹ *Commission on the Limits of the Continental Shelf (CLCS) Purpose, functions and sessions*, U.N. DIV. OCEAN AFF. L. SEA, https://www.un.org/depts/los/clcs_new/commission_purpose.htm [<https://perma.cc/5Z2Z-BGVC>] (last visited Nov. 4, 2021).

²⁰² UNCLOS, *supra* note 183, at Part V, art. 63 ("Stocks occurring within the exclusive economic zones of two or more coastal States or both within the exclusive economic zone and in an area beyond and adjacent to it."); *See id.* at Part V, art. 64

Migratory species, fish that cross zones, are given special protection.²⁰³ UNCLOS recognizes that coastal states are limited in what they can do to protect these moving animals. It defines which fish fall into this category, including tunas, sharks, swordfish, and billfish.²⁰⁴ The treaty instructs nations to work together to develop programs to limit the excessive take of these species. Marine mammals are also given special consideration.

2. *High Seas*

“Specifying the high seas as the object of the inquiry requires a caveat. . . . UNCLOS deliberately does not contain a geographic definition of the high seas.”²⁰⁵ The high seas legal regime coexists with the legal regime of the continental shelf.

The High Seas are the waters beyond the UNCLOS zones.²⁰⁶ There, coastal state jurisdiction ends. In the Arctic Ocean, there are about 1.1 million square miles (around 2.85 million square kilometers) of “areas beyond national jurisdiction” (“ABNJ”), sometimes known as the “Arctic donut hole.”²⁰⁷ The UNCLOS provisions on the High Seas apply to all parts of the sea that are not included in the EEZ, in the territorial sea, in the internal waters of a State, or in the archipelagic water of an archipelagic state.²⁰⁸

The Central Arctic Ocean (“CAO”) is the largest area of high seas in the Arctic. It is surrounded entirely by the EEZs of Canada, the Kingdom of Denmark (namely, Greenland and the Faroe Islands), Norway, the Russian Federation, and the United States, and spans an area of approximately 2.8 million square kilometers (1.1 million square miles)—virtually the same size as the Mediterranean Sea.²⁰⁹

(addressing highly migratory species).

²⁰³ See UNCLOS, *supra* note 183, at Part V, art. 64.

²⁰⁴ *Id.* at Annex I.

²⁰⁵ Bernard H. Oxman, *High Seas Governance: Gaps and Challenges*, 114 AM. J. INT'L L. 796, 797 (2020).

²⁰⁶ UNCLOS, *supra* note 183, at Part VII.

²⁰⁷ Mia Bennett, *The Donut Hole at the Center of the Arctic Ocean*, CRYOPOLITICS (June 23, 2015), <https://www.cryopolitics.com/2015/06/23/the-donut-hole-at-the-center-of-the-arctic-ocean/> [<https://perma.cc/3DKZ-M2D7>].

²⁰⁸ UNCLOS, *supra* note 183, at Part VII, § 1.

²⁰⁹ *Exploring the Arctic Ocean: The Agreement that Protects an Unknown Ecosystem*, ARCTIC COUNCIL (Oct. 28, 2020), <https://arctic-council.org/en/news/exploring-the-arctic-ocean-the-agreement-that-protects-an-unknown->

No law is in place that all nations agree controls in these important areas. But some international rules do cover these places. For fishing, for example, cooperative agreements exist, such as the Code of Conduct for Responsible Fisheries of the Food and Agricultural Organization of the United Nations.²¹⁰ Further, regional organizations have been established to regulate fishing in the high seas. They set quotas for the number of fish that can be caught, then divide this “total allowable catch” among states.²¹¹ Arctic nations are members of a number of regional fisheries’ management organizations.²¹²

No matter what decisions are made on the extent of the outer

ecosystem/#:~:text=To%20bring%20the%20area%20into,and%20the%20United%20States%2C%20and [https://perma.cc/F2CU-WFWS].

²¹⁰ See *Code of Conduct for Responsible Fisheries*, FOOD & AGRIC. ORG. U.N., <https://www.fao.org/fishery/code/en> [https://perma.cc/3697-Q22U] (last visited Oct. 26, 2021).

²¹¹ UNCLOS, *supra* note 183, at Art. 4.

²¹² Regional Fisheries Management Organizations (RFMO) in the area are the North Atlantic Fisheries Organization (NAFO) and the North East Atlantic Fisheries Commission (NEAFC). There are also other national and intergovernmental organizations that manage commercial stocks of the Arctic. Roland Blomeyer et al., *Fisheries Management and the Arctic in the Context of Climate Change*, EUR. PARLIAMENT DIRECTORATE-GENERAL FOR INT’L POLICIES 1, 15 (2015).

reaches of the continental shelves²¹³ of Arctic countries,²¹⁴ up to two million square kilometers (777,200 square miles) of the Arctic will still not be covered because they are beyond the sovereign powers of nation states under UNCLOS zones.²¹⁵ The surface of the

213 UNCLOS Article 76 defines the continental shelf as “compris[ing] the seabed and subsoil of the submarine areas that extend beyond its territorial sea throughout the natural prolongation of its land territory to the outer edge of the continental margin.”

3. The continental margin comprises the submerged prolongation of the land mass of the coastal State, and consists of the seabed and subsoil of the shelf, the slope and the rise. It does not include the deep ocean floor with its oceanic ridges or the subsoil thereof.

4.

(a) For the purposes of this Convention, the coastal State shall establish the outer edge of the continental margin wherever the margin extends beyond 200 nautical miles from the baselines from which the breadth of the territorial sea is measured, by either:

(i) a line delineated in accordance with paragraph 7 by reference to the outermost fixed points at each of which the thickness of sedimentary rocks is at least 1 per cent of the shortest distance from such point to the foot of the continental slope; or

(ii) a line delineated in accordance with paragraph 7 by reference to fixed points not more than 60 nautical miles from the foot of the continental slope.

(b) In the absence of evidence to the contrary, the foot of the continental slope shall be determined as the point of maximum change in the gradient at its base.

5. The fixed points comprising the line of the continental shelf on the seabed, drawn in accordance with paragraph 4 (a)(i) and (ii), either shall not exceed 350 nautical miles from the baselines from which the breadth of the territorial sea is measured or shall not exceed 100 nautical miles from the 2,500 metre isobath, which is a line connecting the depth of 2,500 metres.

6. Notwithstanding the provisions of paragraph 5, on submarine ridges, the outer limit of the continental shelf shall not exceed 350 nautical miles from the baselines from which the breadth of the territorial sea is measured. This paragraph does not apply to submarine elevations that are natural components of the continental margin, such as its plateaux, rises, caps, banks and spurs.

UNCLOS, *supra* note 183, art. 76.

214 As of 2018, Arctic nations have not yet established jurisdiction over areas beyond their Exclusive Economic Zones. Overlapping claims include Canada and Denmark; Canada and the United States; Denmark and Norway; Denmark and Russia; Norway and Russia; Russia and the United States; and Canada, Denmark and Russia. Stephanie Pezard et al., *The Future of Arctic Cooperation in a Changing Strategic Environment*, RAND CORP. 1, 3 (2018).

215 The area is about 2.8 million square kilometers in the case of the water column and is less in the case of the seabed. See Stewart M. Patrick, *Why the U.N. Pact on High Seas Biodiversity Is Too Important to Fail*, WORLD POLITICS REV. (July 8, 2019), <https://www.worldpoliticsreview.com/articles/28011/why-the-u-n-pact-on-high-seas-biodiversity-is-too-important-to-fail> [<https://perma.cc/V9UR-3TXN>].

sea, the water below it, and the bed of the sea make up a significant area in need of more attention to their environments. These include places of historically unprecedented fisheries collapse such as of the pollock in the 1980s.²¹⁶ The area is environmentally important because of its fisheries, mineral resources, and biodiversity. There is a need for much greater knowledge in the Arctic concerning all of these areas.

a. Some Fisheries' Rules

The global legal regime for high seas fisheries does apply to the CAO. The rules provided by the law of the sea are the 1982 UNCLOS, the 1995 U.N. Fish Stocks Agreement,²¹⁷ the 1995 Code of Conduct for Responsible Fisheries,²¹⁸ and a number of U.N. General Assembly Resolutions.²¹⁹ Now also in effect is the Central Arctic Ocean Fisheries Agreement.²²⁰ In 2018, the five Arctic Ocean coastal states (Canada, Denmark [on behalf of Greenland and the Faroe Islands], Norway, Russia, and the United States – the ‘Arctic Five’) and China, the European Union (EU), Iceland, Japan, and South Korea signed the Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean (CAOFA).²²¹ The objective of the CAOFA is to prevent unregulated fishing in the high seas portion of the CAO “through the application of precautionary conservation and management measures as part of a long-term strategy to safeguard healthy marine ecosystems and to ensure the conservation and sustainable use of fish stocks.”²²²

²¹⁶ Kevin M. Bailey, *An Empty Donut Hole: The Great Collapse of a North American Fishery*, 16 *ECOLOGY & SOC'Y* 28 (2011).

²¹⁷ U.N. Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks, *Agreement For The Implementation of The Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks*, U.N. Doc. A/CONF.164/37, (Sept. 8, 1995).

²¹⁸ *Code of Conduct for Responsible Fisheries*, *supra* note 210.

²¹⁹ Valentin Schatz, Alexander Proelss & Nengye Liu, *The 2018 Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean: A Primer*, EJIL (Oct. 26, 2018), <https://www.ejiltalk.org/the-2018-agreement-to-prevent-unregulated-high-seas-fisheries-in-the-central-arctic-ocean-a-primer/> [<https://perma.cc/CC7L-X795>].

²²⁰ *Agreement to prevent unregulated high seas fisheries in the central Arctic Ocean*, GOV'T OF CANADA (Oct. 3, 2018), <https://www.dfo-mpo.gc.ca/international/agreement-accord-eng.htm> [<https://perma.cc/AY3D-WFUZ>] [hereinafter CAOFA].

²²¹ *Id.*

²²² Valentin Schatz et al., *The 2018 Agreement to Prevent Unregulated High Seas*

Prior to the CAOFA, the CAO had not been part of a comprehensive regional fisheries agreement, although a bit of the CAO does fall within the area of the North-East Atlantic Fisheries Commission. Other regional fisheries management organizations (RFMOs) and arrangements (RFMAs) do not provide a mandate for comprehensive fisheries regulation in the CAO. The Svalbard Treaty, although the meaning of which on access to certain resources is not agreed upon, also addresses sharing of fishing rights in parts of the Arctic.²²³

The CAOFA covers species of fish, mollusks, and crustaceans, but not sedentary species, as defined by UNCLOS (which are covered in the continental shelf law under UNCLOS).²²⁴ The CAOFA has a sunset clause and will be automatically renewed unless one of the parties objects.²²⁵ Underscoring the view of sustainability as embracing cultural traditions, the CAOFA is an example of integration of principles of the U.N. Declaration on the Rights of Indigenous Peoples in international law-making.²²⁶

b. Other Resources Beyond National Jurisdiction

More comprehensive resource coverage is lacking in the Arctic High Seas. However, many countries are now actively negotiating a global treaty on marine biodiversity in this area.²²⁷ The treaty would promote the “conservation and sustainable use” of marine resources and living organisms in the high seas, an expanse encompassing fifty percent of the planet’s surface and all the water below.²²⁸ These riches can belong to anyone, everyone, or no one, depending on what rules are made. These areas are home to deep-sea coral fields. They are also a place where carbon is stored through phytoplankton, fisheries abound, and yet-to-be-discovered

Fisheries in the Central Arctic Ocean: A Critical Analysis, 34 INT’L J. MARINE & COASTAL L. 195, 222 (2019).

²²³ The wording of the CAO agreement was aimed to avoid conclusions on the status of waters around Svalbard (or Spitsbergen) where Norway has fisheries jurisdiction, but other nations have rights to engage in, inter alia, fishing. *Id.*

²²⁴ UNCLOS, *supra* note 183, art. 77(4).

²²⁵ CAOFA, *supra* note 220, art. 13(2).

²²⁶ G.A. Res. 61/295, United Nations Declaration on the Rights of Indigenous Peoples (Oct. 2, 2007).

²²⁷ Vito De Lucia, *The BBNJ Negotiations and Ecosystem Governance In The Arctic*, MARINE POL’Y 1, 1-2 (2019).

²²⁸ *Id.*

genetic resources exist (i.e., valuable material from plants, animals, and microbes that need to be sustained to maintain the complexity of life and which also can be used for human products).²²⁹ The treaty would create special areas of high seas marine protection, develop a means of sharing benefits from the resources, and require environmental studies before actions are taken. As of 2020, the United Nations' negotiations on the treaty were postponed until 2021 because of the COVID-19 pandemic.

Among the uncertainties related to which law applies are unknowns about the determinations of the continental shelf boundary demarcations and the future decisions of affected Arctic states after those are made.

Mining is guided in part by the concept of the common heritage of mankind. It holds that certain riches that are found in the seas are owned by mankind as a whole and should be shared in ways that benefit not only the rich but also poorer nations. UNCLOS created the International Seabed Authority (ISA), based in Jamaica, to manage the eventual exploitation of High Seas seabed.²³⁰ Its activities reflect a compromise among nations that advocated a sharing of resources and those—most vociferously the United States—that strongly opposed it. ISA nonetheless reflects the general idea of common heritage in its work. It has a double function: develop deep-sea minerals and protect the environment. The ISA creates policies for the seabed and contracts with private and public corporations to explore and later mine areas of the deep seabed. The area covers around 54% of the total area of the world's oceans.²³¹ All state parties to UNCLOS are members of ISA. Thus, all Arctic states, except the United States, are members.²³² The ISA has made some efforts for environmental protection such as in requiring environmental assessments of activities done in the Area.²³³

The Law of the Sea also has *general environmental protection parts*.²³⁴ The countries of the world must work, individually or

²²⁹ *Id.*

²³⁰ *About ISA*, INT'L SEABED AUTH., <https://www.isa.org.jm/about-isa> [<https://perma.cc/J4K9-98QG>] (last visited Oct. 16, 2021).

²³¹ *Id.*

²³² *Id.*

²³³ UNCLOS, *supra* note 183, art. 145.

²³⁴ *Id.*

together, to control pollution from ships, activities on land, the exploitation of the seabed, and dumping. Countries also need to protect and preserve rare or fragile ecosystems and the habitat of endangered and other marine life. The treaty requires the use of the “best practicable means” available to achieve these goals.²³⁵

Under UNCLOS, the coastal states in the Arctic have additional powers in ice-covered areas. One section applies to areas of ice coverage for most of the year.²³⁶ This may allow coastal states broader powers to set rules for ship construction and other activities on vessels in their waters.

3. *Interpreting the Rules*

The Law of the Sea provides a variety of means to resolve legal questions. For boundary questions, the Commission on the Limits of the Continental Shelf makes recommendations to states on the establishment of the outer limits of the continental shelf beyond two hundred nautical miles.²³⁷ In the Arctic, the five Arctic coastal states have or soon will have submitted Commission recommendations on the outer limits of the continental shelf.²³⁸ As of late 2020, the Commission was still considering submissions made by the Russian Federation for the Arctic Ocean (following up on an earlier submission).²³⁹ What happens if these disputes are left unresolved is unknown. Also unclear are next steps if the Commission’s decisions are rejected. Rulings may not be binding under customary international law.²⁴⁰ Thus, there is some concern that the Commission’s results will not lead to formal resolution of competing claims of Arctic states.²⁴¹

²³⁵ UNCLOS *supra* note 183, § XII, art. 194.

²³⁶ UNCLOS, *supra* note 183, § VII, art. 234.

²³⁷ *Id.*

²³⁸ *Commission on the Limits of the Continental Shelf (CLCS) Purpose, Functions and Sessions*, U.N. DIV. OCEAN AFF. L. SEA, https://www.un.org/Depts/los/clcs_new/commission_purpose.htm [<https://perma.cc/RW8C-MEH3>] (last visited Oct. 16, 2021).

²³⁹ *Id.*

²⁴⁰ See Press Release, Division for Ocean Affairs and Law of the Sea, Commission on Limits of Continental Shelf Concludes Fifty-First Session, U.N. Press Release SEA/2120 (Dec. 2, 2019).

²⁴¹ See Terence Andrew, Jr., *Finding the Right Forum: The Need for Novel Multilateral Diplomatic Solutions to Resolve Competing Territorial Claims Over the Arctic’s Natural Resource* (Oct. 31, 2013).

Under UNCLOS and other laws relevant to the Arctic dispute, resolution mechanisms available include negotiations and voluntary negotiations, arbitration of a number of kinds, a special arbitral tribunal for specified categories of disputes including over fisheries and other environmental matters, and the International Court of Justice.

4. *Law Beyond the Law of the Sea*

There are numerous other sources of environmental rules for the Arctic. The International Maritime Organization (IMO) is legally influential through treaties and “soft law.”²⁴² In 2017, its Polar Code, which is more stringent than requirements imposed by other marine international law, entered into force. It is binding under the International Convention for the Safety of Life at Sea (SOLAS) and the International Convention for the Prevention of Pollution from Ships (MARPOL).²⁴³ It covers the full range of shipping relevant to navigation in polar water. It bans discharges of oil residues from ships traveling in the polar regions.²⁴⁴ One part covers safety,²⁴⁵ while a second covers pollution prevention.²⁴⁶ The Code prohibits discharges of chemicals used to clean ships and tanks.²⁴⁷ It requires that food waste that is generated on polar going ships be ground and disposed several miles away from land or the nearest ice formation.²⁴⁸

Some rules do not include all states, all Arctic states, or all peoples of the Arctic.²⁴⁹ Bilateral agreements include the 1983

²⁴² See Mark P. Nevitt & Robert V. Percival, *Polar Opposites: Assessing the State of Environmental Law in the World's Polar Regions*, 59 B.C. L. REV. 1655, 1657 (2018).

²⁴³ *Introduction to IMO*, INT'L MARITIME ORG., <https://www.imo.org/en/About/Pages/Default.aspx> [<https://perma.cc/GHS4-Q7R2>] (last visited Oct. 17, 2021).

²⁴⁴ MARPOL itself was amended in 2010. Regulation 43 prohibits carrying fuels of a prescribed densities at given temperatures. *Table of MARPOL amendments*, AUSTRALIAN MARITIME SAFETY AUTHORITY, <https://www.amsa.gov.au/marine-environment/marine-pollution/table-marpol-amendments> [<https://perma.cc/FA57-8MAN>] (last visited Oct. 17, 2021).

²⁴⁵ *International Code for Ships Operating in Polar Waters (Polar Code)*, INT'L MAR. AUTH., <https://www.imo.org/en/OurWork/Safety/Pages/polar-code.aspx> [<https://perma.cc/8ZCP-EXVD>] (last visited Oct. 17, 2021).

²⁴⁶ *Id.*

²⁴⁷ *Id.* pt. II-A.

²⁴⁸ *Id.* pt. II-A, ¶ 5.2.1.

²⁴⁹ See *id.*

²⁴⁹ See e.g., Vienna Convention on the Law of Treaties art. 32, opened for signature

Canada-Denmark Agreement, in which the two nations agreed to cooperate and protect the marine environment within their areas of responsibility.²⁵⁰ Regional groups also create rules and norms for the Arctic. The Barents Euro-Arctic Council of the five Nordic states, the European Union Commission, and Russia (BEAR) is a platform for promotion of sustainable economic and social development in the Barents Region.²⁵¹ The Barents Regional Council (BRC), constituted by seven subnational governments, provincial, county and oblast, and the Saami Council is another cooperation protocol.²⁵² Indigenous peoples have advisory roles in both organizations.²⁵³

Many domestic laws have an Arctic reach.²⁵⁴ Some of these address substantive rights of indigenous people, and others address participation in decision making.²⁵⁵ Both types play an important function in promoting notions of sustainability that include indigenous peoples.²⁵⁶

May 23, 1969, 1155 U.N.T.S. 331.

²⁵⁰ Agreement for Cooperation Relating to the Marine Environment, Den.-Can., Aug. 26, 1983, 1348 U.N.T.S. 122.

²⁵¹ Barents Euro-Arctic Council, *Declaration: Cooperation in the Barents Euro-Arctic Region Conference of Foreign Ministers in Kirkenes*, (Jan. 11, 1993) https://www.barentsinfo.fi/beac/docs/459_doc_KirkenesDeclaration.pdf. See also *Cooperation in the Barents Euro-Arctic Region*, BARENTS EURO-ARCTIC COUNCIL, <https://www.barentscooperation.org/en> [<https://perma.cc/Y9ZP-TB34>].

²⁵² See Barents Euro-Arctic Council, *Protocol Agreement from the Statutory Meeting of the Regional Council of the Barents Region (The Euro-Arctic Region)* (Jan. 11, 1993) (outlining the BEAR agreement terms) [hereinafter *BEAR Protocol*]. See also SAAMI COUNCIL, *THE SÁMI ARTIC STRATEGY 4* (2019).

²⁵³ See *BEAR Protocol*, *supra* note 252, at 2 (“[The] Regional Council of the Barents Euro-Arctic Region [] will include . . . [the] representation of the indigenous peoples of the Region.”).

²⁵⁴ Nevitt & Percival, *supra* note 242, at 1687 (describing the limited effectiveness of Arctic law due to the varying legal status of indigenous peoples in domestic law).

²⁵⁵ See *id.*

²⁵⁶ See Robert T. Anderson, *The Katie John Litigation: A Continuing Search for Alaska Native Fishing Rights After the Alaska Native Claims Settlement Act (ANCSA)*, 51 ARIZ. STATE L.J. 845, 857–58 (2019) (“ANCSA’s affirmative elimination of aboriginal hunting and fishing rights has had devastating effects on Native subsistence uses and has made it extremely difficult for Native tribes to have a role in co-management of subsistence resources.”). See also CANADIAN CHARTER OF RIGHTS AND FREEDOMS [CONSTITUTION], § 25, Part I of the Constitution Act, 1982, being Schedule B to the Canada Act, 1982, c 11, § 25 (U.K.) (providing for indigenous rights and requirements of consulting with indigenous peoples.).

a. Ozone depletion

The Arctic has a central place in the story of the ozone hole. A number of rules control and eventually ban worldwide the production and use of chemicals that weaken the ozone layer, a protective layer of the earth's atmosphere within the stratosphere. These are the original Vienna Convention for the Protection of the Ozone Layer and instruments culminating in the sixth Amendment (Kigali) to the Montreal Protocol in 2016 (The Ozone Regime).²⁵⁷ The substances, now in the aggregate called ozone depleting substance, were ubiquitous after World War II when they came to be used in air conditioners, spray cans, refrigerators, and many other consumer products.²⁵⁸ They were considered benign with no toxic effects until the chemical reaction which led to creation of the ozone hole was discovered.²⁵⁹ Rapidly for a world response, a system of legal controls on these chemicals, beginning with chlorofluorocarbons (CFCs), was adopted. Starting in 1976, an initiative began with United Nations actions—at first modest because the full effects of the chemical reaction and its effects on humans (cataracts, skin cancers, etc.) and nature (destruction of phytoplankton, for example) were not fully appreciated.²⁶⁰ Quickly, however, science established that these effects were becoming increasingly alarming, and the nations of the world developed an elegant treaty group.²⁶¹ The Ozone Regime does not target only the Arctic itself, but, as with the Antarctic, it is a direct beneficiary of the rules.²⁶² The hole over the poles should be metaphorically closed within several decades if the nations of the world continue to comply with the rules.²⁶³ However, there will be years when the Arctic ozone layer oscillates, and global climate change will counter some of the positive results, as ozone-depleting substances account

²⁵⁷ Montreal Protocol, *supra* note 136.

²⁵⁸ JAMES W. ELKINS, *ENCYCLOPEDIA OF ENVIRONMENTAL SCIENCE* 78–80 (David E. Alexander & Rhodes W. Fairbridge eds., 1999).

²⁵⁹ *See id.*

²⁶⁰ Peter M. Morrisette, *The Evolution of Policy Responses to Stratospheric Ozone Depletion*, 29 *NAT. RES. J.* 793 (1989).

²⁶¹ *Id.*

²⁶² *See* ELKINS, *supra* note 258, at 78-80 (noting that ozone loss was enhanced in Polar regions by CFC pollution).

²⁶³ *See* Guus J. M. Velders et al., *The Importance of the Montreal Protocol in Protecting Climate*, 104 *PROC. NAT'L ACAD. SCIS.* 4814, 4814 (2007) (noting the impact of the Montreal Protocol on the reduction of ozone layer loss.).

for about half of the global warming in the Arctic.²⁶⁴

b. Species protection

A complex web of national and international rules exists to protect endangered or threatened species, some iconic or lovable (at least from a distance) in the Arctic, as for the world.

A main global treaty is the Convention on the International Trade in Endangered Species of Flora and Fauna, generally called CITES.²⁶⁵ CITES controls the trade in selected plants and animals, subjecting them to regulation of import, export, and re-export (and introduction from the sea).²⁶⁶ The nature of the requirements depends on the seriousness of the challenge to extinction that a species confronts; different levels of vulnerability are published in appendices.²⁶⁷ Among the species found in the Arctic with varying degrees of protection are whales (the fin, the bowhead, the sperm, the humpbacked, the Minke, the killer and the Beluga), the white-tailed eagle, the Polar bear, and the walrus.²⁶⁸ Arctic species of particular popularity that are not affected are seal, reindeer, and musk oxen.²⁶⁹

Other treaties that govern in the Arctic through membership by Arctic states are the Convention on Biological Diversity,²⁷⁰ the Convention on Conservation of Migratory Species of Wild Animals,²⁷¹ the International Convention of the Regulation of Whaling,²⁷² the Cartagena Protocol on Biosafety to the Convention on Biological Diversity,²⁷³ the Nagoya Protocol on Access to

²⁶⁴ See *id.* at 4817 (discussing the varying ozone layer levels throughout the years).

²⁶⁵ Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Mar. 3, 1973, 993 U.N.T.S. 243.

²⁶⁶ See *id.* art. III.

²⁶⁷ See *id.* art. II (noting that different appendices apply based on their extinction status).

²⁶⁸ See Summary of CITES Appendices I, II and III, CONVENTION ON INT'L TRADE IN ENDANGERED SPECIES (2021) (providing a list of all species under CITES protections).

²⁶⁹ *Id.*

²⁷⁰ Convention on Biological Diversity, Jun. 5, 1992, 1760 U.N.T.S. 79.

²⁷¹ Convention on Conservation of Migratory Species of Wild Animals, Jun. 23, 1979, 1651 U.N.T.S. 4.

²⁷² International Convention of the Regulation of Whaling, Dec. 2, 1946, 161 U.N.T.S. 72.

²⁷³ Cartagena Protocol on Biosafety to the Convention on Biological Diversity, Jan. 29, 2000, 2226 U.N.T.S. 208.

Genetic Resources, and the Fair and Equitable Sharing of Benefits Arising from Their Utilization.²⁷⁴

The tensions between some notions of environmental protection and cultural protection are reflected in a hard-fought case in the Arctic involving seal hunting (including seal pups).²⁷⁵ Rules under the World Trade Organization law were at issue. Supporters of annual seal hunts say they provide important income for fishery workers and that the hunts are important parts of traditional cultural practices.²⁷⁶ Animal rights activists and some environmentalists oppose the hunts in part because of the means used to kill the animals and the age of some of the seals killed.²⁷⁷ Rules aimed to stop the hunts have been adopted in many places, and among the most important were in the European Union (EU).²⁷⁸ Its Seal Regime bans the sale of seal products in all EU member states, with a few exceptions including for products from hunts by indigenous peoples.²⁷⁹ The ban specifically targets commercial sealing operations, such as those in two Arctic nations, Canada and Norway.²⁸⁰ The two nations complained in a case brought before the World Trade Organization (WTO).²⁸¹

A lower court or panel of the WTO found that the EU's ban on imported seal products is justified under a section of trade rules involving protection of public morals, here specifically on the grounds of animal welfare.²⁸² However, the ban was discriminatory in the way it is applied; it needed to be changed to comply with global trade rules.²⁸³ The EU had not made comparable efforts to

²⁷⁴ Nagoya Protocol on Access to Genetic Resources, and the Fair and Equitable Sharing of Benefits Arising from Their Utilization, Convention on Biological Diversity (Oct. 29, 2010).

²⁷⁵ See Appellate Body Report, European Communities—Measures Prohibiting the Importation and Marketing of Seal Products, WTO Doc. WT/DS400/AB/R, WT/DS401/AB/R (adopted June 18, 2014).

²⁷⁶ See, e.g., *id.* ¶ 2.56.

²⁷⁷ See, e.g., *id.* ¶ 2.131.

²⁷⁸ *Id.* ¶ 1.2.

²⁷⁹ *Id.*

²⁸⁰ See Appellate Body Report, European Communities—Measures Prohibiting the Importation and Marketing of Seal Products, WTO Doc. WT/DS400/AB/R, WT/DS401/AB/R (adopted June 18, 2014).

²⁸¹ *Id.*

²⁸² *Id.* ¶ 5.139.

²⁸³ See Appellate Body Report, European Communities—Measures Prohibiting the

facilitate access of the Canadian Inuit to the exception to the hunting ban as it did for the Greenlandic Inuit. WTO rejected an appeal by Canada and Norway, setting a precedent that animal welfare can prevail over the right to trade.²⁸⁴

The dispute was one of the most polarizing and complex in WTO history and marked the first time that the WTO body accepted animal welfare as moral grounds for justifying a country's violation of the global trade body's "most favored nation" principle.²⁸⁵

The Arctic program is a "partner program" in the United Nations Environment Programme (UNEP) Regional Seas Programme (RSP).²⁸⁶ "Partner" means the connection of the sea or region to the United Nations is less formal than for others, such as for the Mediterranean—one of the oldest and most active programs.²⁸⁷ There are calls for formalizing and strengthening the program in the Arctic to move in the direction of making rules, which is discussed in the next Section.²⁸⁸

c. The Arctic Council-cooperation and influencing rules

Initiatives that influence the quality of the Arctic's social and physical environment do not only include specific rules. An organization that is playing a central place in the Arctic world and beyond is the Arctic Council. The Council is a forum that promotes cooperation, coordination, and interaction among the Arctic nations and the Arctic peoples (native and others).²⁸⁹

In 1991, Finland convened a conference in Rovaniemi of the eight Arctic states. There they signed the Rovaniemi Declaration,²⁹⁰ adopting the Arctic Environmental Protection Strategy, a

Importation and Marketing of Seal Products, WTO Doc. WT/DS400/AB/R, WT/DS401/AB/R (adopted June 18, 2014).

²⁸⁴ *Id.*

²⁸⁵ *Id.*

²⁸⁶ *Regional Seas Programme*, U.N. ENV'T PROGRAMME, <https://www.unep.org/explore-topics/oceans-seas/what-we-do/regional-seas-programme> [<https://perma.cc/A89N-8366>] (describing the various conventions established for sea regions).

²⁸⁷ *Id.* (mentioning the various types of agreements between members).

²⁸⁸ *Id.*; see *infra* Section E.4 (noting the recommendation for the Arctic's future involvement with the Regional Seas Programme).

²⁸⁹ Arctic Council, Declaration on The Establishment of The Arctic Council, art. 1, (Sept. 19, 1996) [hereinafter Ottawa Declaration].

²⁹⁰ Arctic Council, Declaration on The Protection of Arctic Environment, Jun. 14, 1991.

nonbinding agreement among the Arctic nations. In a rare outcome for international institutions, some indigenous peoples of the Arctic were also represented through the Indigenous Peoples Secretariat. It is composed of three Permanent Participants: the SAAMI Council (Nordic and Western Russia), the Inuit Circumpolar Conference (U.S., Canada, Greenland, and Russia), and the Association of Indigenous Minorities of the North—Siberia and the Far East of the Russian Federation.²⁹¹

This relationship formalized in 1996, when the eight Arctic nations signed a declaration that created the Arctic Council.²⁹² Its mandate is broad, but it does not address military security.²⁹³ Now, the Arctic Athabaskan, Aleut, Gwich'in, Inuit, Sami, and forty-one indigenous peoples of the Russian Association of Indigenous Peoples of the North sit as Permanent Participants at the Council meetings, along with elected and appointed government officials.²⁹⁴

The Arctic Council has acted as a self-described catalyst for three international agreements entered into by the Arctic states negotiating legally binding agreements.²⁹⁵ These are the Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic (2011);²⁹⁶ the Agreement on Cooperation on Marine Oil Pollution Preparedness and Response in the Arctic (2013);²⁹⁷ and the Agreement on Enhancing International Arctic Scientific Cooperation (2017).²⁹⁸

The Arctic Council has organized initiatives on several items, some of which we argue below should be elevated to binding law status.

²⁹¹ See *id.* at 1. See generally INDIGENOUS PEOPLES' SECRETARIAT, <https://www.arcticpeoples.com/#ride> [<https://perma.cc/RCG2-C9CY>].

²⁹² See Ottawa Declaration, *supra* note 289, art. 1.

²⁹³ See *id.* at n. 1.

²⁹⁴ See *id.* art. 2–3 (providing a list of all members, observers and permanent participants to agreement).

²⁹⁵ *International Cooperation in the Arctic*, ARCTIC COUNCIL: OUR WORK, <https://arctic-council.org/explore/work/cooperation/> [<https://perma.cc/B9C7-ANAW>] (last visited Nov. 15, 2021) (listing the agreements the council is party to).

²⁹⁶ Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic, May 12, 2011, TIAS No. 17-605, 50 I.L.M. 110.

²⁹⁷ Arctic Council, *Agreement on Cooperation on Marine Oil Pollution Preparedness And Response In The Arctic*, (May 12, 2011).

²⁹⁸ Arctic Council, *Agreement on Enhancing International Arctic Scientific Cooperation* (May 12, 2011).

d. Soft Law

Arctic countries also act in accordance with soft law, concepts they wish to have influence: aspirations for the protection of the planet.²⁹⁹ The term soft law refers to principles that may later structure more formal rules and, in the meantime, can guide discussion, negotiations, and even decisions.³⁰⁰ An example is the Precautionary Principle. Found in the preambles of some treaties and widely referred to by negotiators and scholars, it states, to use the form coming from the 1992 Rio environmental meeting: “Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.”³⁰¹

In the Arctic, the principles are the underlying basis for the Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean (CAOFA).³⁰²

Also, within the inventory of “soft law” in 2015, the United Nations stated a set of international goals for sustainable development.³⁰³ There are seventeen—those that are most relevant to the Arctic include:

- Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.
- Goal 5. Achieve gender equality and empower all women and girls.
- Goal 6. Ensure availability and sustainable management of water and sanitation for all.
- Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all.
- Goal 8. Promote sustained, inclusive and sustainable economic

²⁹⁹ See Nevitt & Percival, *supra* note 242, at 1656 (explaining that “the Arctic region lacks a unifying Arctic treaty and is governed by the newer ‘soft law’ global environmental law model”).

³⁰⁰ See *id.*

³⁰¹ The United Nations Conference on Environment and Development, Rio Declaration on Environment and Development, U.N. Doc. A/CONF.151/26/Rev.1 (Vol. 1), annex I, Principle 15 (Aug. 12, 1992).

³⁰² Agreement To Prevent Unregulated High Seas Fisheries in The Central Arctic Ocean, Oct. 3, 2018, <https://www.dfo-mpo.gc.ca/international/documents/pdf/EN-CAO.pdf> (entered into force Jun. 25, 2021).

³⁰³ See *The 17 Goals*, U.N. DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS, <https://sustainabledevelopment.un.org/?menu=1300> [<https://perma.cc/CEG8-CBJ2>].

growth, full and productive employment and decent work for all.

- Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.
- Goal 13. Take urgent action to combat climate change and its impacts.
- Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development.³⁰⁴

e. No more major rules?

In 2008, the five Arctic coastal states adopted the Ilulissat Declaration.³⁰⁵ It concluded that there was no need for a new comprehensive international legal regime to govern the Arctic Ocean.³⁰⁶

By virtue of their sovereignty and jurisdiction in large areas of the Arctic Ocean, the five coastal states are in a unique position to address these possibilities and challenges. Notably, the law of the sea provides for important rights and obligations concerning the delineation of the outer limits of the continental shelf, the protection of the marine environment, including ice-covered areas, freedom of navigation, marine scientific research, and other uses of the sea. We remain committed to this legal framework and to the orderly settlement of any possible overlapping claims.³⁰⁷

The Declaration suggests a geopolitical position that is controversial among some non-Arctic nations. Our recommendations below do not subscribe fully to the Declaration; we conclude that Arctic environmental governance and efforts to maintain and further promote Arctic sustainability are not solely of interest to Arctic nations.

f. National Law

Rules for Arctic environmental protection and sustainability also come from the laws of the individual Arctic states themselves, laws that apply in their Arctic territories. The inventory here is also large. It includes “environmental law” but also laws not labeled environmental, which often have great influence on the

³⁰⁴ *See id.*

³⁰⁵ *See* Ilulissat Declaration, May 28, 2008, 48 I.L.M. 362.

³⁰⁶ *See id.* at 2.

³⁰⁷ *Id.* at 1.

environment. Many of the Arctic countries require environmental impact assessments, wherein they consider the environmental consequences before making a decision on actions that may harm the environment. Arctic countries have laws on coastal zone management, endangered species law, fisheries protection law, and wetland protection, to name a few.

National rules can also extend in reach outside of a country; this exercise of power is called the extraterritorial reach of domestic law. Countries may claim extraterritorial effects for various reasons: one is a state's national security interest. There are several sources of this authority, such as Principle 21 of the Stockholm Declaration.³⁰⁸

g. Indigenous law

i. Understandings of this term

There are a number of understandings of the meaning of the term indigenous law.³⁰⁹ However, each of them finds examples in the Arctic. If understood as the norms and cultural practices of indigenous peoples, "what had to be followed, done, or not done" in indigenous cultures, they understand them independent of codification or recognition by government they are many.³¹⁰ If understood as agreements between indigenous peoples and a federal or other government in a country, these include those of general and transformative influence that also implicate environmental protection and sustainability, such as the Nunavut Land Claims Agreement (Nunavut Agreement)³¹¹ and the Alaskan land claims

³⁰⁸ U.N. Conference on the Human Environment, Declaration of the United Nations Conference on the Human Environment, U.N. Doc. A/CONF.48/14/Rev.1, pt II, Principle 21 (Jun. 16, 1972) (requiring that countries ensure that activity within them does not cause damage to the environment of another state or the global commons).

³⁰⁹ See PHILOSOPHIES OF POLAR LAW (ed. Dawid Bunikowski & Alan D. Hemmings 2020).

³¹⁰ See, e.g., MARIANO AUPILAJUK ET AL., INUIT LAWS (ed. Jarich Oosten, Frederic Laugrand, & Willem Rasing 2017).

³¹¹ The Nunavut Land Claims Agreement (Nunavut Agreement), between the Inuit of the Nunavut Settlement Area and Canada. The Nunavut Agreement was ratified, given effect to, and declared valid by the Parliament of Canada in 1993 with the coming into force of the Nunavut Land Claims Agreement Act. Prior to 1993, the Northwest Territories Fishery Regulations provided the management regime for implementing fisheries and resource management principles under the Fisheries Act. These regulations continue to apply within the Nunavut Territory, but "they have not been amended to fully reflect the principles and elements of the Nunavut Agreement." *Nunavut Fisheries Regulations*, FISHERIES & OCEANS CANADA (Mar. 28, 2019), <https://www.dfo->

acts.³¹²

Other more specific rules include the Nunavut Fishery Regulations which aim to ensure fish stocks sustainably; they recognize the Inuit's existing approach to fisheries management and harvesting rights.³¹³

h. Arctic Rules from the Courts

Opinions or decisions of courts or other tribunals are also part of the corpus of Arctic law.³¹⁴ The inventory of cases is large.³¹⁵ National court environmental cases are numerous, and climate change is a major focus. A U.S. example is *Native Village of Kivalina v. ExxonMobil*.³¹⁶ The Village of Kivalina sued over two dozen energy companies in a California district court.³¹⁷ It charged that the companies' massive greenhouse gas emissions resulted in global warming, leading to severe erosion of the land where the city is located.³¹⁸ The suit, brought under the common law of nuisance, argued that the companies knew that their operations were causing harm and conspired to keep it secret.³¹⁹ The lawsuit failed; the court concluded that this is a politically charged conflict that the courts are unfit to resolve.³²⁰

Kivalina is one example of the use of the litigation strategy that started with some innovative lawyers in a small number of cases. The number of climate-change-based cases alone brought before U.S. courts reached more than a thousand.³²¹ The number may grow

mpo.gc.ca/acts-lois/rules-reglements/rule-reglement35-eng.htm.

³¹² 43 U.S.C. §§ 1601-1629h.

³¹³ Northwest Territories Fishery Regulations, C.R.C. c 847 (Can.).

³¹⁴ The Sea Shepherd, the seal pups, and the Arctic Sunrise Russian piracy cases are part of the jurisprudence influencing sustainability decisions in the Arctic.

³¹⁵ See, e.g., the exhaustive treatment in the Sabin Center for Climate Change Law at Columbia Law School, <https://climate.law.columbia.edu/> [<https://perma.cc/9GCN-UMJV>].

³¹⁶ *Native Vill. of Kivalina v. ExxonMobil Corp.*, 696 F.3d 849, 858 (9th Cir. 2012) (affirming the judgment of the district court).

³¹⁷ *Native Vill. of Kivalina v. ExxonMobil Corp.*, 663 F.Supp.2d 863 (N.D. Cal. 2009).

³¹⁸ *Id.* at 869.

³¹⁹ *Id.*

³²⁰ *Native Vill. of Kivalina*, 696 F.3d 849 at 858.

³²¹ According to the Climate Change Center at Columbia University Sabine Center, they have used both state law and federal law and a range of legal arguments. Parties use

as science more accurately indicates specific causes of climate change and those responsible.³²²

Causes of action and theories vary in these lawsuits. In 2013, environmental groups unsuccessfully challenged the U.S. Environmental Protection Agency's permits that authorized exploratory drilling in the Arctic Ocean.³²³ The permits will result in Shell emitting more than 250 tons of pollutants every year. Environmentalists argued that greenhouse gases and black carbon from ships would accelerate the melting of the snow pack and sea ice in the Arctic in Native Alaskan communities.³²⁴ Claims under the Endangered Species Act involve the listing (more precisely, the failure to list) and conservation of threatened and endangered species.³²⁵ Most U.S. courts have held that the effects of climate change need to be considered when deciding whether to list species and to determine their habitats, including in the Arctic. In one case, pinpointing a habitat for polar bears was allowed to go forward, even though the area was an industrial staging area for oil and gas operations.³²⁶ In Canada, a case focused on procedures: a hamlet was sued for failure to consult with indigenous peoples on seismic testing in the Arctic.³²⁷

arguments based on legislation, federal law such as the Clean Air Act or the National Environmental Policy Act; constitutional claims; state law; and common law civil actions and creative new arguments.

³²² In 2013, scientists linked 63% of cumulative worldwide greenhouse gas emissions from 1854 to 2010 to just 90 companies. See Richard Heede, *Tracing Anthropogenic Carbon Dioxide & Methane Emissions to Fossil Fuel & Cement Producers, 1854–2010*, 122 CLIMATIC CHANGE 229, 229 (2014). In 2015, the International Energy Agency used data to estimate the total amount of emissions from the top twenty greenhouse gas-emitting countries. The United States came in second, only behind China.

³²³ *Resisting Env't'l Destruction on Indigenous Lands (REDOIL) v. U.S. EPA*, 716 F.3d 1155 (2013).

³²⁴ Many cases brought under the federal air quality law have had similar fates: petitions were denied, or claims dismissed. Environmentalists have, however, seen some success.

³²⁵ See Barry Kellman, *Climate Change in the Endangered Species Act: A Jurisprudential Enigma*, 46 ENV'T'L L. REP. NEWS & ANALYSIS 10845, 10846 (2016).

³²⁶ *Alaska Oil & Gas Ass'n v. Jewell*, 815 F.3d 544, 559 (9th Cir. 2016). See also *Alaska Oil & Gas Ass'n v. Prizker*, 2014 WL 3726121 at *16 (D. Alaska, 2014) (finding that the listing of a certain kind of bearded seal as endangered was arbitrary and capricious when there was "no quantified threat of extinction within the reasonably foreseeable future").

³²⁷ A decision of the Supreme Court Canada in *Clyde River (Hamlet) v. Petroleum Geo-Services Inc.*, 2017 S.C.C. 40, 1 S.C.R. 1069 (2017), overturned a Canadian National

The goals of lawsuits vary: some aim to move toward zero emissions, some wish to keep all coal in the ground, some seek sustainable development, some emphasize preservation, and some push for remediating the damage already caused or paying for it. This range of goals makes for varied plaintiffs.

i. A Public Trust?

Some actions are based on alleged violations of the public trust. Under this theory, the atmosphere is seen as a resource that is common to all people. Governments cannot convey, give, or sell public trust resources to private entities except in very legally constrained circumstances.³²⁸ Governments hold common property resources—air, wildlife, water—in an endowment. The government is trustee, and it must manage the corpus or resource for present and future generations; the trustees must protect the assets. As stated in *Illinois Central*,³²⁹ “[t]he State can no more abdicate its trust over property in which the whole people are interested . . . than it can abdicate its police powers.”³³⁰ Public trust-based lawsuits aim at “decarbonizing the atmosphere” and “drawing down” excess carbon dioxide in the atmosphere.³³¹ Plaintiffs in a

Energy Board decision. The Board had allowed seismic testing relating to oil and gas production in the Arctic Ocean, the Canadian Supreme Court ruled that the Board did not properly consult with the Inuit of the area. There are many more lawsuits: an environmental law group sues a natural gas provider for negligent management of pipelines; governments are sued for alleged illegal approval of oil and gas projects; governments themselves claim public nuisance for the way energy companies run their power plants. Cases charge that company officials knew, or should have known, about the climate impacts of their activities. National cases have been brought throughout the world. They total several hundred in Argentina, Austria, Brazil, Chile, Czech Republic, Estonia, Germany, India, Indonesia, Kenya, Mexico, the Netherlands, Nigeria, Pakistan, the Philippines, Slovenia, South Korea, Sweden, Uganda, the United Kingdom, Australia, Belgium, Canada, Colombia, Ecuador, France, Guyana, Ireland, Japan, Luxembourg, Nepal, New Zealand, Norway, Peru, Poland, South Africa, Spain, Switzerland and Ukraine. In addition, cases have been brought by the European Union (55) and various human rights organizations before a variety of tribunals. See THE CLIMATE CHANGE LIT. DATABASES, <http://climatecasechart.com/climate-change-litigation/> [https://perma.cc/2VNS-STHD].

³²⁸ See e.g. MICHAEL C. BLUMM & MARY WOOD, *THE PUBLIC TRUST DOCTRINE IN ENVIRONMENTAL AND NATURAL RESOURCES LAW* (3d Ed. 2021). On the seminal articulation and explanation of the doctrine, see Joseph L. Sax, *The Public Trust Doctrine in Natural Resource Law: Effective Judicial Intervention*, 68 MICH. L. REV. 471 (1970).

³²⁹ *Ill. Cent. R.R. v. Illinois*, 146 U.S. 387 (1892).

³³⁰ *Id.* at 453.

³³¹ Mary Christina Wood, “*You Can’t Negotiate with a Beetle*”: *Environmental Law*

number of cases are children.³³² They plead that they and future generations will suffer the greatest injuries of climate change from the government's failure to protect the common atmosphere today.³³³

The public trust doctrine has been applied in national courts in the United States, India,³³⁴ the Netherlands,³³⁵ Pakistan,³³⁶ and Uganda.³³⁷ Some mention the Arctic explicitly; others, were they to succeed, would protect the Arctic environment by limiting fossil fuel exploitation, helping villages hurt by climate change, and requiring the study of damage to the Arctic for proposed new projects.³³⁸

j. International Tribunals

Cases on climate change in the Arctic have been heard by international tribunals. The Circumpolar Conference, a nongovernmental indigenous peoples organization, brought a case before the Inter-American Commission on Human Rights, an organ of the Organization of America States.³³⁹ The Circumpolar Conference argued that climate change linked to emissions of greenhouse gases in the United States violated their rights to maintain a traditional way of life.³⁴⁰ In sections which highlight the special importance of climate change in the Arctic, the petition

for a New Ecological Age, 50 NAT. RES. J. 167, 200–02 n.102 (2010).

³³² See e.g., *Juliana v. United States*, 217 F. Supp. 3d 1224 (D. Or. 2016); *Filippone ex rel Philippone v. Iowa Dep't Nat Res.*, 829 N.W. 2d 589 (Iowa App. 2013); *Funk v. Wolf*, 144 A.3d 228 (Pa. App. 2016); *Tex. Comm'n Env't Quality v. Bonser-Lain*, 438 S.W. 3d 887 (Tex. App. 2014).

³³³ *Id.*

³³⁴ *Ridhima Pandey v. Union of India* (OA No. 187/2017).

³³⁵ *Foundation v. Kingdom of the Netherlands*, HAZA C/09/00456689 (Netherlands District Court 2015).

³³⁶ *Leghari v. Pakistan*, WP No 25501/2015 (Lahore High Court of Pakistan 2015).

³³⁷ *Mbabazi et al. v. the Attorney General and National Environmental Management Authority*, No. 283 (High Court of Kampala in Uganda 2012).

³³⁸ The first few cases were dismissed. However, several cases have achieved advances in the courts. In 2016, an Oregon court ruled that minors had standing to make the public trust claim. An appeals court, in 2018, ruled in favor of the children, denying the Trump Administration's attempt to squash the suit. *Juliana v. United States*, 2018 WL 6303774 (D. Or. 2018).

³³⁹ *Petition to the Inter-American Commission on Human Rights Violations Resulting from Global Warming Caused by the United States*, Inter-Am. Comm'n H.R. (2005).

³⁴⁰ *Id.*

stated:

Several principles of international law guide the application of the human rights issues in this case. Most directly, the United States is obligated by its membership in the Organization of American States and its acceptance of the American Declaration of the Rights and Duties of Man to protect the rights of the Inuit The United States also has international environmental law obligations that are relevant to this petition. For instance, the United States also has an obligation to ensure that activities within its territory do not cause transboundary harm or violate other treaties to which it is a party The impacts of climate change, caused by acts and omissions by the United States, violate the Inuit's fundamental human rights These include their rights to the benefits of culture, to property, to the preservation of health, life, physical integrity, security, and a means of subsistence, and to residence, movement, and inviolability of the home The United States of America, currently the largest contributor to greenhouse emissions in the world, has nevertheless repeatedly declined to take steps to regulate and reduce its emissions of the gases responsible for climate change.³⁴¹

Another case was brought before the Inter-American Commission based on violations of human rights on behalf of the Arctic Athabaskan.³⁴² The Athabaskan Peoples, who have lived in the Arctic regions of Canada and the United States for 10,000 years, depend on the Arctic climate for survival.³⁴³ They argued that global warming has changed the Arctic climate drastically, damaging their lives, livelihoods, and culture.³⁴⁴ They sought a declaration that Canada's black carbon emissions violate the American Declaration.³⁴⁵ They also requested an established plan to help mitigate the effects of emissions in the Arctic.³⁴⁶

These actions also face considerable obstacles and have either been denied or are pending after long periods of consideration.

³⁴¹ *Id.* at 5 & 6.

³⁴² Petition to the Inter-American Commission on Human Rights Seeking Relief from Violations of the Rights of Arctic Athabaskan Peoples Resulting from Rapid Arctic Warming and Melting Caused by Emissions of Black Carbon by Canada, Inter-Am. Comm'n H.R. (2013).

³⁴³ *Id.*

³⁴⁴ *Id.*

³⁴⁵ *Id.* at 3.

³⁴⁶ *Id.* at 1.

Nonetheless they bring international attention to climate change effects on identified populations and provide ideas for strategies for later actions. Also, other international law strategies might be employed. For instance, the Convention Concerning Indigenous and Tribal Peoples in Independent Countries provides arguments to pursue climate lawsuits actions in the Arctic, recognizing indigenous peoples' rights to lands and resources traditionally occupied or used by them.³⁴⁷

k. Adaptation based actions

In the Arctic, climate change has already caused erosion, extreme weather events, scorching high temperatures, loss of hunting and fishing habitat, and destruction of traditional villages. Therefore, regardless of the success of mitigation actions, communities face great costs of adaptation to climate change. Lawsuits attempting to address this side of the climate change challenge seek remediation, reparations, and repair. For example, in *Conservation Law Foundation Inc. v. ExxonMobil Corporation*, plaintiffs sought to require management plans for energy facilities that threaten the nearby environment.³⁴⁸

5. Effectiveness

The previously described encyclopedia of rules has contributed to some success in environmental protection and sustainability of the Arctic. Views as to how much has been accomplished vary.

The World Wildlife Foundation grades Arctic nations on topics important to the Arctic environment.³⁴⁹ Canada earned the most As—three for its successes in ecosystems-based management, control of black carbon and methane pollution, and effective management of oil spills.³⁵⁰ The United States and Denmark earned the most Ds; they both received this grade on shipping control, and the United States received a D for ineffective biodiversity

³⁴⁷ Indigenous and Tribal Peoples' Convention, No. 169, art. 14, 15 (June 27, 1989), adopted by the General Conference of the International Labour Organization.

³⁴⁸ *Conservation Law Found. Inc. v. ExxonMobil Corp.*, 448 F. Supp. 3d 7, 12 (D. Mass. 2020).

³⁴⁹ *Arctic Council Scorecard 2019*, WWF (Mar. 23, 2021), <https://arcticwwf.org/work/governance/acscorecard19/> [<https://perma.cc/Z5AD-NGT8>].

³⁵⁰ *Id.*

protection.³⁵¹ Denmark had this same grade for insufficient protection of its conservation areas.³⁵² Overall, across the countries graded, good marks were given for ecosystems-based management and use of environmental impact and risk assessment, and poor marks were given for recognition of the equal partner status of indigenous peoples in Arctic management.³⁵³

Rules that are most often characterized as helpful in the marine environment include UNCLOS, the Polar Code, regional efforts to create Marine Protected Areas, and specific fishing stocks protection. For the air environment, good grades are often given for the Persistent Organic Pollution Convention, the Paris Agreement, the Ozone regime, controls on black carbon, and the Minamata Convention on Mercury.³⁵⁴ As for species protection, whaling, seal, and walrus management, the Polar Bear Treaty, and rules on biodiversity protection have been at least somewhat successful. For required procedures, Arctic observers find valuable the rules requiring consultation with indigenous peoples, cooperation across governments, and environmental impact assessment obligations.³⁵⁵

The Arctic experts (UCI survey) are generally positive about the effectiveness of environmental governance of the Arctic but express considerable concerns about gaps in the law. The Expert Group addressed the following questions: (1) How influential has environmental governance, specific or general, been in improving Arctic conditions?; and (2) Is more international environmental law needed to improve the Arctic environment in the future? In the aggregate, majorities said yes.³⁵⁶ However, strong opinions run contrary to these views, vehemently among some.

E. Future Rules; More to Be Done

To achieve a sustainable future environment of the Arctic, what remains to be done? Policymakers, scholars, experts in and of the

³⁵¹ *Id.*

³⁵² *Id.*

³⁵³ *Id.*

³⁵⁴ *Arctic Council Scorecard 2019, supra* note 349.

³⁵⁵ *Id.*

³⁵⁶ *See* Arctic Survey, *supra* note 3. Once again, the responses are suggestive and not statistically significant. As to the first questions, 60% chose either *very* or *moderately* and 40% chose *slightly*. For the second question over 70% said yes, despite strong commentary that more law was not needed nor helpful.

Arctic, and the literature from which we draw have identified gaps where additional legal initiatives are necessary to assure the sustainability of the Arctic. Not all recommendations are widely shared. Some directly address a range of sustainability goals (such as greater protection of the Central Arctic Ocean); others do so indirectly (such as increasing the range of perspectives and goals in environmental impact assessment); and some focus on specific indicators (such as indigenous peoples' empowerment). In this section, we describe and analyze several.

1. More Fully Protect the Central Arctic Ocean from Unregulated Fishing

There should be a commitment to making permanent the 2018 Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean. The Agreement is in place for up to sixteen years, renewable in increments of five years. There is an opportunity to make it permanent through early international action. Precedent exists (such as with other international agreements including The Kyoto Protocol and the Paris Agreement) for changing political administrations in signatory states to back away from additional commitments. Withdrawal under international law is always a possibility; however, during this period of relative consensus that the prevention of certain types of fishing in the Arctic is important, safeguards could be created to make that action much more difficult.

2. Protect Biodiversity in Areas beyond National Jurisdiction

The International Legally Binding Instrument on the Conservation and Sustainable Use of Marine Biodiversity of Areas Beyond National Jurisdiction should be completed and ratified. In the alternative, Arctic states should create a comprehensive protection regime for the ocean rather than waiting for the larger international treaty.³⁵⁷

³⁵⁷ See generally Julien Rochette et al., *The Regional Approach to the Conservation and Sustainable Use of Marine Biodiversity in Areas Beyond National Jurisdiction*, 49 MARINE POL'Y 109 (2014) (stating that "the regionalisation of international law is an important cornerstone of environmental politics as 'not every international environmental problem needs to be dealt with on a global level'"). See also De Lucia, *supra* note 227 (noting that arctic states "resist a global legal and governance framework for BBNJ, favoring by contrast a regional approach that shall not undermine existing regional and sectoral bodies and institutions."); Christian Prip, *Arctic Ocean Governance in Light of an*

The United Nations has for several years recognized governance gaps related to marine biodiversity in areas beyond national jurisdiction (ABNJ). In 2004, the UNGA established a Working Group to study the conservation and sustainable use of marine biological diversity in these areas.³⁵⁸ That working group later recommended that a “process be initiated” by UNGA that could include the development of a multilateral agreement on the topic.³⁵⁹ It might address marine genetic resources, including benefit sharing; area-based management tools such as marine protected areas (MPAs); environmental impact assessments; capacity-building; and the transfer of marine technology.³⁶⁰ In 2015,³⁶¹ the UNGA decided to develop an international legally binding instrument under UNCLOS.³⁶² However, on many crucial topics, considerable divergence remained. Finally, in December 2017, based on the recommendation of the PREPCOM,³⁶³ the UNGA launched an intergovernmental conference (IGC). At the time of this writing, the IGC has held three substantive sessions scheduled in the resolution. As text-based negotiations finally started, based on text prepared by the President of the IGC,³⁶⁴ matched substantive progress has been slow. The proposed treaty is significant for the marine Arctic because a large portion of the Central Arctic Ocean lies beyond the jurisdiction of any state. Substantive rules adopted under the new treaty, and rules that regulate the relationships between the legally binding instrument (ILBI) and existing institutions that have jurisdiction in the Arctic, have significant implications for biodiversity protection. The outcome can determine, inter alia, an implementing mechanism for ecosystem governance in the Arctic.³⁶⁵

International Legally Binding Instrument on the Conservation and Sustainable Use of Marine Biodiversity of Areas Beyond National Jurisdiction, MARINE POL’Y (forthcoming) (suggesting that Arctic states can go forward with such protections rather than awaiting the global instrument).

³⁵⁸ De Lucia, *supra* note 227.

³⁵⁹ *Id.*

³⁶⁰ *Id.*

³⁶¹ *Id.*

³⁶² *Id.*

³⁶³ Vito De Lucia, *The BBNJ Negotiations and Ecosystem Governance in the Arctic*, MARINE POL’Y 1, 1-2 (2019).

³⁶⁴ *Id.*

³⁶⁵ *Id.*

3. *Establish Additional Marine Protected Areas*

The Arctic marine environment, rich in biodiversity, faces unprecedented pressures from a changing climate that is rapidly warming Arctic waters and melting sea ice, which in turn is creating greater opportunity for increased shipping activities.³⁶⁶ Establishing MPAs is one strategy for mitigating these threats. While there is no single, universal definition of MPAs, the International Union for Conservation of Nature and Natural Resources (IUCN) defines an MPA as a “clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.”³⁶⁷ MPAs may focus on protecting “key ecological features” such as “species, habitats, ecologically and biologically significant areas, geophysical features, [and] landscapes . . . ecological processes and services” such as subsistence harvest, and cultural values,³⁶⁸ such as archaeological sites.³⁶⁹

In the Arctic, it is particularly important that MPAs are established as a network of MPAs,³⁷⁰ which is “a collection of individual MPAs or reserves operating cooperatively and

³⁶⁶ See Neil Bellefontaine & Tafsir M. Johansson, *Arctic Oil Spill Intervention: In Search of an Integrated Approach for the High Seas*, in SUSTAINABLE SHIPPING IN A CHANGING ARCTIC 255, 260 (Lawrence P. Hildebrand et al. eds., 2018); *Protecting the Arctic*, OCEAN CONSERVANCY, <https://oceanconservancy.org/protecting-the-arctic/> [https://perma.cc/9C9P-3BGA] (last visited Feb. 2, 2021).

³⁶⁷ INT'L UNION FOR THE CONSERVATION OF NATURE, GUIDELINES FOR APPLYING THE IUCN PROTECTED AREA MANAGEMENT CATEGORIES TO MARINE PROTECTED AREAS 1, 14 (2012).

³⁶⁸ *Id.* at 8.

³⁶⁹ See e.g., NOAA, MARINE PROTECTED AREAS IN THE U.S. ARCTIC 11 (2020); *Cultural Resources Inventory and Vulnerability Assessment at Bering Land Bridge National Preserve and Cape Krusenstern National Monument, Alaska*, NOAA, <https://marineprotectedareas.noaa.gov/toolkit/cultural-resources-case-study.html> [https://perma.cc/2X4N-2D5F] (last visited Nov. 1, 2021). See also *Cultural Resource Program in Cape Krusenstern National Monument Alaska*, U.S. NAT'L PARK SERV., <https://www.nps.gov/cakr/learn/historyculture/program.htm> [https://perma.cc/G7HB-L6DS] (last visited Feb. 27, 2022); *Cape Krusenstern Archaeological District*, U.S. NAT'L PARK SERV., <https://www.nps.gov/cakr/learn/historyculture/nhl.htm> [https://perma.cc/7C5E-B3UU] (last visited Nov. 15, 2021).

³⁷⁰ See Radhika Kannan, *The Effectiveness of Environmental Laws in Preventing Transboundary Pollution from Oil Drilling in the Arctic*, 45 COLUM. J. ENV'T L. 241, 279–82 (2020); PROTECTION OF THE ARCTIC MARINE ENVIRONMENT, AREA-BASED CONSERVATION MEASURES AND ECOLOGICAL CONNECTIVITY 11–12 (2017).

synergistically, at various spatial scales, and with a range of protection levels that are designed to meet objectives that a single reserve cannot achieve.”³⁷¹ A connected network of MPAs can better protect wide-ranging species, account for increased migration caused by climate change, and connect fragmented habitat.³⁷² This “reflects a general trend within conservation science to move from single-species to more holistic, ecosystem and ocean-wide strategies.”³⁷³

There is no single authority governing the establishment of MPAs. Rather, governments on the local, regional, national, and international levels can establish MPAs through their own legal mechanisms. For example, in August 2019, the Canadian government in collaboration with the Qikiqtani Inuit Association and the government of Nunavut established an MPA named Tuvaijuttuq off the northern coast of Greenland and the Canadian Arctic Archipelago.³⁷⁴ It is the first MPA to be designated by ministerial order under Canada’s Oceans Act for interim protection.³⁷⁵ The Oceans Act, enacted in 1997, provided an unprecedented framework for ecosystem-based ocean management.³⁷⁶ However, in the years following enactment, it fell short of expectations and was recently amended in 2019.³⁷⁷

³⁷¹ Christina K.A. Geijer & Peter J.S. Jones, *A Network Approach to Migratory Whale Conservation: Are MPAs the Way Forward or do all Roads Lead to the IMO?*, 51 MARINE POL’Y. 1, 1 (2015).

³⁷² See, e.g., *id.* at 2; Radhika Kannan, *The Effectiveness of Environmental Laws in Preventing Transboundary Pollution from Oil Drilling in the Arctic* 45 COLUM. J. ENVTL. L. 241, 279 (2020); JAMES HORROX, ENV’T AM. NEW LIFE FOR THE OCEAN 1, 6 (2021).

³⁷³ Geijer & Jones, *supra* note 371, at 1. PAME recommends “four key steps for integrating connectivity into Arctic MPA management and network design” — “(1) Define conservation objectives;” “(2) Synthesize information and identify important nodes (existing or potential MPAs);” “(3) Identify connections for species with planktonic life history phases;” and “(4) Identify connections for active swimmers and flyers.” PROTECTION OF THE ARCTIC MARINE ENVIRONMENT, AREA-BASED CONSERVATION MEASURES AND ECOLOGICAL CONNECTIVITY 21 (2017).

³⁷⁴ Warwick F. Vincent & Derek Mueller, *Witnessing Ice Habitat Collapse in the Arctic*, 370 SCIENCE, 1031, 1031 (2020). See also *Tuvaijuttuq Marine Protected Area*, FISHERIES OCEANS CAN. (Jan. 7, 2020), <https://www.dfo-mpo.gc.ca/oceans/mpa-zpm/tuvaijuttuq/index-eng.html> [<https://perma.cc/F5ZU-LND3>].

³⁷⁵ *Tuvaijuttuq Marine Protected Area*, *supra* note 374.

³⁷⁶ See Oceans Act, S.C. 1996, c. 31 (Can.).

³⁷⁷ See *id.* at 57; see also Megan Bailey et al., *Canada at a Crossroad: The Imperative for Realigning Ocean Policy with Ocean Science*, 63 MARINE POLICY 53 (2016); *Oceans Act*, W. COAST ENVTL. L., <https://www.wcel.org/oceans-act> [<https://perma.cc>].

The Tuvaijuttuq MPA prohibits “new or additional human activities” for up to five years in an area of unique ecological significance³⁷⁸—a portion of the Last Ice Area.³⁷⁹ Scientists predict this region’s multi-year pack ice will be the last remaining summer sea ice in 2040 after all other summer sea ice in the Arctic has disappeared.³⁸⁰ The Tuvaijuttuq MPA provides for some exceptions to its prohibition on human activities including for Inuit wildlife harvesting rights, marine scientific research, emergency activities, and certain activities of foreign entities.³⁸¹

There is debate over the optimal scope of MPA protections. The establishment of MPAs has traditionally caused tension between conservationists and the fishing industry.³⁸² Some conservationists advocate for strict no-take zones supported by evidence that “[n]o-take marine reserves are by far the most effective type of MPA” when it comes to the goal of protecting and restoring marine biodiversity.³⁸³ However, there is growing recognition that including local communities in establishment of MPAs can lead to stronger MPA governance systems, providing benefits both for conservation as well as for livelihood security.³⁸⁴ This

/HR58-6S56].

³⁷⁸ *Tuvaijuttuq Marine Protected Area*, *supra* note 374; *Report on the Designation of the Tuvaijuttuq Marine Protected Area*, FISHERIES OCEANS CAN. (Feb. 25, 2021), <https://www.dfo-mpo.gc.ca/oceans/publications/tuvaijuttuq/designation/index-eng.html> [<https://perma.cc/H78C-TATA>].

³⁷⁹ *The Last Ice Area*, NAT’L GEOGRAPHIC (June 2015) <https://www.nationalgeographic.org/projects/pristine-seas/expeditions/the-last-ice-area/> [<https://perma.cc/SNE5-CJHR>].

³⁸⁰ *Id.*

³⁸¹ *Tuvaijuttuq Marine Protected Area*, *supra* note 374.

³⁸² See e.g., Richard Stafford, *Lack of Evidence that Governance Structures Provide Real Ecological Benefits in Marine Protected Areas*, 152 OCEAN & COASTAL MGMT. 57 (2018); see also, e.g., Charlie J. Gardner et al., *The Rapid Expansion of Madagascar’s Protected Area System*, 220 BIOLOGICAL CONSERVATION 29, 34 (2018) (“[There is a] growing body of recent research which finds little evidence for the effectiveness of community-based, extractive resource management in conserving biodiversity in terrestrial, developing world contexts, primarily due to the differences in objectives between local resource users and conservationists, and the inability of resources users to satisfy their needs through permitted sustainable uses.”).

³⁸³ Eric Sala & Sylvaine Giakoumi, *No-Take Marine Reserves are the Most Effective Protected Areas in the Ocean*, 75 ICES J. MARINE SCI. 1166, 1167 (2018).

³⁸⁴ Richard Stafford, *Lack of Evidence that Governance Structures Provide Real Ecological Benefits in Marine Protected Areas*, 152 OCEAN & COASTAL MGMT. 57-58 (2018).

“participatory governance” of MPAs is particularly important in the Arctic where indigenous peoples have lived for millennia and whose “spiritual and material foundations of . . . cultural identities are sustained by . . . unique relationships to their traditional territories.”³⁸⁵

Despite there being over 300 MPAs throughout the Arctic, a majority of marine areas still remain unprotected.³⁸⁶ This is, in part, because MPAs in the Arctic are all established under national jurisdiction, which does not extend beyond the EEZ, leaving the high seas largely unprotected by MPAs.³⁸⁷ However, even within the EEZ, there is a need for greater coordination between Arctic States to effectively protect marine areas from the transboundary, cumulative impacts of fishing, shipping, and hydrocarbon extraction.³⁸⁸ The Arctic Council should develop guidance on a standardized approach to establishment of MPAs with specific implementation timelines to help achieve greater, more effective protection for the Arctic’s marine ecosystem.³⁸⁹

At the same time, a standardized approach should not sacrifice the flexibility of MPA establishment not requiring pan-Arctic

³⁸⁵ *Indigenous Peoples of the Arctic*, GRID ARENDAL, <https://www.arcgis.com/apps/Cascade/index.html?appid=2228ac6bf45a4cebafc1c3002ffe0c4> [<https://perma.cc/4GAS-XFQD>] (last visited Nov. 15, 2021) (citing *Prevention of Discrimination and Protection of Indigenous Peoples and Minorities*, Commission on Human Rights Sub-Commission on the Promotion and Protection of Human Rights, Fifty-third Session (June 11, 2001)).

³⁸⁶ PROTECTION OF THE ARCTIC MARINE ENVIRONMENT, ARCTIC PROTECTED AREAS INDICATOR REPORT 6 (2017) (indicating that as of 2016, only 4.7% of Arctic marine areas were protected). See also *Explore the World’s Marine Protected Areas*, WORLD DATABASE ON PROTECTED AREAS, <https://www.protectedplanet.net/marine> [<https://perma.cc/A5ME-P36Q>].

³⁸⁷ Millicent McCreath & Lawson W. Brigham, *Challenges for the Establishment of Marine Protected Areas in Response to Arctic Marine Operations and Shipping*, in SUSTAINABLE SHIPPING IN A CHANGING ARCTIC 297, 298 (Lawrence P. Hildebrand et al. eds., 2018). The right of coastal nations to adopt unilateral regulations up to 200 nautical miles from their coasts is given in United Nations Convention on the Law of the Sea, Part V. art. 234, Dec. 10, 1982, S. TREATY DOC. NO. 130-39, 1833 U.N.T.S. 3; *Explore the World’s Marine Protected Areas*, *supra* note 386 (stating only 1.18% of the nearly 27 million square kilometers of protected marine areas is outside national boundaries).

³⁸⁸ See Radhika Kannan, *The Effectiveness of Environmental Laws in Preventing Transboundary Pollution from Oil Drilling in the Arctic*, 45 COLUM. J. ENV’T L. 241, 280 (2020).

³⁸⁹ See *id.* at 279-80.

involvement in certain areas.³⁹⁰ This is not to say that strengthening legal standards for MPAs to enhance Arctic marine protection is not warranted, because it is. Critics point out that “the Arctic Council . . . has no power to establish legally binding duties for member states.”³⁹¹ UNCLOS “does not contain comprehensive prohibitive or protective regulations for the marine environment” and “only sets minimum standards for pollution protection.”³⁹² Particularly in the ABNJ, where no single state has authority and UNCLOS does not specify mechanisms for protecting marine ecosystems, there is little incentive to establish MPAs.³⁹³ This governance gap along with the lack of guidance on MPA establishment suggest a need for a strengthened regulatory framework, which could come from an agreement between the Arctic States to give the Arctic Council the authority to create legally binding MPA regulations.³⁹⁴

a. Particularly Sensitive Sea Areas

There are certain types of MPAs that focus on protections from impacts related to shipping.³⁹⁵ One such comprehensive management tool at the international level is designation of Particularly Sensitive Sea Areas (PSSAs).³⁹⁶ The International Maritime Organization (IMO) has the exclusive authority to designate this protected status through Assembly Resolution 720(17), adopted in 1991.³⁹⁷ The IMO defines a PSSA as “an area that needs special protection . . . because of its significance for recognized ecological, socio-economic, or scientific attributes where such attributes may be vulnerable to damage by international shipping activities.”³⁹⁸ The PSSA designation process is complex,

³⁹⁰ See generally, *Tuvaijuittuq Marine Protected Area*, *supra* note 374 (providing an example of this approach).

³⁹¹ See Kannan, *supra* note 370, at 259.

³⁹² *Id.* at 260.

³⁹³ See *id.* at 259–60. For more, see *Governing Areas Beyond National Jurisdiction*, INTERNATIONAL UNION FOR CONSERVATION OF NATURE: ISSUE BRIEF.

³⁹⁴ See Kannan, *supra* note 370, at 281–82.

³⁹⁵ *Marine Protected Areas: Particularly Sensitive Sea Areas*, NOAA, https://www.gc.noaa.gov/gcil_mpa-pssa.html [<https://perma.cc/FAN7-PZZ3>] (last visited Nov. 15, 2021).

³⁹⁶ *Id.*

³⁹⁷ A. Res. 17/720, I.M.O. Doc. A/RES/17/720 (Nov. 6, 1991).

³⁹⁸ *Id.* at ¶ 1.2.

involving sets of criteria and a multi-stage approval process. There are three considerations required: (1) “the particular attributes of the proposed area;”³⁹⁹ (2) “the vulnerability of such an area to damage by international shipping activities;”⁴⁰⁰ and (3) “the availability of associated protective measures within the competence of IMO to prevent, reduce, or eliminate risks from these shipping activities.”⁴⁰¹

To date, out of the 17 PSSAs the IMO has designated, none are designated in the Arctic.⁴⁰² However, this tool has been contemplated and recommended for use in the Arctic.⁴⁰³ For example, a 2015 case study assessing the potential for a PSSA designation to protect “transboundary marine environmental and cultural resources” in the Bering Strait region concluded such a designation “holds the potential to benefit marine mammals and indigenous communities in terms of resilience.”⁴⁰⁴ The Pikialasorsuaq Commission has also recommended consideration of PSSAs as a tool for protecting the Pikialasorsuaq, Canada and Greenland’s North Water polynya, which is an area of “open water that remain[s] ice-free throughout the winter due to ocean and wind

³⁹⁹ The area must meet at least one criterion from any of three categories: (1) ecological criteria; (2) social, cultural, and economic criteria; or (3) scientific and educational criteria. At least one of these criteria must exist “throughout the entire proposed area, though the same criterion need not be present throughout the entire area.” International Maritime Organization Res. A.982(24) ¶ 4.4, U.N. Doc. A.24/Res.982 (Feb. 6, 2006) [hereinafter Res. A.982(24)].

⁴⁰⁰ *Id.*

⁴⁰¹ An applicant is limited to measures that have been adopted or will be approved by the IMO. See Res. A.982(24), *supra* note 399.

⁴⁰² See *Particularly Sensitive Sea Areas*, INT’L MARITIME ORG, <http://www.imo.org/en/OurWork/Environment/PSSAs/Pages/Default.aspx> [<https://perma.cc/F232-VUS5>].

⁴⁰³ See *Specially Designated Marine Areas in the Arctic High Seas*, PROTECTION ARCTIC MARINE ENV’T, <https://pame.is/projects/arctic-marine-shipping/amsa/specially-designated-marine-areas-in-the-arctic-high-seas> [<https://perma.cc/KP8B-CJ6P>] (reporting on the application of this tool in the High Seas of the Arctic.). See also Timo Koivurova et al., *The Arctic Ocean: Are We Ready to Govern a New Ocean?*, in GLOBAL CHALLENGES AND THE LAW OF THE SEA 59 (Marta Chantal Ribeiro et al., eds. 2020) (noting the central Arctic Ocean “appears to be a prime candidate” for designation as a particularly sensitive sea area). But see Elise Johansen & Tore Henriksen, *Climate Change and the Arctic: Adapting to Threats and Opportunities in Arctic Marine Waters*, in RESEARCH HANDBOOK ON CLIMATE CHANGE, OCEANS AND COASTS (Jan McDonald et al. eds., 2020).

⁴⁰⁴ Kevin Hillmer-Pegram & Martin D. Robards, *Relevance of a Particularly Sensitive Sea Area to the Bering Strait Region: A Policy Analysis Using Resilience-Based Governance Principles*, 20 ECOLOGY & SOC’Y 25, 25 (2015).

currents” and that supports a diversity of marine life “as a result of the upwelling of nutrient-rich waters.”⁴⁰⁵

The centralized authority of the IMO facilitates a standardized approach to creating PSSAs that the establishment of MPAs lacks. The “high-level authoritative status of the IMO” also grants PSSAs “unparalleled international recognition” compared to many other marine protected areas.⁴⁰⁶ Further, the APMs are enforceable not only against a state’s own flagged ships, but all ships in the area.⁴⁰⁷ The regulatory reach the IMO provides through PSSAs is especially advantageous in that it can provide protections in international waters—waters MPAs have been limited in their ability to protect.⁴⁰⁸

PSSAs do have their shortcomings. Enforcement of APMs is dependent on the flag state and port state compliance with international regulations.⁴⁰⁹ However, in comparison to MPAs, compliance with PSSAs is high, which is likely attributed to the fact that APMs are IMO-endorsed measures.⁴¹⁰ The IMO’s authority does have its limitations. It is constrained by common international law, which requires a balance between marine protection and navigation rights, such that APMs are not permitted to unduly interfere with the right to navigate in international waters.⁴¹¹ Further, PSSAs presents challenges even before reaching the enforcement stage. Extensive, sustained political cooperation is required to successfully implement this management tool in the first place. In the case of the Bering Strait, for example, designation of a PSSA would require overcoming tensions between the United

⁴⁰⁵ Report of the Pikialasorsuaq Commission, *People of the Icebridge: The Future of the Pikialasorsuaq*: Executive Summary at VIII (Nov. 2017).

⁴⁰⁶ See Hillmer-Pegram & Robards, *supra* note 404.

⁴⁰⁷ See *id.*

⁴⁰⁸ See discussion *supra* on MPAs. A broad application of PSSAs could offer greater protection against Arctic Ocean plastics pollution. See Janis Searles Jones et al., *Advancing A Network of Safety Measures in the Bering Strait Region: Now Is the Time*, 25 OCEAN & COASTAL L.J. 64, 121 (2020) (finding that PSSA designation provides opportunity a number of protective measures).

⁴⁰⁹ Geijer & Jones, *supra* note 373, at 9.

⁴¹⁰ *Id.*

⁴¹¹ United Nations Convention on the Law of the Sea, art. 37 Dec. 10, 1982, S. TREATY DOC. NO. 130-39, 1833 U.N.T.S. 3; see also, e.g., Nilufar Oral, *PSSA for the Black Sea*, 35 U. HAW. L. REV. 787, 799, 801 (2013).

States and Russian Federation⁴¹² and, more generally, between the shipping industry and some environmental groups. Notably, this same governance challenge arises in efforts to establish connected networks of MPAs.⁴¹³

Despite the tradeoffs presented by MPAs and PSSAs, both tools have demonstrated potential to provide effective marine protection in the Arctic. More comprehensive and interconnected protection is needed, and both MPAs and PSSAs can be implemented to achieve such ecosystem-based protection.

4. *Create an Active Arctic Regional Seas Programme with Treaty-Making Goals*

The United Nations Environment Programme (UNEP) Regional Seas Programme (RSP) takes advantage of a comprehensive, ecosystem-based approach with the objective of conserving the marine and coastal environment on a regional level.⁴¹⁴ It consists of three types of Regional Seas Conventions and Action Plans (RSCAPs): (1) those that have been established and are directly administered by UNEP; (2) those that have been established “under the auspices of UNEP,” but are administered by another regional body; and (3) and those that have not been established by UNEP, but cooperate with the RSP.⁴¹⁵ The Arctic falls under this third type of RSCAPs.⁴¹⁶ The Arctic Council cooperates with the RSP through its Protection of the Arctic Marine Environment (PAME) working group.⁴¹⁷ RSPs typically consist of a regional, non-binding action plan supported by legally-binding conventions, and most have a trust fund that is funded by participating states.⁴¹⁸ While most RSPs focus on addressing marine pollution, they can cover additional environmental threats.⁴¹⁹

⁴¹² See Hillmer-Pegram & Robards, *supra* note 404, at 26.

⁴¹³ See Geijer & Jones, *supra* note 371, at 2.

⁴¹⁴ See *Regional Seas Programme*, U.N. ENV'T PROGRAMME, <https://www.unep.org/explore-topics/oceans-seas/what-we-do/regional-seas-programme> [<https://perma.cc/NYY6-T79Q>] (last visited Nov. 1, 2021).

⁴¹⁵ *Id.*

⁴¹⁶ *Id.*

⁴¹⁷ Heather Exner-Pirot, *New Directions for Governance in the Arctic Region*, ARCTIC YEARBOOK 224, 233 (2012).

⁴¹⁸ Kanako Hasegawa, *The Regional Seas Agreements: Lessons Learned*, 2 WWF MAG. 9, 10–11 (2016).

⁴¹⁹ Oran Young, *Governing the Arctic Ocean*, 72 MARINE POL'Y 271, 276 (2016)

A regional seas agreement in the Arctic could facilitate the management of shipping, fisheries, oil and gas activity, and the development of protected areas. The recommendation to establish an Arctic RSP first appeared in the 2015 Iqaluit Declaration, in which Arctic Council Ministers established a task force to evaluate the need for a regional seas program.⁴²⁰ The idea, however, has mostly languished, partly because of some perceived weaknesses in the UNEP RSP. These include restrictions due to strict adherence to budget protection by U.N. agencies, over-extension of personnel and financial resources, and the perception that UNEP is “dominated by the advice of environmentalists, conservationists, and academics” and fails “to give full consideration to the potential contribution of the private sector.”⁴²¹ This orientation could be especially detrimental in the Arctic, where industry offers considerable technical and scientific expertise.⁴²²

Despite these criticisms of the UNEP RSP, there is still a case for establishment of an Arctic RSP.⁴²³ There are established RSPs in place that can provide guidance in developing an Arctic RSP, such as that in the Baltic.⁴²⁴ Arctic states can also benefit from the experience of U.N. agencies and affiliated bodies who are actively involved in RSPs. For example, UNEP provides technical support for Action Plan development and coordinates regional activities with global initiatives.⁴²⁵ UNEP is limited financially in that it relies on funds provided by participating states, as mentioned above. To

(citing the OSPAR arrangement as an example of a regional seas agreement that covers multiple issues in addition to pollution).

⁴²⁰ *Iqaluit Declaration*, ARCTIC COUNCIL, 6 (2015), https://oaarchive.arctic-council.org/bitstream/handle/11374/662/EDOCS-2547-v1-ACMMCA09_Iqaluit_2015_Iqaluit_Declaration_formatted_brochure_low-res.PDF?sequence=6&isAllowed=y.

⁴²¹ Roger D. Needham & Maureen Jedyneck-Copley, *The United Nations Regional Seas Programme: General Guides and Principles*, 14 CAN. WATER RES. J. 42, 44–49 (1989).

⁴²² *Id.* at 44.

⁴²³ See, e.g., Amber Rose Maggio, *Resource Use Conflicts in Arctic Waters: A Legal Perspective*, in ARCTIC MARINE SUSTAINABILITY: ARCTIC MARITIME BUSINESSES AND THE RESILIENCE OF THE MARINE ENVIRONMENT 443 (Eva Pongrácz et al., eds, 2020).

⁴²⁴ JOSEPH F. C. DiMENTO & ALEXIS HICKMAN, ENVIRONMENTAL GOVERNANCE OF THE GREAT SEAS: LAW AND EFFECT (2012). For example, challenges resulting from pollution from land can be addressed as they are covered in the HELCOM Annexes.

⁴²⁵ Kanako Hasegawa, *The Regional Seas Agreements: Lessons Learned*, 2 WWF MAGAZINE 9, 11 (2016).

address concerns regarding this challenge, Arctic states could use their substantial influence to promote greater allocation of resources to the UNEP RSP and to advocate for greater representation of indigenous peoples in regional seas sustainability initiatives.

Alternatively, a regional seas program could be established independent of the U.N. This may be the more feasible approach, given the negative perception of UNEP and Arctic coastal states' resistance to U.N. involvement and any arrangements that reduce their decision-making authority in relation to non-Arctic states.⁴²⁶ As mentioned above, this was contemplated by the Arctic Council when the United States was its chair from 2015 to 2017. That Task Force on Arctic Marine Cooperation recommended a "new Arctic Council subsidiary body and other complementary enhancements . . . to existing Arctic Council mechanisms."⁴²⁷ A second task force took up this mandate; however, at the direction of Senior Arctic Officials, it focused only on complementary enhancements of the Arctic Council institutions and not on the recommendation for a new subsidiary body.⁴²⁸

Although the Arctic Council lacks authority to create legally binding obligations for its member states, this is not an impediment to negotiation of a legally binding regional seas agreement.⁴²⁹ An agreement could be (1) negotiated by the Arctic governments, which then establish links between it and the Council;⁴³⁰ (2) undertaken under the auspices of the Arctic Council; or (3) negotiated by member states with the aim of conferring international legal personality to the Council, which would then negotiate the agreement.⁴³¹

⁴²⁶ See Oran Young, *Governing the Arctic Ocean*, 72 *MARINE POL'Y* 271, 276 (2016).

⁴²⁷ *Report to Ministers of the Task Force on Arctic Marine Cooperation*, ARCTIC COUNCIL (2017).

⁴²⁸ *Recommendations By The Task Force On Arctic Marine Cooperation II For Complementary Enhancements Of The Arctic Council Institutions Including The SAO Based Mechanism To Coordinate Marine Issues In The Arctic Council*, ARCTIC COUNCIL (March 2018).

⁴²⁹ Sebastien Duyck, *Legal Issues Related to Options for a Regional Seas-Type Arrangement for the Arctic Ocean*, N. INST. ENV'T & MINORITY L. 5, 5 (2014).

⁴³⁰ *Id.* at 15–16 (referencing the Jeddah Convention as an example of a regional sea agreement linked with an existing organization).

⁴³¹ Brooks B. Yeager, *Coordinating Ocean Management in the Arctic: Options and Possible Next Steps for the Arctic Council*, NAT. RES. DEF. COUNS. (Mar. 25, 2014).

5. *More Fully Protect Cultural Resources*

Each of the Arctic 8 countries are parties to the 1972 World Heritage Convention,⁴³² but there are few World Heritage sites in the Arctic territories and there are no Intangible Heritage sites in the Arctic. Several have been recommended or suggested.⁴³³

Important gaps exist in the rules that seek to protect Arctic traditions, cultures including artifacts and sacred sites, and how the rules are enforced. Custodians of these special places are stymied for many reasons. Infrastructure construction does not always recognize the existence or importance of sites deeply revered by indigenous people. Meaningful protection can be seen as slowing economic development. There is abuse through nonmanaged tourism or exploitation of cultural treasures.⁴³⁴ Meanwhile, the erosive and destructive actions of climate change continue to harm these treasures. New approaches need to be created. These can come from interpretations and applications of customary law, such as the Precautionary Principle. Also, international human rights law, including the U.N. Declaration on the Rights of Indigenous Peoples (UNDRIP),⁴³⁵ can be used to protect the cultural value to indigenous people, which properly understood, is value to all humankind.⁴³⁶

Indigenous people “can pursue further their right to maintain and strengthen their distinctive spiritual relationship with their

⁴³² *World Heritage Convention*, WORLD HERITAGE, <https://www.iucn.org/theme/world-heritage/about/world-heritage-convention> [<https://perma.cc/5YNR-T76J>] (last visited Oct. 5, 2021).

⁴³³ *New Report Identifies Potential World Heritage Sites in Arctic Water*, WWF (Apr. 4, 2017), https://wwf.panda.org/discover/knowledge_hub/where_we_work/arctic/publications/?297031/New%2Dreport%2Didentifies%2Dprime%2Dworld%2Dheritage%2Dsites%2Din%2DArctic%2Dwaters [<https://perma.cc/B4NX-MADD>].

⁴³⁴ Heinamaki, Leena, Herrmann, Thora Martina eds., *EXPERIENCING AND PROTECTING SACRED NATURAL SITES OF SÁMI AND OTHER INDIGENOUS PEOPLES*, SACRED ARCTIC (2017); see also Marcus Eriksen et al., *Mitigation Strategies to Reverse the Rising Trend of Plastics in Polar Regions*, 139 ENV'T INT'L. 105704 (2020) (focusing in part on management of tour company operations).

⁴³⁵ G.A. Dec. 61/295, U.N. Doc. A/61/L.67 (Sept. 13, 2007).

⁴³⁶ Sophie Starrenburg, *Cultural heritage protection: a truly 'global' legal problem?*, VÖLKERRECHTSBLOG (Sept. 5, 2018), <https://voelkerrechtsblog.org/de/cultural-heritage-protection-a-truly-global-legal-problem/> [<https://perma.cc/W4WB-B23X>]; see also George Nicholas, *Protecting Heritage Is A Human Right*, CONVERSATION (Sept. 9, 2018), <https://theconversation.com/protecting-heritage-is-a-human-right-99501> [<https://perma.cc/QN7P-SX7S>].

traditionally owned or otherwise occupied and used lands, territories, waters and coastal seas, and other resources and to uphold those responsibilities to future generations”⁴³⁷ For example, the Declaration is part of the foundation upon which the Commission on Pikialasorsuaq based their argument on the Icebridge, which is a migration route from North America historically used by the Inuit who now live along Greenland’s coast.⁴³⁸ The 2018 Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean mentioned earlier also reflects an evolution towards the deeper integration of the Declaration in multilateral law-making.

6. *More Fully Incorporate Indigenous Knowledge and Perspectives in Law and Policy-Making*

Substantive rules and those on processes (environmental impact procedures, citizen participation forms, and the make-up of work groups) need to better recognize and support involvement of indigenous people, incorporating their knowledge, views, perspectives, and experiences as equal contributors to decision making.⁴³⁹ At the international level, going beyond national obligations (such as the Canadian duty to consult on decisions that could interfere with domestic, aboriginal, or treaty rights), new obligations should include a legal requirement to include indigenous peoples in negotiating international environmental agreements and rules on human rights.⁴⁴⁰

This change raises concerns about understandings of sovereignty of the nation states in which indigenous peoples live. If this group of interested persons achieves this status, may there be

⁴³⁷ REPORT OF THE PIKIALASORSUAQ COMMISSION, *PEOPLE OF THE ICEBRIDGE: THE FUTURE OF THE PIKIALASORSUAQ*, A-19 (Nov. 2017), <https://oceansnorth.org/wp-content/uploads/2018/11/Report-of-the-Pikialasorsuaq-Commission-Nov-2017.pdf>.

⁴³⁸ *Id.* at A-6.

⁴³⁹ On approaches to promoting greater consultation and involvement, see Emma Wilson, *Indigenous Rights and Resource Development in the Arctic: An Overview of International Standards and Principles for Consultation, Participation and Consent*, in *REGULATION OF EXTRACTIVE INDUSTRIES: COMMUNITY ENGAGEMENT IN THE ARCTIC* (Rachael Lorna Johnstone & Anne Merrild Hansen eds., 2020).

⁴⁴⁰ Risa Schwartz, *Realizing Indigenous Rights in International Environmental Law - A Canadian Perspective*, 109 *CTR. FOR INT’L GOVERNANCE INNOVATION* 1, 1 (2017); see also Somini Sengupta, Catrin Einhorn & Manuela Andreoni, *There’s a Global Plan to Conserve Nature. Indigenous People Could Lead the Way*, *N.Y. TIMES*, A-13 (Mar. 12, 2021).

pressure to generalize the increased role to other groups? Furthermore, administratively there needs to be a way to identify who is to be involved when there are many different tribes and groups—some very small, some large and without shared perspectives. However, as with other representational challenges, institutions can develop means of selecting representatives, including by having interested groups do so themselves.

7. *Stricter Liability Assignment to Regulate Offshore Energy Installations*

As Arctic sea ice melts, more opportunities follow for exploration and exploitation of fossil fuels and for renewables, which in various parts of the Arctic, include hydropower, wind, solar, tidal movements, geothermal, and nuclear.⁴⁴¹ Careful management can limit damage to sea life, the waters, and coastal communities. However, where it is absent and unforeseen circumstances lead to pollution, death, damage, or destruction, current international law that addresses what must be done is limited. Furthermore, domestic laws of Arctic countries do not create similar obligations.

International law on liability is encompassed in the 1992 International Civil Liability Convention for Oil Pollution Damage (1992 CLC).⁴⁴² That regime is made up of the Civil Liability Convention, the Fund Convention, and the Supplementary Fund Convention.⁴⁴³ All Arctic states except the United States are members of the 1992 Civil Liability Convention. It applies to oil pollution damages in the territorial seas and the EEZ of member states. In a preventative provision, it also applies to collisions beyond the territorial seas if those collisions create threats to cause pollution within a member state's territory.

Individual Arctic states have similar, but in important ways,

⁴⁴¹ Magnus de Witt, Hlynur Stefansson, & Agust Valfell, *Energy Security In The Arctic: Policies And Technologies For Integration of Renewable Energy*, ARCTIC YEARBOOK, <https://arcticyearbook.com/arctic-yearbook/2019/2019-briefing-notes/329-energy-security-in-the-arctic-policies-and-technologies-for-integration-of-renewable-energy> [https://perma.cc/W9XE-7BPQ].

⁴⁴² Protocol of 1992 to Amend the International Convention on Civil Liability for Oil Pollution Damage, 1969, Nov. 27, 1992, 1956 U.N.T.S. 255.

⁴⁴³ Protocol of 1992 to Amend the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage, 1971, Nov. 27, 1992, 1953 U.N.T.S. 330.

different liability law.⁴⁴⁴ Shared provisions include those distinguishing damages caused by fault, negligence, or violations of statutory law from damages resulting from compliant behavior; application of liability rules to specified territories and zones; and compensation for economic losses to defined businesses, such as fishing.

The harsh conditions of the Arctic indicate that, should there be a significant spill, the existing legal regime will not be sufficient to cover damages experienced in the North. Only reasonable costs are admissible for compensation under Article VI(a) of the 1992 International Civil Liability Convention for Oil Pollution Damage.⁴⁴⁵ Furthermore, the unique characteristics of the Arctic environment leave unanswered and uncharted what would be reasonable. Experts conclude that negative effects on biodiversity in the region “may prevail for more than 50 years before natural elimination processes make it disappear.”⁴⁴⁶ Finally, other than IMO rules and those required by flag states, damages in the High Seas, beyond the jurisdiction of Arctic nations, may not be sufficiently covered. More developed rules on civil liability are needed—for oil pollution, accidents, disasters, and even for common activities such as discharges of bunker oil.⁴⁴⁷

Improvements in international law that would be helpful to Arctic sustainability include a broader definition of “ship,” because passenger ships likely will increase their use of Arctic routes for their tourism value.⁴⁴⁸ Another change should expand the areas of environmental damage coverage to include damage to the marine

⁴⁴⁴ See OIL SPILL LIABILITY AND REGULATORY REGIME, THE LAW LIBRARY OF CONGRESS, GLOBAL LEGAL RESEARCH CENTER (June 2010).

⁴⁴⁵ *Liability and Compensation for Oil Pollution Damage*, INT’L OIL POLLUTION COMP. FUNDS, 11 (2008), <https://iopcfunds.org/wp-content/uploads/2018/12/WEB-IOPC-Text-of-Conventions-ENGLISH.pdf>.

⁴⁴⁶ Ikler K. Basaran, *Can the Civil Liability Convention for Oil Pollution Withstand the Pressure of a Major Oil Spill in the Arctic Ocean?*, ARCTIC YEARBOOK, 11 (2018) (citing W. Ostreng, NATURAL SECURITY AND INTERNATIONAL ENVIRONMENTAL COOPERATION IN THE ARCTIC—THE CASE OF THE NORTHERN SEA ROUTE, 83 INSROP (1997)).

⁴⁴⁷ Elizabeth Kirk, *Science Based Governance and Regulation of Arctic Energy Installations*, ARCTIC YEARBOOK (2018); see also Béatrice Schütte, *Marine Pollution in the Arctic Region: What Future for Civil Liability? - The Need for a Comprehensive Liability Scheme*, in TRANSFORMING THE OCEAN LAW BY REQUIREMENT OF THE MARINE ENVIRONMENT CONSERVATION (Patrick Chaumette ed., 2019).

⁴⁴⁸ Article 1 (1), 1992 CLS.

environment. Now, claims are not recognizable for non-economic damages such as loss of recreational fishing spots, whereas loss of revenue for reduced income from parking or mooring fees is recognizable.⁴⁴⁹

Increasing the limits on amounts to be paid may also be advisable as melting increases the amount of shipping and perhaps oil exploration in the Arctic. Finally, should acceptable international liability rules for the High Seas not materialize, nations could extend national application of the CLC 1992 to oil pollution on the High Seas. This change benefits both the would-be polluting ship owner and the environment.⁴⁵⁰

Significant economic risks for investors could follow, which might impede economic development relevant to the overall focus on sustainability of peoples. The trade off on this policy choice is merited as stricter liability rules could encourage other policies to improve economies, such as focusing on renewable energy sources.

8. *Mandate Environmental Studies in More Cases*

Environmental impact assessment is widely undertaken in Arctic nations; however, there are some gaps that limit its effectiveness. Now, Arctic regions face increasingly significant development pressures, including proposed large-scale projects, such as international airports, ports, and energy production facilities. There is a new scale of proposed project; new actors are involved or wanting to be involved, and new impacts result from changing climate. These changes suggest the need for greater depth of environmental analysis.

Greater attention should be given to indigenous peoples' inputs and those of other Arctic inhabitants into the assessment

⁴⁴⁹ Basaran, *supra* note 446 (copying the Norwegian approach). *See also id.* at 12 (citing *Working Paper on the Legal Framework for Civil Liability for Vessel-Sources Oil Spills in Polar Regions*, CMI INTERNATIONAL WORKING GROUP (2017). Recently, a Russian company announced it had paid an almost \$2 billion fine for a 2020 diesel fuel spill of 20,000 tons in the Arctic. President Putin had ordered the company to pay for the spill. Agence France-Presse, *Russian Mining Giant Pays \$2B Fine for Arctic Spill*, COURTHOUSE NEWS SERVICE (Mar. 10, 2021), <https://www.courthousenews.com/russian-mining-giant-pays-2b-fine-for-arctic-spill/> [<https://perma.cc/HV5K-CTFX>].

⁴⁵⁰ *Working Paper on the Legal Framework for Civil Liability for Vessel-Sources Oil Spills in Polar Regions*, CMI INT'L WORKING GROUP, 52 (2017), <https://comitemaritime.org/wp-content/uploads/2018/05/2017-12-15-Civil-Liability-WP-Final.pdf>.

processes.⁴⁵¹ Additional improvements are feasible: dissemination of best practices for environmental Impact Assessment and engagement in the Arctic for large-scale projects; integration of EA and land-use planning and Arctic science programs; use where appropriate of regional environmental analysis; and additions of information on socio-economic conditions in the Arctic.⁴⁵²

EIA can be made stronger by including assessment not only of hard or quantitative, but also qualitative, value-based, and sometimes interpretive contributions. Also, impact assessment should be done for privately negotiated agreements.⁴⁵³ Greenland has adopted an approach to impact benefit agreements, whereby negotiated agreements are part of the formal requirements for Strategic Social Impact Assessments.⁴⁵⁴ These agreements are arranged among project proponents, local governments, and the national government bringing them into the context of public law.

9. Incorporate Elements of Ecosystem-based Management in Existing Rules

The Arctic Council has a long history of effective coordination and cooperation on issues well-suited to an ecosystem-based management (EMB) approach.⁴⁵⁵ In 2004, the Arctic Council Ministers adopted EBM as part of the Arctic Marine Strategic Plan, and by 2011, an expert group led by the Protection of the Arctic Marine Environment (PAME) working group was developing

⁴⁵¹ *Emerging Practices and Options for Effective Indigenous-led Project Assessment; the Strengths and Limitations of Existing Indigenous-led Environmental Assessment in the Arctic Region and Elsewhere*, GWICH'IN COUNCIL INT'L (2018), https://gwichincouncil.com/sites/default/files/Firelight%20Gwich%27in%20Indigenous%20led%20review_FINAL_web_0.pdf.

⁴⁵² See *Good Practices for Environmental Impact Assessment and Meaningful Engagement in the Arctic*, ARCTIC COUNCIL (May 2019), https://oaarchive.arctic-council.org/bitstream/handle/11374/2377/Arctic-EIA_Final-Report_May-2019.pdf?sequence=1&isAllowed=y [<https://perma.cc/YV92-D9EU>].

⁴⁵³ Such agreements are commonplace in some Arctic regions, particularly in Canada's Northwest Territories and have become part of the reality of business practices in the mining sector. (Veiga et al., 2001).

⁴⁵⁴ Bram Noble & Kevin Hanna, *Environmental Assessment in the Arctic: A Gap Analysis and Research Agenda*, 68 ARCTIC 341 (2015).

⁴⁵⁵ See Joseph F.C. DiMento, Elizabeth M. Taylor, & Stephanie L. Talavera, *Advancing Ecosystem-Based Marine Management in the Arctic: Recommendations to the Arctic Council Task Force on Arctic Marine Cooperation*, U. CAL., IRVINE SCH. OF L. CTR. FOR LAND ENV'T & NAT. RES. (Sept. 2016).

guidelines for implementation of EBM in Arctic.⁴⁵⁶ In 2013, a definition of EBM, principles, and recommendations were adopted as part of the Kiruna Declaration.⁴⁵⁷ As agreed upon by the Arctic Council Ministers, EBM is the “[c]omprehensive, integrated management of human activities based on best available scientific and traditional knowledge about the ecosystem and its dynamics, in order to identify and take action on influences that are critical to the health of ecosystems, thereby achieving sustainable use of ecosystem goods and services and maintenance of ecosystem integrity.”⁴⁵⁸

EBM is a place-based approach that requires a holistic consideration of ecosystems.⁴⁵⁹ It recognizes that humans are a part of ecosystems, and it is their influences on ecosystems that must be managed, rather than ecosystems themselves.⁴⁶⁰ EBM highlights the need for sectoral integration and underlines the importance of thinking in terms of arrangements that are able to encompass a broad range of specific concerns (e.g., ocean acidification or oil spills). It involves “engaging a broad range of participants in developing management options and reconciling conflicting uses.”⁴⁶¹ EBM efforts can benefit greatly from transboundary partnerships and perspectives.⁴⁶² Arctic marine ecosystems are inherently complex and rapidly changing, and understanding of their functioning is constantly evolving. EBM highlights the importance of adaptable, flexible governance.

The Arctic Council has developed a framework for implementation of an EBM approach in the Arctic.⁴⁶³ This

⁴⁵⁶ *EA Guidelines: Implementing an Ecosystem Approach to Management of Arctic Marine Ecosystems*, ARCTIC COUNCIL (May 2019), <https://pame.is/index.php/document-library/pame-reports-new/pame-ministerial-deliverables/2019-11th-arctic-council-ministerial-meeting-rovaniemi-finland/424-guidelines-for-implementing-an-ecosystem-approach-to-management-of-arctic-marine-ecosystems/file> [https://perma.cc/GD9D-P4WB].

⁴⁵⁷ ARCTIC COUNCIL, SENIOR ARCTIC OFFICIALS’ REPORT TO MINISTERS, KIRUNA, SWEDEN 24–28 (2013).

⁴⁵⁸ ARCTIC COUNCIL, ECOSYSTEM-BASED MANAGEMENT IN THE ARCTIC, 1 (May 2013).

⁴⁵⁹ See DiMento, Taylor, & Talavera, *supra* note 455; *EA Guidelines*, *supra* note 456.

⁴⁶⁰ DiMento, Taylor, & Talavera, *supra* note 455.

⁴⁶¹ *Id.*

⁴⁶² *Id.*

⁴⁶³ *EA Guidelines*, *supra* note 456.

framework has six components: (1) identifying the geographic extent of the ecosystem; (2) describing the biological and physical components and processes of the ecosystem including humans; (3) setting ecological objectives that define the sustainability of the ecosystem; (4) assessing an integrated ecosystem; (5) valuing the cultural, social, and economic goods produced by the ecosystem; and (6) managing human activities to sustain the ecosystem.⁴⁶⁴

To a significant extent, implementing an EBM approach requires coordination at the national level,⁴⁶⁵ working across fragmented authorities and jurisdiction. This raises many questions. What aspects of EBM in the Arctic necessitate (or would be served by) international cooperation? What is the optimal combination of legal/institutional arrangements to facilitate such cooperation? What is less easily done than describing and advocating for EBM is effectuating it. How should it be implemented? Should it be mandated through law?

The activities of EBM are not actions readily directed by treaty law. Terms and required actions are subject to variable interpretation. Indicia of compliance are difficult to articulate. Yet, many in the international sustainability community recognize the overall value of its approach to linking social and physical environmental elements of ocean protection.

Soft law may be the most appropriate strategy at this point—at least until more operational elements of EBM can be agreed upon. One step above that in building the Arctic sustainability regime is to incorporate aspects of it in existing rules, such as that of environmental impact assessment.⁴⁶⁶ Finally, it seems reasonable to explore adding it as an element of the Arctic Council linked science cooperation agreement.

10. Other Future Actions

There are several other suggested Arctic initiatives that may merit action. Some are narrowly focused. These include managing more effectively ship ballast water and fuel content; adopting Arctic

⁴⁶⁴ *Id.*

⁴⁶⁵ This also includes subnational and indigenous governments in indigenous land claim areas.

⁴⁶⁶ Such as being included in the “Access to Data” encouragement provision of Article 7. AGREEMENT ON ENHANCING INTERNATIONAL ARCTIC SCIENTIFIC COOPERATION, signed at the Fairbanks Ministerial meeting, May 11, 2017.

species focused treaties such as on the protection of beluga whales (some sub-species of which are seriously threatened with one listed under Appendix II of the Convention on the International Trade in Endangered Species of Wild Fauna and Flora); and creating binding rules for Arctic hydrocarbon exploitation and for shipping emissions.

Others are more general and ambitious, such as adopting a comprehensive environmental protection treaty for zones of the Arctic within the jurisdiction of individual countries.⁴⁶⁷ A few are strongly advocated but not widely endorsed, such as removing any distinction between Permanent Participants and Members of the Arctic Council to make indigenous groups truly equal partners in Arctic Council activities.

F. Conclusion

The existing regime of Arctic governance addressing environmental protection and sustainability is fairly comprehensive. It is also effective to a considerable degree. Components of Arctic sustainability law are found in treaties, including some that are Arctic-centered, global, and regional; in initiatives of indigenous peoples; in customary international law; in national and subnational law; in judicial opinions and decisions; and in soft law. UNCLOS is fundamental to this system, but more targeted rules such as the Polar Code, species-focused agreements, and native claims settlement acts are also important.

However, there are identified gaps in the regime. These range from the large scale, such as insufficient precautionary protection of the Central Arctic Ocean, to the pollution specific, such as controls on plastics. Several recommendations for initiatives to fill those gaps are under consideration in various Arctic venues. Measuring the nature and scale of the gap is a function of different understandings of Arctic sustainability and priorities assigned to various goals. The Arctic encompasses many interests in all of the Arctic states, indigenous peoples, and non-Arctic states.

Additional initiatives offered recognize mature positions on what sustainability means. Among the most widely advocated, but

⁴⁶⁷ This might mean strengthening provisions of UNCLOS as nothing prevents the Arctic nations from working together for greater sustainability—UNCLOS provides a floor, not a ceiling, for protection.

by no means universally accepted (and with sometimes considerable disagreement among experts) are to more fully protect the Central Arctic Ocean; to adopt international measures to protect biodiversity in areas beyond national jurisdiction; to give much greater protection to cultural resources; and to incorporate more completely indigenous knowledge and perspectives in law- and policy-making. Also, better regulation of offshore energy installations, including through stricter liability assignment, should be pursued. Additional marine protected areas need to be identified and protected. Furthermore, greater use of environmental impact analysis and its use across more projects will be productive. Other initiatives such as strengthening regional seas environmental cooperation and encouraging ecosystem-based management in the Arctic can be achieved in a number of ways.

New hard law is not indicated for some of these recommendations. Ongoing cooperative activities among interested parties and interest groups in a variety of fora can help in moving toward a sustainable Arctic. Finally, individual nation state efforts, especially when aggregated, can increase the probability of long-term stability of the Arctic region.

The above initiatives represent an ambitious agenda. However, despite tensions and conflicts that arise somewhat regularly, the Arctic remains a region that Arctic nations and many actors (and individuals) throughout the world wish to protect, preserve, and sustain. Furthermore, these initiatives are not targeted to one central source of sustainability law and policy. Rather, they can be carried out in a decentralized manner through actions by Arctic organizations, bilateral and multilateral actions, and cooperative initiatives among national and sub nations governments and those of indigenous peoples.

