A Call for U.S. Ratification of the Protocol on Antarctic Environmental Protection

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CONTENTS

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INTRODUCTION

An uninhabited continent covered by ice, surrounded by ocean, and located in the southernmost region of the globe, Antarctica is easily lost from public view. Antarctica's remoteness makes it a natural laboratory, where relatively pristine conditions allow important scien-

tific research to be conducted.[1] The extreme Antarctic conditions appeal to the adventurer, and the Antarctic tourist industry is rapidly growing. The Antarctic environment, however, is not only harsh, but also fragile—the cold challenges human survival, yet the impression of a footprint in the coastal moss may remain for decades.[2] The earliest Antarctic explorers hunted seals and whales to near extinction. Today, scientists and tourists are increasingly causing waste disposal problems and other detrimental impacts. If a footprint in the Antarctic endures for decades, a discarded battery or fuel drum remains much longer.

The impacts of human activity are exacerbated by the Antarctic environment's low assimilative capacity. For example, the shortness in foodchains due to the limited number of Antarctic species of flora and fauna means that harm to any member—whether through chemical contaminants, overexploitation, or human disturbances to breeding populations—may adversely affect the entire Antarctic ecosystem. The harshness of the Antarctic further diminishes our capacity to address environmental problems. For instance, the ice and rough sailing conditions in the Antarctic Ocean not only increase the potential for oil tanker accidents, but also hinder oil spill clean up efforts.

The Protocol on Environmental Protection to the Antarctic Treaty (Madrid Protocol),[3] signed at Madrid on October 4, 1991, has the potential to protect the Antarctic environment with some of the most advanced mechanisms yet developed in international environmental law. Along with its five annexes, the Madrid Protocol creates a comprehensive regime for assessment of environmental impacts, conservation of flora and fauna, protection of sensitive areas, regulation of waste disposal, and prevention of marine pollution in Antarc-

1. In spite of its remoteness, the Antarctic environment suffers from the long-range impacts of industrialized society. DDT, radioactive materials from atomic bomb tests, and other products of the industrial world have appeared in Antarctica in ever increasing quantities, and plastic pesticides have become a growing threat to sea birds. Christopher C. Joyner, *Protection of the Antarctic Environment: Rethinking the Problems and Prospects,* 19 CORNELL INT'L L.J. 259, 261 (1986); *see also* PHILIP W. QUIGG, A POLE APART: THE EMERGING ISSUE OF ANTARCTICA 65 (1983). Moreover, chlorine compounds have caused a hole in the ozone layer to appear over Antarctica during the winter. *Antarctic Environmental Protection Act: Hearings on H.R. 964 before the Subcomm. on Science of the Senate Comm. on Science, Space and Technology,* 103d Cong. 1st Sess. 8 [hereinafter *1993 Hearings*] (statement of Dr. Frederick Bernthal, Deputy Director, National Science Foundation). These problems are addressed by general international regimes not specific to Antarctica. *See, e.g.,* Convention on Long Range Transboundary Air Pollution, Nov. 13, 1979, T.I.A.S. No. 10,541; Montreal Protocol on Substances That Deplete the Ozone Layer, Sept. 16, 1987, 26 I.L.M. 1550 (entered into force Jan. 1, 1989) [hereinafter Montreal Protocol].

2. LEE A. KIMBALL, WORLD RESOURCES INSTITUTE, SOUTHERN EXPOSURE: DECIDING ANTARCTICA'S FUTURE 1 (1990).

3. Protocol on Environmental Protection to the Antarctic Treaty, *opened for signature* Oct. 4, 1991, 30 I.L.M. 1455 [hereinafter Madrid Protocol].

tica. Twenty-six countries, including the United States, signed the protocol, but only six countries have ratified the instrument to date.[4]

The United States maintains the largest population of Antarctic scientists and tourists and has been responsible for some of the worst environmental practices. The obligations and enforcement mechanisms that the United States legislates to implement the protocol may thus determine the protocol's efficacy in protecting the Antarctic environment. The large American presence means that our country has an added responsibility to protect this region. As a dominant political power, the legislative choices the United States makes may influence other countries and encourage them to complete the ratification process. In light of these realities, the protocol challenges the United States to demonstrate its commitment to environmental protection to the international community.

U.S. ratification cannot be completed until implementing legislation has been enacted.[5] Competing bills proposed to implement the protocol were introduced in the House of Representatives and the Senate during both the 102nd and 103rd sessions of Congress. The bills differed mainly on whether the National Science Foundation (the NSF) or the National Oceanic and Atmospheric Administration (NOAA) should have primary authority to implement and enforce the legislative provisions. The bills also provided different degrees of protection to the Antarctic environment.[6] Provisions of the three bills introduced during the 103rd Congress[7] are discussed throughout the comment as representative of the various policy positions and legislative options available to implement the protocol. Analysis is not limited to these bills, however, because further compromise legislation may be introduced and possibly enacted during the 103rd or later Congresses.

This comment calls on the United States to enact strong implementing legislation, which will encourage other countries to do the same, and simultaneously will promote the U.S. interest in protecting

4. Telephone Interview with U.S. Dep't of State (Jan. 27, 1994). These six countries are Argentina, Ecuador, France, Norway, Peru, and Spain. *Id.* All 26 signatories must ratify the protocol before it will enter into force. Madrid Protocol, *supra* note 3, art. 23, 30 I.L.M. at 1469.

5. Message From the President to the Senate Transmitting the Protocol on Environmental Protection to the Antarctic Treaty, 1992-93 PUB. PAPERS I-244 (Feb. 14, 1992).

6. *See infra* parts III and IV (comparing key provisions of the different bills); *see also* Angelini & Mansfield, *supra* note **.

7. One Senate bill and two House bills were introduced in the 103rd session: S. 1427, 103d Cong., 1st Sess. (1993); H.R. 1066, 103d Cong., 1st Sess. (1993); and H.R. 964, 103d Cong., 1st Sess. (1993). House bill 964 proposes to amend the Antarctic Conservation Act of 1978, 16 U.S.C. §§ 2401-2412 (1988) [hereinafter ACA]. Therefore, in citing to H.R. 964 this comment will use the form "H.R. 964 § — (proposed 16 U.S.C. § —)," unless the bill provision cited to has no corresponding ACA provision.

Antarctica's value for important scientific research. Since knowledge of the region's unique physical characteristics is needed to understand the threats to the Antarctic environment, part I describes Antarctica's geography, climate, and biology, and documents the impacts of human activity. Part II reviews the treaties and recommendations that have governed Antarctica prior to the protocol and indicates their gaps and weaknesses in protecting the environment. Part III analyzes key provisions of the protocol, explaining how they differ from existing instruments and evaluating their own shortcomings. Finally, part IV identifies issues that have blocked U.S. implementation of the protocol, and suggests ways to resolve these issues and enact legislation consistent with a leadership role.

I
HUMAN IMPACTS ON ANTARCTICA

A. Physical Features of Antarctica

Antarctica is a vast continent surrounded by turbulent, ice-strewn seas and numerous islands.[8] The summer sun does not set for five months, and the winter brings three months of continuous darkness to Antarctica.[9] The continent is often described in superlative terms;[10] it is the coldest,[11] windiest,[12] and driest place on Earth.[13] Ancient glacial ice, averaging 2000 meters in thickness,[14] covers over ninety-eight percent of the continent.[15] The Antarctic ice grows in the winter, ex-

8. The land area of the Antarctic continent measures approximately 13.5 million square kilometers. Joyner, *supra* note 1, at 260. The continent covers about 10% of the Earth's surface. Colin C. Deihl, *Antarctica: An International Laboratory,* 18 B.C. ENVTL. AFF. L. REV. 423, 426 (1991).

9. *See* Christopher C. Joyner & Ethel R. Theis, *The United States and Antarctica: Rethinking the Interplay of Law and Interests,* 20 CORNELL INT'L L.J. 65, 69 n.1 (1987); JOHN MAY, THE GREENPEACE BOOK OF ANTARCTICA: A NEW VIEW OF THE SEVENTH CONTINENT 60 (1989).

10. *See, e.g.,* Bernard H. Oxman, *The Antarctic Regime: An Introduction,* 33 U. MIAMI L. REV. 285, 286 (1978); SANFORD MOSS, NATURAL HISTORY OF THE ANTARCTIC PENINSULA ix (1988).

11. Inland temperatures in East Antarctica average -60°C in the winter. Deborah Cook Waller, *Note, Death of a Treaty: The Decline and Fall of the Antarctic Minerals Convention,* 22 VANDERBILT J. TRANSNAT'L L. 631, 635 (1989). The coldest temperature on Earth, -89.3°C, was recorded in Antarctica. Joyner & Theis, *supra* note 9, at 69 n.12.

12. Winds over the continent can gust up to 322 kilometers per hour. Joyner & Theis, *supra* note 9, at 69.

13. The Antarctic continent is technically a desert, receiving less than seven centimeters average annual precipitation, most of which falls on the coast. Joyner, *supra* note 1, at 260.

14. *Id.*

15. The small area of the land covered by neither snow nor ice is comprised primarily of valleys, which experience extremely cold temperatures and high winds, and, unlike the coastal regions, have not received precipitation in some two million years. France Beguette, *Antarctica, Continent of Science and Peace?* UNESCO COURIER, July-Aug. 1992,

tending in sheets into the surrounding waters, and almost doubles the size of the continent.[16] The sheets recede in the summer, releasing fresh water.[17] The Antarctic ice may contain as much as ninety-five percent of the world's supply of fresh water,[18] giving cause for concern about contaminants entering the ice. Contamination may persist longer here than elsewhere because the cold temperatures hinder decomposition of chemical pollutants and wastes, such as plastics, which are deposited on land.[19]

The waters surrounding Antarctica are known as the "Southern Ocean."[20] Immense ice sheets form near the coasts, while an enormous band of pack ice surrounds the continent in winter,[21] making access by ships problematic, if not impossible. Stresses within the ice can cause high vertical cliffs to form, and the sun's warmth causes the ice pack to break apart into floating pieces during the summer.[22] Along the northern edge of the circumpolar waters is the Antarctic Convergence, where the cold, dense southern waters mix with warmer, less dense northern waters to create a frigid and windy climate.[23] The Southern Ocean has the worst sailing conditions on the planet, with swells at the Antarctic Convergence measuring up to 1.2 kilometers in length and fifteen meters in height.[24] The severe storms, high winds, cold temperatures, drifting icebergs, freezing structures, and inevitable mental and physical stress suffered by humans under such conditions not only enhance the probability of tanker accidents

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at 38, 38. Antarctica has an active volcano, Mount Erebus, which erupted violently in 1984. *Id.*

16. Waller, *supra* note 11, at 634. The ice sheets may extend 800 to 1600 meters into the surrounding waters. Joyner, *supra* note 1, at 262. The surface area of the ice sheets can cover more than 20 million square kilometers. MAY, *supra* note 9, at 40.

17. MAY, *supra* note 9, at 40.

18. Oxman, *supra* note 10, at 286. A more conservative estimate is that Antarctica contains just 70% of the world's fresh water supply. Joyner & Theis, *supra* note 9, at 69.

19. Joyner, *supra* note 1, at 261. Because the biodegradation process is severely inhibited, waste materials tend to remain in place. *Id.* Particles of plastic are increasingly present in the digestive tracts of indigenous sea birds. *Id.* DDT has been discovered in Antarctic wildlife, and radioactive materials from atomic bomb tests have been found in Antarctic snow. *Id.*

20. The term "Southern Ocean" is widely used in Antarctic literature to denote the southern portions of the Pacific, Atlantic, and Indian Oceans. *See, e.g.*, MARINE MAMMAL COMMISSION, 1991 ANNUAL REPORT TO CONGRESS 126 (1992); Joan M. Bondareff, *The Congress Acts to Protect Antarctica*, 1 TERR. SEA J. 223, 225 (1991); Joyner, *supra* note 1, at 262. This ring of oceans forms a unique ecosystem. KIMBALL, *supra* note 2, at 4. The Southern Ocean covers 36 million square kilometers, Joyner, *supra* note 1, at 260, and accounts for almost 10% of the world's oceans. Waller, *supra* note 11, at 631.

21. Joyner & Theis, *supra* note 9, at 68-69.

22. *Id.* at 69.

23. MAY, *supra* note 9, at 18.

24. Joyner & Theis, *supra* note 9, at 70 n.24.

in the Southern Ocean,[25] but also complicate the cleanup of oil spilled from a tanker.[26]

Most lifeforms cannot survive in the subfreezing temperatures, wind, winter darkness, and lack of precipitation that characterize Antarctica. The continent has no indigenous human population. Only algae, lichens, mosses, and microscopic fungi exist naturally in the interior.[27] By contrast, the Southern Ocean and the coastal areas support thriving populations of whales, seals, fish, crustaceans (such as krill, lobsters, and crabs), and birds, including penguins and albatross.[28] Krill is of central importance in the Antarctic marine ecosystem, because this shrimp-like crustacean is the primary food source for much of the marine life.[29] Since relatively few species exist in the

25. Joyner, *supra* note 1, at 264.

26. *Id.* Little information is available regarding the dissipation of oil in Antarctic conditions. *Id.* On the one hand, frigid conditions may tend to produce thicker films of oil covering smaller areas on the ocean surface. *Id.* On the other hand, the dynamic weather and current conditions may tend to minimize the long-term contamination of the area impacted by an oil spill. Mahlon C. Kennicutt & Stephen T. Sweet, *Hydrocarbon Contamination on the Antarctic Peninsula: III. The Bahia Paraiso—Two Years After the Spill*, 25 MARINE POLLUTION BULL. 303, 303 (1992).

A recent hydrocarbon degradation experiment applied a light fuel to an Antarctic beach. Graham Green et al., *Hydrocarbon and Coprostanol Levels in Seawater, Sea-ice Algae and Sediments Near Davis Station in Eastern Antarctica: A Regional Survey and Preliminary Results for a Field Fuel Spill Experiment*, 25 MARINE POLLUTION BULL. 293, 293 (1992). Up to 99% of the fuel disappeared within two months, mainly by volatilization. *Id.* The researchers concluded that, in the event of a fuel spill in Antarctica, a useful strategy may be to allow natural dispersal and evaporation to take their course. *Id.* at 301. However, a study of the effects of the *Bahia Paraiso* spill showed that beaches were still unusually contaminated after two years, despite a significant effort by the United States and other states to contain the spill. Kennicutt & Sweet, *supra*, at 303.

27. Joyner & Theis, *supra* note 9, at 70. These lifeforms live within the porous surfaces of translucent rocks and are able to survive on very small amounts of water by switching their metabolism on and off as required. MAY, *supra* note 9, at 72.

28. Joyner & Theis, *supra* note 9, at 83. In all, there are some 120 fish species, 19 seabird species, 7 penguin species, 8 seal species, and 20 whale species. QUIGG, *supra* note 1, at 38. At the Southern Convergence, the mixing of warm northern water with cool southern water causes nutrients to be carried off the ocean floor. These increased levels of nutrient salts are particularly important for the support of the marine ecosystem, and result in unusually high levels of photoplankton growth and other biological activity at the Southern Convergence. Joyner, *supra* note 1, at 262. The seabed of the Southern Ocean is also teeming with life. *See generally* MAY, *supra* note 9, at 76-79. The Antarctic coast and islands support insects, worms, and arthropods. Waller, *supra* note 11, at 631.

29. Krill is the most abundant herbivore in the Southern Ocean. John A. Gulland, *The Antarctic Treaty System as a Resource Management Mechanism—Living Resources, in* ANTARCTIC TREATY SYSTEM: AN ASSESSMENT, 221, 226-27 (Polar Research Bd. ed., 1986) [hereinafter ANTARCTIC TREATY SYSTEM]. Krill helps to support all of the higher species, and is the major food source for 5 whale species, 3 seal species, 20 fish species, 3 squid species, and numerous penguin and other bird species. James N. Barnes, The Place of Science on an Environmentally Regulated Continent, Remarks at a Symposium on "Changing Trends in Antarctic Research" (Sept. 30, 1991) (transcript available from The Antarctic Project, Washington, D.C.).

Antarctic waters,[30] the foodchains are generally short.[31] For instance, phytoplankton are removed from baleen whales by just two steps via krill.[32] In addition, Antarctic marine species mature slowly in the cold waters.[33] Short foodchains and slow growth rates mean that environmental impacts are magnified, so disturbances in the populations of one species may adversely affect the entire Antarctic ecosystem. For example, pollutants that enter the aquatic foodweb of Antarctica at the lower levels will easily reach top predators such as seals and penguins.[34]

Antarctica's biological wealth may be matched by the richness of its mineral resources.[35] Geologists have discovered the presence of lead, zinc, tin, silver, gold, copper, nickel, and chromium, but have not found commercially viable deposits of these minerals.[36] Iron and coal have also been found, but large and easily accessible reserves elsewhere make the exploitation of these resources in Antarctica unlikely.[37] Commercial interest has focused on the possibility that Antarctica's continental shelves might contain substantial oil and gas deposits.[38] The harsh climatic conditions in Antarctica, however, would greatly complicate any attempt to exploit terrestrial or offshore resources.[39] Nevertheless, it is generally believed that Antarctic petroleum would become commercially exploitable within the next few decades, if large deposits were discovered.[40] Given the undeveloped state of technology and the insufficiency of information regarding the

30. Joyner & Theis, *supra* note 9, at 83.

31. Gulland, *supra* note 29, at 222.

32. *Id.*

33. John A. Heap & Martin W. Holdgate, *The Antarctic Treaty System as an Environmental Mechanism—An Approach to Environmental Issues, in* ANTARCTIC TREATY SYSTEM, *supra* note 29, at 195, 204.

34. Per Larsson et al., *PCBs and Chlorinated Pesticides in the Atmosphere and Aquatic Organisms of Ross Island, Antarctica,* 25 MARINE POLLUTION BULL. 281, 281 (1992).

35. The evidence of mineral deposits is largely circumstantial and derives from two sources: (1) discovery of minerals in the ice-free areas of Antarctica, and (2) the generally accepted scientific theory about the geological history of the continent. Joyner & Theis, *supra* note 9, at 85. The theory of continental drift postulates that the Antarctic continent once existed in close juxtaposition with South America, South Africa, India, and Australia. *Id.* The abundance of minerals in these once-neighboring regions suggests the presence of similar deposits in Antarctica. *Id.*

36. *Id.* at 85 n.96.

37. *Id.*

38. A U.S. scientific drilling ship discovered the presence of gaseous hydrocarbons in holes drilled in the Ross Sea Continental Shelf. Deihl, *supra* note 8, at 428. Gaseous hydrocarbons often appear in the presence of oil and gas deposits, although they do not necessarily indicate large deposits of these resources. *Id.*

39. MAY, *supra* note 9, at 150-51.

40. Joyner & Theis, *supra* note 9, at 86. In 1983, the U.S. Geologic Survey estimated that the Ross Sea area contained 45 billion barrels of oil, of which only 15 billion barrels could be extracted. Deihl, *supra* note 8, at 428. In 1989, the Congressional Office of Tech-

quantity, quality, and concentration of resources, negotiation throughout the 1980's of an international convention to regulate Antarctic mining was largely prophylactic.[41] The Madrid Protocol bans the commercial exploitation of Antarctic mineral resources altogether.[42]

This overview of Antarctica's physical and biological features reveals that although the region's environment is exceedingly harsh, it is also fragile. Antarctic conditions hamper the assimilation of foreign objects and substances. The decomposition of pollutants and the biodegradation of materials is slowed far below normal.[43] In addition, the Antarctic environment may be more susceptible than others to disturbances.[44] Slow growth rates and short foodchains mean that harm to any species may have repercussions throughout the entire Antarctic ecosystem. Finally, the very harshness of the Antarctic both heightens the risk of certain environmental harms, and diminishes our capacity to remedy those harms. Unfortunately, human activity in the Antarctic has historically proceeded without regard to the region's fragility.

B. Exploitation of Antarctic Marine Resources

Shortly after the first voyage to Antarctica in the latter part of the eighteenth century,[45] sealers descended upon the region in search of prey.[46] The early sealers stripped each breeding ground of its entire seal population before heading farther south.[47] After nearly decimating the Fur seals, sealers began to hunt Elephant seals for their blubber.[48] The hunters then turned to King and Emperor penguins

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nology Assessment reported that no commercially viable mineral deposits have yet been discovered in Antarctica. Bondareff, *supra* note 20, at 228.

41. *See* Convention on the Regulation of Antarctic Mineral Resource Activities, June 2, 1988, 27 I.L.M. 868 [hereinafter CRAMRA]. CRAMRA is unlikely to enter into force, because public opinion subsequently turned against Antarctic mining. *See infra* part II.E.

42. Madrid Protocol, *supra* note 3, art. 7, 30 I.L.M. at 1464; *see also infra* note 223.

43. Joyner, *supra* note 1, at 261.

44. Bruce S. Manheim, Jr., *The Failure of the National Science Foundation to Protect Antarctica*, 25 MARINE POLLUTION BULL. 253, 253 (1992).

45. Beginning in 1773, Captain James Cook circumnavigated the ice of Antarctica for three years in an attempt to reach the mythical "lost continent" (Terra Australis), but he never sighted it. MAY, *supra* note 9, at 117, 126. Russia, Britain, the United States, and Chile each claim to have first sighted the continent. *Id.* at 117, 126. The first landing was in 1895, when a whaler set foot upon the continent. *Id.* The first attempt to reach the South Pole was launched in 1902. *Id.* at 113.

46. *Id.* at 142. The sealers were prompted to travel to Antarctica by the accounts of Captain Cook, who reported extensively on the profusion of wildlife in the Southern Ocean and included precise charts in his reports. *Id.* at 117.

47. QUIGG, *supra* note 1, at 9. Early hunters were interested primarily in Fur seals, whose pelts were made into slippers. MAY, *supra* note 9, at 142. An experienced sealer might kill and skin as many as 50 seals per hour. One ship reportedly killed 45,000 seals in one season. QUIGG, *supra* note 1, at 9.

48. QUIGG, *supra* note 1, at 9.

for their oil.[49] Sealing continued until the seal populations were so reduced that the activity became unprofitable. By 1830, most seal species in Antarctica had been slaughtered to near extinction.[50]

At the beginning of the twentieth century, commercial vessels in Antarctica turned to whaling.[51] The first whaling station on the continent, established in 1904, processed 195 whales in its first season.[52] Less than a decade later, six land stations, twenty-one factory ships, and sixty-two catcher boats were operating in the Antarctic.[53] By the early 1930's, the seasonal whale kill totalled 40,000.[54] The large-scale slaughter endangered several whale populations in the Southern Ocean, despite the protective measures of the International Whaling Commission (IWC).[55]

In the late 1960's, the former Soviet Union and other East European countries began large-scale trawling for finfish in the Antarctic.[56] Combined with the slow maturation rate of finfish in the cold Antarctic waters, the trawling rapidly depleted populations at the main fishing grounds.[57] In the early 1970's, the fishing industry began to harvest krill.[58] In the 1991-92 season, the annual harvest was

49. *Id.*

50. *Id.* at 8-9. Even though most seal species have recovered, Antarctic sealing is currently negligible or nonexistent. Any sealing that does take place in the region is regulated by the Convention for the Conservation of Antarctic Seals, *done* June 1, 1972, 29 U.S.T. 441 (entered into force Mar. 11, 1978) [hereinafter Seals Convention]. *See infra* part II.C.

51. QUIGG, *supra* note 1, at 9.

52. MAY, *supra* note 9, at 143-44.

53. *Id.* at 144.

54. *Id.*

55. *Id.* These protective measures were often reactive. Whalers would hunt a species to near extinction and then turn to another species. *Id.* As each species diminished, the IWC would institute a ban on the hunting of that whale. *Id.* Whaling was so extensive before the bans that Blue whale populations now comprise only 1% of their original population, Humpbacks comprise 3% of their original numbers, and Fin whales comprise 20%. *Id.* at 145. Although commercial harvesting of these whales is entirely prohibited, some countries continue to take limited numbers under the "scientific purposes" exception provided in the IWC regulations. *Id.* at 145.

56. KIMBALL, *supra* note 2, at 6. Distant water fishing fleets traveled to the region in response to the rapid extension of 200-mile coastal fishing zones elsewhere in the world. Heap & Holdgate, *supra* note 33, at 207.

57. Heap & Holdgate, *supra* note 33, at 204. Annual finfish catches peaked at about 500,000 tons in 1969-70, and declined rapidly to less than 100,000 tons two decades later. KIMBALL, *supra* note 2, at 6. The total finfish catch in the 1991-92 season was 58,218 metric tons, taken mostly by Bulgarian, Chilean, Russian, and Ukrainian vessels. MARINE MAMMAL COMMISSION, 1992 ANNUAL REPORT TO CONGRESS 139 (1993).

58. KIMBALL, *supra* note 2, at 6. The Japanese and former Soviets spearheaded the move to krill fishing. MAY, *supra* note 9, at 146. Problems of krill decomposition originally made krill unsuitable for human consumption, but rapid-freezing technology overcame this problem. *Id.* at 147. Although krill have been touted as a major potential food source, market demand has remained low, and the costs of catching and preserving the shrimp are high. KIMBALL, *supra* note 2, at 4. Most of the Russian and Japanese catch is used for animal feed. *Id.*

288,500 metric tons.[59] Little is currently known about the long-term effects of high-harvest rates on krill populations,[60] but it is feared that overfishing could have severe effects on the Antarctic ecosystem.[61] The main concern is with the possible impacts that large-scale harvesting may have on the many Antarctic species that feed on krill. For instance, reduced krill populations could endanger the recovery of the depleted stocks of Baleen whales.[62] In response to these threats, the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR) was negotiated and came into force in April 1982.[63]

C. *Antarctic Science*

Despite increasingly adverse environmental impacts, Antarctica remains in a relatively pristine condition, and therefore offers unparalleled opportunities for scientific study.[64] Scientific research in the Antarctic received its greatest impetus during the International Geo-

59. MARINE MAMMAL COMMISSION, *supra* note 20, at 139. The krill catch was approximately 500,000 metric tons in 1985, Gulland, *supra* note 29, at 222, 400,000 metric tons in 1990, KIMBALL, *supra* note 2, at 6, and 357,500 metric tons in 1991, MARINE MAMMAL COMMISSION, *supra* note 20, at 139. Scientists differ over the total available annual krill production, with estimates ranging from 40 to 150 million metric tons. KIMBALL, *supra* note 2, at 4.

60. The long-term effects of different patterns of krill harvests depend not only on the gross magnitude of the harvest, but also on where and what sizes of krill are caught and on how closely these correspond to the location and sizes of krill eaten by larger marine species. Effects may also depend on the detailed population dynamics and other aspects of the biology (e.g., feeding behavior) of both krill and the larger species. This sort of research needs to be long-term and multidisciplinary. Gulland, *supra* note 29, at 227.

61. MAY, *supra* note 9, at 146-47.

62. Gulland, *supra* note 29, at 226-27.

63. Convention on the Conservation of Antarctic Marine Living Resources, May 20, 1980, 33 U.S.T. 3476 [hereinafter CCAMLR]. *See infra* part II.D.

64. S.B. Abbott & W.S. Benninghoff, *Orientation of Environmental Change Studies to the Conservation of Antarctic Ecosystems, in* ANTARCTIC ECOSYSTEMS: ECOLOGICAL CHANGE AND CONSERVATION 394, 394 (K.R. Kerry & G. Hempel eds., 1990). Modern research in Antarctica generally provides services to the sponsoring country or to world science in four main areas: predictions of environmental and geophysical conditions and changes; monitoring of environmental, biological, or geophysical conditions; knowledge and understanding of basic geological, geophysical, biological, and oceanographic processes and of human adaptability; and services to conservation, environmental, and resource management. Fred Roots, Science and the Governance of Antarctica, Presentation at Polar Research Board, National Research Council, Committee on Antarctic Policy and Science: Workshop and Second Committee Meeting (Feb. 10-13, 1993) [hereinafter Workshop].

Important contributions recently made by Antarctic research include: observation of the largest ever ozone hole during the 1992-93 season, which indicates that ozone depletion continues despite curbed global chlorofluorocarbon production; continent-wide monitoring of ultraviolet radiation that suggests marine productivity is reduced 6 to 12% during the time of maximum ozone depletion; measurements of microwave background radiation that help astrophysicists understand the evolution of the universe; and the first-ever coordinated set of measurements of ice, ocean, and atmosphere in the region, at a joint U.S.-

physical Year (IGY), which lasted from July 1957 through December 1958.[65] The IGY initiated cooperation among the sixty-seven participating countries in conducting research and welcoming foreign researchers to stations.[66] The Cold War caused some political stress, especially since countries generally needed military resources and equipment to build and operate Antarctic stations.[67] For instance, the former Soviet Union conducted mapping from its Antarctic stations, despite the perceived military implications of such information collection.[68] Nonetheless, the IGY largely succeeded in fostering international cooperation, and scientists made important progress during this period.[69]

In 1957, the countries participating in the IGY founded a lasting institution, the Scientific Committee on Antarctic Research (SCAR). SCAR is currently composed of one representative from each of the countries conducting research in Antarctica.[70] The committee is responsible for providing scientific advice to the parties to the Antarctic Treaty[71] and serves as the information and advisory hub of the entire Antarctic Treaty System.[72] SCAR holds biennial meetings, publishes

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Russian ice camp. *1993 Hearings, supra* note 1, at 8-9 (statement of Dr. Frederick Bernthal, Deputy Director, National Science Foundation).

65. *See* QUIGG, *supra* note 1, at 51-54.

66. MAY, *supra* note 9, at 114. During this period, 12 countries operated 60 stations in the Antarctic, 48 of which were on the continent itself. The IGY priorities included a number of research fields (e.g., meteorology, glaciology, and oceanography). QUIGG, *supra* note 1, at 47.

67. QUIGG, *supra* note 1, at 48-49.

68. *Id.* Like the former Soviet Union, the United States took advantage of the IGY to secure a stronger foothold in Antarctica. The largest ever Antarctic expedition took place in 1956-57. It involved over 4700 servicemen, 51 scientists, 13 ships, and 50 helicopters. The purpose of the mission, called "Operation High-Jump," was to give the United States experience in polar warfare in anticipation of a possible United States-Soviet confrontation in the Antarctic. MAY, *supra* note 9, at 127. Additionally, the United States exploded three small nuclear devices at a height of 300 miles, discovering much about the way nuclear detonations affect the upper stratosphere and radio communication. QUIGG, *supra* note 1, at 54.

69. QUIGG, *supra* note 1, at 51-54. One discovery was that the Antarctic ice mantle, which had previously been assumed to be about 610 meters thick, was at least 2600 meters thick in some locations (thickness is now known to be 4250 meters). *Id.* at 51-52. Extensive seismic tests revealed that Lesser Antarctica was in fact an archipelago, as had long been hypothesized. *Id.* at 52. Scientists also conducted rewarding research on the auroras and ionosphere. *Id.* at 53.

70. Some organizations, such as the World Meteorological Organization, also hold SCAR membership. James H. Zumberge, *The Antarctic Treaty as a Scientific Mechanism—The Scientific Committee on Antarctic Research and the Antarctic Treaty System, in* ANTARCTIC TREATY SYSTEM, *supra* note 29, at 153, 153.

71. Gulland, *supra* note 29, at 233. SCAR also provides the Antarctic Treaty Consultative Meeting (ATCM) with scientific reports and information. Zumberge, *supra* note 70, at 165; *see also infra* part II.A.

72. Zumberge, *supra* note 70, at 164-65. The Antarctic Treaty System refers to the treaties and other international instruments that govern Antarctic affairs. *See infra* part II.

a bulletin, and makes recommendations and suggestions to research countries.[73] SCAR's advice has been instrumental in the creation of the Seals Convention, CCAMLR, and a number of recommendations adopted by the Antarctic Treaty Consultative Meeting (ATCM).[74] SCAR also coordinates the long-term studies that are essential to the effective scientific management of Antarctica.[75] Since SCAR does not have its own research funds, however, countries are obliged to fund and conduct their own research.[76]

At present, eighteen countries maintain seventy-three scientific bases and twelve refuges in the Antarctic,[77] which support a total summer scientific population of about 4000.[78] The United States carries on the largest research program of any country, with the most bases and personnel.[79] The United States Antarctica Program (USAP), administered by the NSF,[80] maintains eight bases in Antarctica,[81] three of which operate year-round.[82] In 1991, these bases housed 1273 persons in the summer and 245 in the winter.[83]

Countries have historically ignored the environmental impacts caused by their many expeditions and research bases in Antarctica. Research stations have increasingly concentrated in the most easily accessible areas of Antarctica, without thought for the possible environmental effects.[84] The most serious of the many environmentally

73. QUIGG, *supra* note 1, at 55.

74. Gulland, *supra* note 29, at 233. The term "ATCM" refers both to individual annual meetings and to the decisionmaking institution as a whole.

75. *Id.*

76. QUIGG, *supra* note 1, at 55.

77. MAY, *supra* note 9, at 178-80. Greenpeace operated the only year-round, nongovernmental base in Antarctica from 1987 until 1992. *1993 Hearings, supra* note 1, at 32 (statement of Susan J. Sabella, Greenpeace).

78. Alan Hall et al., *The World's Frozen Clean Room,* BUSINESS WK., Jan. 22, 1990, at 72, 72.

79. MAY, *supra* note 9, at 128.

80. In 1992, Congress allocated approximately $193 million to USAP. U.S. OFFICE OF MANAGEMENT & BUDGET, BUDGET OF THE UNITED STATES GOVERNMENT: FISCAL YEAR 1992, H.R. DOC. NO. 3, 102d Cong., 1st Sess. pt. 4, at 1151 (1991). One hundred and eighteen million dollars are allocated for USAP research, and $75 million are allocated for logistic support. *Id.* The goals of USAP are to (1) provide an active and influential presence in Antarctica to support the range of U.S. Antarctic interests, (2) conduct scientific activities in major disciplines, and (3) maintain and support the Antarctic Treaty System. OFFICE OF SAFETY, ENV'T AND HEALTH, NATIONAL SCIENCE FOUND., 1991 FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT FOR THE U.S. ANTARCTIC PROGRAM, at 1-1 to 1-2 (1991) [hereinafter FINAL EIS].

81. MAY, *supra* note 9, at 180.

82. FINAL EIS, *supra* note 80, at 2-1. The year-round stations are McMurdo, Amundsen-Scott South Pole, and Palmer. *Id.*

83. *Id.* at 2-1 to 2-23.

84. In 1985, SCAR issued a report suggesting that activities should be scrutinized more closely, noting that "the majority of existing research stations were established in their current localities because these were the most convenient places for either logistical or scientific reasons and without thought for environmental effects." MAY, *supra* note 9, at

unsound practices involves the management and disposal of waste. The harm caused by the practices of the U.S. McMurdo Station, the largest base in Antarctica,[85] illustrates the damage that the Antarctic environment has suffered because of poor waste disposal.[86] Throughout the 1970's, McMurdo Station discharged chemicals, vehicles, hoses, tires, fuel drums, and other items directly into the waters of McMurdo Bay.[87] Recent tests indicate that the sediments in the bay now contain inordinately high levels of PCB's, petroleum waste products, and heavy metals, all of which may adversely affect the bay environment for decades.[88] During the 1980's, McMurdo Station disposed of waste by bulldozing it into an open pit, dowsing it with fuel, and igniting it.[89] Asbestos contamination has since been detected at the burn site.[90] In 1991, the NSF used approximately 4000 pounds of explosives to destroy seventy pounds of chemicals near McMurdo Station.[91] Some 800 steel drums of liquid waste, many with unknown contents, were allowed to accumulate at McMurdo Station before they were shipped to the United States for processing in 1992.[92] Currently, McMurdo Station uses incinerators to dispose of solid waste[93] and pumps untreated sanitary wastes directly into McMurdo Bay.[94]

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134. Base concentration may have adverse environmental impacts or, conversely, could reduce the cumulative environmental impacts that would have occurred had stations been established at separate locations. LEE A. KIMBALL, WORLD RESOURCES INSTITUTE, REPORT ON ANTARCTICA 6-7 (1989).

85. MAY, *supra* note 9, at 128.

86. *Id.* Manheim, *supra* note 44, at 253. Other U.S. stations have similarly poor waste disposal practices. Palmer Station burned waste in the open until 1989, causing soot containing polychlorinated biphenyls (PCB's) to contaminate outlying snow fields. *Id.* The Amundsen-Scott base at the South Pole pumps its sewage directly into the ice surrounding the base. *Id.*

87. *Id.* McMurdo Station is situated on Ross Island. NATIONAL SCIENCE FOUNDATION, FACTS ABOUT THE UNITED STATES ANTARCTIC PROGRAM 1 (1988) [hereinafter USAP FACTS].

88. Manheim, *supra* note 44, at 253.

89. *Id.* Each of five burns during the 1983-84 season consumed 1000 to 3000 gallons of fuel. MAY, *supra* note 9, at 134.

90. *Antarctic Treaty Protocol on Environmental Protection: Hearings on H.R. 5459 Before the Subcomm. on Oceanography, Great Lakes and the Outer Continental Shelf, Coast Guard and Navigation, and Fisheries and Wildlife Conservation and the Environment of the House Comm. on Merchant Marine and Fisheries,* 102d Cong., 2d Sess. 130, 208 (1992) [hereinafter *1992 Hearings*] (statement of Bruce S. Manheim, Environmental Defense Fund). The NSF is reportedly spending hundreds of thousands of dollars to clean up the asbestos contamination. *Id.*

91. *Id.* Although a large crater was created and the explosion was felt up to 10 miles away, the NSF conducted no prior environmental impact assessment. *Id.*

92. U.S. ANTARCTIC PROGRAM, INFORMATION, at 2 (1992) (*reprinted in 1993 Hearings, supra* note 1, at 13.

93. Manheim, *supra* note 44, at 253. One of the incinerators reportedly lacks any emission controls. *Id.*

94. *See* James P. Howington et al., *Distribution of the McMurdo Station Sewage Plume,* 25 MARINE POLLUTION BULL. 324 (1992). The dumping of untreated sewage can

The logistic operations required to maintain the Antarctic research stations are another significant source of environmental impacts. To support the needs of USAP personnel living year-round in Antarctica, the NSF shuttles food and other supplies by plane and helicopter from New Zealand. Its low capacity for fuel storage in Antarctica, coupled with the difficulty of fuel transportation, led the United States to operate a nuclear power facility in Antarctica from 1962 to 1972.[95] The reactor was eventually shut down because radioactive leakage had contaminated the gravel backfill, as well as the Antarctic soil.[96] Currently, the NSF must ship some thirty million liters of fuel to Antarctica per year.[97]

Countries other than the United States have recently experienced several accidents while transporting fuel, food, or supplies to Antarctica. In January 1989, the Argentinean supply ship *Bahia Paraiso* ran aground and spilled 727,500 liters of fuel into the waters of the Southern Ocean, less than a mile from the U.S. Palmer Station.[98] The spill severely affected the ecosystem, killing penguins, seals, krill, sponges, and kelp.[99] The spill also disrupted studies to determine the ecological effects of ozone depletion and commercial krill harvesting.[100] Less than a month later, the Peruvian ship *Humboldt* caused a fuel spill some 224 kilometers long near King George Island.[101] The two inci-

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pose serious problems for the local marine environment. The introduction of such wastes can alter the productivity of organisms living near the discharge, causing some members to flourish and others to decline. *1993 Hearings, supra* note 1, at 39 (statement of Susan J. Sabella). In addition, the disposal of untreated domestic effluent may result in the introduction of alien bacteria and viruses into the local marine environment. *Id.* Over the past few seasons, ground food wastes were also disposed of through McMurdo's sewage outfall, a practice that can contribute significantly to the alteration and degradation of the local marine environment. *Id.* As of 1992, domestic sewage from McMurdo Station was macerated before discharge from a submerged outfall. U.S. ANTARCTIC PROGRAM, *supra* note 92, at 2.

95. QUIGG, *supra* note 1, at 63. The reactor broke down during the first year, leaving personnel with no fuel reserves and necessitating fuel delivery by helicopters. *Id.*

96. *Id.* The United States was forced to fly 800 tons of radioactive "junk," plus an additional 12,200 tons of irradiated earth and gravel to be buried in the United States. *Id.*

97. FINAL EIS, *supra* note 80, at 2-10, 2-17, 2-22. For example, McMurdo Station received approximately 28.3 million liters of fuel in the 1989-90 season, *id.* at 2-10, while the Palmer Station received about 400,000 liters. *Id.* at 2-22.

98. Manheim, *supra* note 44, at 253.

99. *Id. Cf.* Z.A. Eppley, *Assessing Indirect Effects of Oil in the Presence of Natural Variation: The Problem of Reproductive Failure in South Polar Skuas During the Bahia Paraiso Oil Spill,* 25 MARINE POLLUTION BULL. 307, 311 (1992) (noting that it is difficult to determine the effects of an oil spill on natural populations, whose numbers and reproductive success vary both in time and space).

100. Manheim, *supra* note 44, at 253.

101. Deborah H. Overholt, *Environmental Protection in the Antarctic: Past, Present, and Future,* 28 CANADIAN Y.B. INT'L L. 227, 246 n.81 (1990). Also in February 1989, the British vessel *HMS Endurance* hit an iceberg near Deception Island. *Id.*

dents demonstrate, all too vividly, a lack of preventative contingency planning, although cooperative response was quick in forthcoming.[102]

Procedures for assessing the environmental impacts of proposed Antarctic projects have been in place for many years, but countries generally have not assessed the impacts of their Antarctic activities.[103] For instance, the NSF did not complete any environmental impact assessment for construction of a new facility at McMurdo Station until 1988, after a contract had been signed, plans made, and ground breaking begun.[104] The French began construction of an airstrip near the Dumont d'Urville base in 1983 without prior assessment of the environmental impacts.[105] During the course of construction, numerous penguins and Cape pigeons were killed, penguin eggs were crushed, and the nesting areas of many birds were destroyed.[106] Pressing on nonetheless, because of the difficult ship access to the Dumont d'Urville base, the French recently completed the airstrip and plan to begin using it.[107] These incidents, along with the waste disposal and other problems caused by increasing scientific and logistic populations, highlight the need for measures more protective of the Antarctic environment.

D. Antarctic Tourism

Adding to the environmental impacts is a growing contingent of tourists eager to visit the last frontier. The number of tourist expeditions to Antarctica has been increasing steadily since the 1950's. Recent figures indicate that tours now carry approximately 6500 visitors to the area each year.[108] Most of the tourists who go to Antarctica are

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102. Kennicutt & Sweet, *supra* note 26, at 303.

103. The basic principles underlying environmental impact assessment in Antarctica were adopted by the ATCM in 1970 (recommendation VI-4). Colin M. Harris & Janice Meadows, *Environmental Management in Antarctica: Instruments and Institutions,* 25 MARINE POLLUTION BULL. 239, 241 (1992). Recommendation XIV-2, adopted in 1987, establishes the framework for assessment that forms the basis of annex I of the protocol. *Id.*

104. *1992 Hearings, supra* note 90, at 208 (statement of Bruce S. Manheim). The NSF maintained for years that the National Environmental Protection Act (NEPA) did not apply to its Antarctic activities. OFFICE OF THE GENERAL COUNSEL, NATIONAL SCIENCE FOUNDATION, A NATIONAL SCIENCE FOUNDATION STRATEGY FOR COMPLIANCE WITH ENVIRONMENTAL LAW IN ANTARCTICA 22-23 (1989).

105. Joyner, *supra* note 1, at 269. French law required an environmental impact assessment prior to initiating any such project, but the assessment was not performed until after construction began. Once published, the report was criticized as inadequate. A revised impact statement released in late 1984 failed to examine alternatives to constructing the airstrip. *Id.*

106. *See* MAY, *supra* note 9, at 136.

107. *Greenpeace Want New Zealand Freeze on Helping French,* AGENCE FRANCE PRESSE, Feb. 24, 1993, *available in* LEXIS, News Library, World:AFP File.

108. Totals for three past seasons (1989-90, 1990-91, 1991-92) were 2581, 4842, and 6495, respectively. Debra J. Enzenbacher, *Antarctic Tourism and Environmental Concerns,*

U.S. citizens, and the majority of ship tour operators are U.S. companies.[109] Tourists typically reach Antarctica in ships, which range in size from small private yachts carrying fewer than twenty people, to cruise ships carrying 400 people.[110] Shipborne tourists are often taken ashore in inflatable boats to visit scientific research stations and participate in other activities.[111]

The notable growth in Antarctic tourism raises environmental questions concerning pollution emissions, waste disposal, and personnel experience.[112] As more ships visit the same sites in Antarctica, tourist activity may need to be coordinated to prevent harm to wildlife or excessive visitation of sensitive areas such as penguin breeding grounds.[113] At present, Antarctic tourism is essentially unregulated. No binding international agreement addresses Antarctic tourism per se.[114] An international instrument, implemented in the United States by the Antarctic Conservation Act (ACA),[115] does provide some protections to Antarctic species and specially designated areas.[116] Enforcement is problematic, however, since violations within the vast Antarctic expanse are unlikely to be detected. The NSF has recently employed a program of placing observers aboard U.S. tourist ships to promote compliance with the ACA's provisions.[117] Yet, environmen-

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25 MARINE POLLUTION BULL. 258, 258 (1992). The approximately 6500 tourists spent perhaps as many as 100,000 hours on the Antarctic continent in the 1991-92 summer season. *1992 Hearings, supra* note 90, at 163 (statement of John Splettstoesser, International Ass'n of Antarctic Tour Operators). Collecting accurate data on tourists and ships is difficult for many reasons. The number of passengers carried per ship and per operator has varied widely. Different ships have been employed by the same operator during the same season, and this makes it difficult accurately to assess passenger counts. Some ships are employed for only a few trips per season, whereas others spend the entire austral summer (November through March) in Antarctica. VICTORIA E. UNDERWOOD, ANTARCTIC TOURISM 3 (1993).

109. UNDERWOOD, *supra* note 108, at 4.

110. *Id.* at 3. Some 11 cruise ships conducted over 60 voyages to Antarctica during the 1992-93 summer season. *Id.* at 1. Qantas Airways and Air New Zealand conducted popular overflight tours in the 1970's, but the airlines ended this practice when an Air New Zealand DC-10 crashed in Antarctica in 1979, killing all 257 persons on board. Since 1984, at least one company has continued to bring tourists, photographers, and mountain climbers to various inland destinations by small aircraft. *Id.* at 4.

111. Enzenbacher, *supra* note 108, at 258-59.

112. *Id.* at 261. Issues such as vessel standards, navigational aids, fuel consumption, and communication practices between vessels also need to be considered to manage the tourist industry effectively. *Id.*

113. *Id.*

114. The ATCM has adopted recommendation XVI-3, to address tourism, and recommendation VIII-9, to create the Areas of Special Tourist Interest designation. *See* Enzenbacher, *supra* note 108, at 260, 265. Such recommendations are nonbinding in nature. Harris & Meadows, *supra* note 103, at 240.

115. 16 U.S.C. §§ 2401-2412 (1988).

116. *See infra* part II.B.

117. *1992 Hearings, supra* note 90, at 137 (statement of Dr. Frederick Bernthal).

talists charge that the NSF has failed to respond to violations documented by observers.[118]

The increasingly voiced concerns about tourists' impacts on Antarctica have led the International Association of Antarctica Tour Operators (IAATO), which represents all major U.S. tour operators, to adopt self-regulatory "guidelines of conduct" for tour operators[119] and visitors.[120] IAATO claims that tour operators and visitors comply with the guidelines.[121] Empirical data, however, suggest that industry self-regulation may not prevent negative impacts on the Antarctic environment.[122] Moreover, tourists who travel to Antarctica with non-IAATO companies or in their own private vessels are not subject to the voluntary guidelines.[123] The growing number of tourists suggests the need for comprehensive regulation of tourism, to be observed by all countries with an Antarctic presence.

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118. Manheim, *supra* note 44, at 254.

119. INTERNATIONAL ASS'N OF ANTARCTICA TOUR OPERATORS, GUIDELINES OF CONDUCT FOR ANTARCTICA TOUR OPERATORS (1993). These guidelines call on tour operators to abide by the ACA. Tour operators should hire a professional crew, 75% of which has prior Antarctic experience. Operators should hire one naturalist for each 20 to 25 passengers on board and take no more than 100 passengers ashore at one time. Communication between tour operators and the provision of adequate notice to research stations is encouraged. Operators must refrain from dumping sewage within 12 nautical miles of land or ice shelves. *Id.* at 1-2.

120. INTERNATIONAL ASS'N OF ANTARCTICA TOUR OPERATORS, GUIDELINES OF CONDUCT FOR ANTARCTICA VISITORS (1993). These guidelines call on visitors to follow seven rules: (1) do not disturb or harass animals; (2) maintain at least 15 feet between themselves and most animals, and 50 feet for Fur seals; (3) do not walk on or damage lichens, mosses, and grasses; (4) do not leave any litter or remove any objects; (5) do not interfere with scientific research or disturb historic sites; (6) do not smoke; and (7) stay with ship leaders when ashore. *Id.* at 1-2.

121. *1992 Hearings, supra* note 90, at 162-94 (statement of John Splettstoesser). An IAATO spokesperson testified that "non-compliance with the IAATO Tour Operators Guidelines will result in revoking the membership" of the offending company and this would "attract tremendous negative trade publicity." *Id.* The industry maintains that tourists who visit Antarctica are mostly "socially-conscious college-educated professionals" and are eager to follow the visitor guidelines adopted by all U.S. tour operators. UNDERWOOD, *supra* note 108, at 4.

122. Enzenbacher, *supra* note 108, at 264. While conducting field work during the 1991-92 season, a scientist witnessed the following transgressions of tourism guidelines:

> 1. a boat driver smoking while transporting passengers ashore; 2. a passenger attempting to feed a penguin; 3. a passenger touching a penguin; 4. a passenger tossing small stones at the foot of a penguin to improve a photographic opportunity; 5. a crew member throwing a lit cigarette within 10 m. of nesting penguins; 6. shore guides having no previous Antarctic experience; 7. groups of more than 100 ashore at any given time; 8. passengers ashore in numbers exceeding the recommended 25:1 tourist to guide ratio; 9. plastic bags, matches and cigarettes left ashore by passengers; and 10. untreated food waste inadvertently discharged in an enclosed bay.

Id.

123. The 13 major U.S. tour operators belong to IAATO, but other tour companies are based in foreign countries, and a growing number of tourists travel to Antarctica in private yachts. UNDERWOOD, *supra* note 108, at 2.

In sum, scientific operations, logistic operations, and tourist expeditions are resulting in increasingly adverse impacts on the Antarctic environment. Isolated incidents such as the *Bahia Paraiso* oil spill and the Dumont d'Urville airstrip have caused severe damage within limited areas. Ongoing activities have caused waste management and disposal problems, and possibly other cumulative impacts of yet undetermined severity. Existing international instruments regulate human activities in Antarctica to some extent, but they do not provide adequate environmental protection. Tourism, for instance, is regulated only by voluntary industry guidelines. A comprehensive list of gaps and new activities that require attention might include waste disposal, marine pollution control, contingency planning and emergency response, environmental impact assessment, expansion of protected areas, environmental inspections, liability for environmental damages, and general regulation of tourism.[124] The next section describes the Antarctic Treaty System and highlights the system's environmental deficiencies.

II
THE ANTARCTIC TREATY SYSTEM

Antarctica is governed by a relatively complex international legal regime. The Antarctic Treaty,[125] signed at the height of the Cold War in 1959, is the main instrument of the regime. A number of recommendations adopted under the Antarctic Treaty relate to protection of the Antarctic environment. Three freestanding instruments protect and regulate exploitation of Antarctic living resources: the Agreed Measures for the Conservation of Antarctic Flora and Fauna,[126] the Convention for the Conservation of Antarctic Seals,[127] and the Convention for the Conservation of Antarctic Marine Living Resources.[128] Together these instruments comprise the Antarctic Treaty System. In addition, the Convention on the Regulation of Antarctic

124. KIMBALL, *supra* note 84, at 3.

125. Antarctic Treaty, *done* Dec. 1, 1959, 12 U.S.T. 794 (entered into force on June 23, 1961). It was signed originally by 12 states: Argentina, Australia, Belgium, Chile, France, Japan, New Zealand, Norway, South Africa, Union of Socialist Soviet Republics (whose obligations are under review by the Republics of the former U.S.S.R.), United Kingdom, and United States. *Id.* An additional 28 states have since acceded to the treaty. U.S. DEP'T OF STATE, TREATIES IN FORCE, 289-90 (Jan. 1, 1992). The treaty is open for accession by any member of the United Nations. Antarctic Treaty, *supra,* art. XIII, para. 1, 12 U.S.T. at 800.

126. Measures in Furtherance of the Principles and Objectives of the Antarctic Treaty, June 2-13, 1964, Appendix: Agreed Measures for the Conservation of Antarctic Flora and Fauna, 17 U.S.T. 991, 995 [hereinafter Agreed Measures].

127. Seals Convention, *supra* note 50, 29 U.S.T. at 441.

128. CCAMLR, *supra* note 63, 33 U.S.T. at 3476.

Mineral Resources Activities[129] was signed in 1988, but the subsequent upswelling of public and political opinion against the Convention makes its ratification unlikely.[130] The Madrid Protocol will add significantly to the environmental protections of the Antarctic Treaty System.

A. The Antarctic Treaty

The Antarctic Treaty was drafted in response to tensions caused by Cold War rivalries, conflicting claims to Antarctic territory, and increasing scientific activity. Seven countries claimed sovereignty over Antarctic territory, in some cases overlapping.[131] The United States and the former Soviet Union asserted no claims, and both refused to recognize other countries' claims.[132] Increasing Antarctic scientific research in the wake of the IGY provided the impetus to create an enduring solution to these territorial problems. Seeking to preserve the cooperation fostered during the IGY, the United States and the former Soviet Union persuaded the other countries to negotiate the Antarctic Treaty.

The primary goals of the treaty are to preserve Antarctica for peaceful nonmilitary uses and to promote freedom of scientific investigation throughout the continent.[133] Article III provides for international cooperation in scientific research by means of sharing scientific data and exchanging scientific personnel.[134] Article V prohibits any nuclear explosions or disposal of radioactive waste,[135] making Antarctica the planet's first international denuclearized zone.[136] Article IV addresses the problem of competing territorial claims by freezing, without prejudice, all present and future claims.[137] While environ-

129. CRAMRA, *supra* note 41, 27 I.L.M. at 868.

130. *See generally* Waller, *supra* note 11.

131. Lee A. Kimball, *Antarctica: Testing the Great Experiment*, ENVIRONMENT, Sept. 1985, at 14, 16. The United Kingdom, New Zealand, France, Australia, Norway, Chile, and Argentina made territorial claims arising from geographic contiguity, prior exploration, scientific expeditions, and marine resources exploitation. *Id.* at 16. These claims cover approximately 85% of the continent's territory, and the claims of the United Kingdom, Chile, and Argentina overlap. *Id.*

132. John J. Barceló III, *The International Legal Regime For Antarctica*, 19 CORNELL INT'L L.J. 155, 157 (1986). Neither country has foreclosed the possibility of making claims in the future. *Id.*

133. Antarctic Treaty, *supra* note 125, art. I-II, 12 U.S.T. at 795.

134. *Id.* art. III, para. 1, 12 U.S.T. at 796.

135. *Id.* art. V, 12 U.S.T. at 796.

136. Yuri M. Rybakov, *Juridical Nature of the 1959 Treaty System, in* ANTARCTIC TREATY SYSTEM, *supra* note 29, at 33, 35.

137. *See* Antarctic Treaty, *supra* note 125, art. IV, 12 U.S.T. at 796. The treaty sidesteps the issue of territorial claims by providing that none of the agreed upon cooperative activities under the Treaty is to prejudice or affect in any way the legal rights and claims of either the claimant or nonclaimant states. No new claims are to arise; no enlargement of existing claims is to occur; and no renunciation, diminution or denial of claims is to be

mental protection is not an explicit goal of the Antarctic Treaty, some of the treaty's provisions contain limited protections, such as the ban on nuclear explosions,[138] the prohibition against dumping radioactive waste,[139] and the reference to the "preservation and conservation of living resources in Antarctica."[140] The treaty's requirement of peaceful uses[141] may also provide a basic environmental safeguard, but its scope is narrow.[142] Elimination of military use does not provide complete protection because the peacefulness of an activity does not determine whether the activity endangers environmental integrity.[143] Indeed, the purely peaceful activity of tourism now poses one of the greatest threats to the Antarctic environment.

It bears emphasizing that the Protocol on Environmental Protection is a protocol *to* the Antarctic Treaty. Thus, the decisionmaking mechanism, inspection provisions, and scope of application of the treaty are also those of the protocol. The treaty's unique decisionmaking mechanism effectively allows some states to make decisions binding on other states. For purposes of decisionmaking, states party to the Antarctic Treaty fall into two categories: consultative parties and nonconsultative parties.[144] Any party to the treaty may acquire and maintain Antarctic Treaty consultative party (ATCP) status "during such time as that Contracting Party demonstrates its interest in Antarctica by conducting substantial scientific research activity there, such as the establishment of a scientific station or the dispatch of a scientific research expedition."[145] Only ATCP's may participate at the annual Antarctic Treaty Consultative Meetings,[146] which serve as the

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grounded upon the parties' cooperative activities under the Treaty. Barceló, *supra* note 132, at 158.

138. Antarctic Treaty, *supra* note 125, art. V, 12 U.S.T. at 796.

139. *Id.*

140. *Id.* art. IX, para. 1(f), 12 U.S.T. at 798.

141. *Id.* art. I, 12 U.S.T. at 795.

142. S.K.N. Blay, *Current Development: New Trends in the Protection of the Antarctic Environment: The 1991 Madrid Protocol,* 86 AM. J. INT. L. 377, 378-79 (1992).

143. *Id.*

144. As of early 1992 there were 26 Antarctic Treaty consultative parties (ATCP's): Argentina, Australia, Belgium, Brazil, Chile, China, Ecuador, Finland, France, Germany, India, Italy, Japan, the Republic of Korea, the Netherlands, New Zealand, Norway, Peru, Poland, Spain, South Africa, Sweden, the former U.S.S.R., the United Kingdom, the United States, and Uruguay. There were 14 nonconsultative parties: Austria, Bulgaria, Canada, Colombia, Cuba, Czechoslovakia, Denmark, Greece, Guatemala, Hungary, the Democratic People's Republic of Korea, Papua New Guinea, Romania, and Switzerland. U.S. DEP'T OF STATE, *supra* note 125, at 289-90.

145. Antarctic Treaty, *supra* note 125, art. IX, para. 2, 12 U.S.T. at 798. The Protocol on Environmental Protection adds the additional requirement that contracting parties must ratify the protocol as a precondition of attaining consultative party status. Madrid Protocol, *supra* note 3, art. 22, para. 4, 30 I.L.M. at 1469.

146. Regular ATCM's were held biannually from 1961 until 1991, when the decision was made to hold them annually. Harris & Meadows, *supra* note 103, at 246.

treaty's main decisionmaking institution.[147] The ATCM operates by consensus to adopt recommendations that have effect with respect to both ATCP's and nonconsultative parties.[148] The consensus requirement means that every ATCP must approve a recommendation to make it effective. Since India has not ratified any recommendation since becoming an ATCP in 1983, technically no recommendation adopted since that date has entered into force, although the parties that signed the recommendations may feel morally bound to comply with them.[149] As the ATCM is the decisionmaking mechanism for the protocol, such hold-out behavior has the potential to delay or undermine environmentally protective decisions.

Despite the lack of a specific environmental mandate in the Antarctic Treaty, the environment has been the subject of the majority of recommendations adopted by the ATCM over the years.[150] Two recommendations "emphasize the need to act in the Antarctic in the interests of *all* humankind; to plan activities to avoid significant and avoidable environmental damage; and to maintain continuing scientific . . . monitoring."[151] A number of recommendations based on SCAR's advice have recently been adopted, including recommendation XIV-2 on environmental impact assessment, recommendation XV-3 on waste disposal, and recommendation XV-4 on marine pollution.[152] These recommendations contain sophisticated provisions, many of which form the basis for the protocol.[153] The key weakness of the recommendations is their nonbinding nature, accompanied by often weak or hortatory language.[154] Moreover, some serious gaps remain, including contingency planning and emergency response, expansion of the protected areas system, and regulation of tourism.[155]

147. Antarctic Treaty, *supra* note 125, art. IX, para. 2, 12 U.S.T. at 798. Critics charge that developing countries are prevented from participating in decisionmaking under the Antarctic Treaty. Christopher C. Joyner, *Antarctica and the Indian Ocean States: The Interplay of Law, Interests and Geopolitics*, 21 OCEAN DEV. & INT'L L. 41, 62 (1990). These states may be barred from maintaining research facilities in the Antarctic by the prohibitive cost. David A. Colson, *The Antarctic Treaty System: The Mineral Issue*, 12 LAW & POL'Y INT'L BUS. 841, 861 (1980).

148. Antarctic Treaty, *supra* note 125, art IX, paras. 1, 4, 12 U.S.T. at 798.

149. Harris & Meadows, *supra* note 103, at 240.

150. As of 1993, the ATCM had adopted 199 recommendations, of which 137 (almost 70%), related to environmental matters. *Id.*

151. Heap & Holdgate, *supra* note 33, at 202 (citations omitted) (describing recommendations VIII-13 and IX-5).

152. Harris & Meadows, *supra* note 103, at 241-42.

153. *Id.* at 244-45; *see also* LEE A. KIMBALL, WORLD RESOURCES INSTITUTE, REPORT ON ANTARCTICA 13-15 (1991) (comparing recommendations with the protocol).

154. Harris & Meadows, *supra* note 103, at 240.

155. KIMBALL, *supra* note 84, at 3.

The Antarctic Treaty provides the signatories with extensive inspection rights.[156] The primary purposes of past inspections have been to verify compliance with the nonmilitarization provisions, to monitor the ban on nuclear explosions, and to check for the dumping of radioactive materials.[157] Inspectors could also check for compliance with regulations adopted to protect the Antarctic environment.[158] Inspections have traditionally not been used to check that protected areas are being respected or that other environmental measures, such as waste disposal or impact assessment, are being properly implemented.[159] Moreover, the treaty's inspection provisions may be inadequate for environmental enforcement purposes. The lack of a coordinating body for inspections or agreed formats for inspection checklists and reporting means that inspection reports have only variable usefulness.[160] Since there is no coordinated schedule for inspections, some stations are never inspected, while others are inspected frequently.[161] The absence of provisions requiring prompt reporting and circulation of inspection findings means that information exchange is limited.[162] The protocol restates and somewhat expands the treaty's right of inspection.[163] The protocol thereby makes clear that inspection is meant to serve an environmental function, but it does not fully remedy the procedural shortcomings.[164]

The Antarctic Treaty has a limited geographic scope; it applies to "the area south of 60 degrees South Latitude, including all ice

156. Joyner & Theis, *supra* note 9, at 81. Article VII of the Antarctic Treaty grants designated observers the right to inspect "[a]ll areas of Antarctica, including all stations, installations and equipment within those areas, and all ships and aircraft at points of discharging or embarking cargoes or personnel in Antarctica." Antarctic Treaty, *supra* note 125, art. VII, para. 3, 12 U.S.T. at 797. As of 1987, however, only five nations had exercised the right of inspection: New Zealand, Australia, the United Kingdom, Argentina, and the United States. *See* Joyner & Theis, *supra* note 9, at 81. The United States has exercised the right most often (in 1964, 1967, 1971, 1975, 1980, and 1982-83). *Id.*

157. Joyner & Theis, *supra* note 9, at 81. No violations of the treaty provisions have been reported. *Id.*

158. *Id.* The inspections apply to all measures adopted pursuant to the Antarctic Treaty, including those having to do with the environment. *Panel Discussion on Conservation and Environment, in* ANTARCTIC TREATY SYSTEM, *supra* note 29, at 211, 217.

159. The potential of the Antarctic Treaty's inspection provisions for improving environmental protection was recognized only recently at the XVth ATCM when the United States presented a detailed "environmental checklist" that it had used as part of a recent inspection of bases in the Ross Sea. ANTARCTIC AND SOUTHERN OCEAN COALITION, ASOC INFORMATION PAPER NO. 2, UPON CLOSER INSPECTION 1 (1992) [hereinafter ASOC INFORMATION PAPER NO. 2].

160. ANTARCTIC AND SOUTHERN OCEAN COALITION, ASOC INFORMATION PAPER NO. 4, THREE CHEERS OR [N]ONE FOR THE COMMITTEE FOR ENVIRONMENTAL PROTECTION, 4 (1992) [hereinafter ASOC INFORMATION PAPER NO. 4].

161. *Id.*

162. *Id.*

163. Madrid Protocol, *supra* note 3, art. 14, 30 I.L.M. at 1486.

164. *See infra* part III.A.2.

shelves," but not to the high seas within that area.[165] In their evident concern to protect high seas freedoms, the drafting states thus foreclosed the possibility that the Antarctic Treaty, or any instrument adopted under the treaty, could apply to the waters of the Southern Ocean. Separate conventions, wholly independent of the Antarctic Treaty, have been established to regulate the use of marine living resources. The protocol, however, contains provisions that relate to the marine environment and arguably limit the fundamental high seas freedom of navigation.[166] On the one hand, the restricted applicability of the Antarctic Treaty could create problems for such provisions of the protocol. On the other hand, the parties to the Antarctic Treaty may well have recognized, as has the general international community, that high seas freedoms must give way to regulation ensuring environmentally sound uses of the seas.

B. Agreed Measures for the Conservation of Antarctic Flora and Fauna

The Agreed Measures seek to protect mammals, birds, and plants native to Antarctica.[167] Since the Agreed Measures were adopted under the Antarctic Treaty, they could apply only to living resources on land, not to resources in high seas areas.[168] The Agreed Measures primarily seek to ensure that human activities do not accidently damage plants and wildlife.[169] Three types of regulatory control are used: general rules applying to all human activities, rules providing additional protection to designated species, and rules restricting access to designated areas.

The Agreed Measures generally forbid anyone to kill, wound, or capture any native mammal or bird without a permit.[170] Harmful interference with the normal living conditions of native mammals and

165. Antarctic Treaty, *supra* note 125, art. VI, 12 U.S.T. at 797. Article VI provides that the treaty does not "affect the rights, or the exercise of the rights, of any State under international law with regard to the high seas within that area." *Id.*

166. For instance, annex IV concerns the prevention of marine pollution. Madrid Protocol, *supra* note 3, Annex IV, 30 I.L.M. at 1483. *See infra* part III.B.4.

167. While the Agreed Measures do not rise to the level of a treaty or convention, they do have a more mandatory nature than ATCM recommendations. JEFFREY D. MYHRE, THE ANTARCTIC TREATY SYSTEM: POLITICS, LAW AND DIPLOMACY 51 (1986). The term "Agreed Measures" was adopted in order to allow countries that do not require legislation for implementation to treat the provisions as code, while allowing countries that do require such legislation to treat them as a convention. *Id.* This had the practical effect of speeding up implementation in countries not requiring any legislative act. *Id.*

168. *See supra* text accompanying note 165.

169. Agreed Measures, *supra* note 126, arts. VI-IX, 17 U.S.T. at 998-1000. In light of the scarcity of living resources on the Antarctic continent, there is little interest in harvesting living resources on the land. Gulland, *supra* note 29, at 231. The exception is the possible harvesting of marine animals when they come ashore to breed. *Id.*

170. Agreed Measures, *supra* note 126, art. VI, 17 U.S.T. at 998.

birds must be minimized, and pollution of coastal waters must be avoided.[171] Non-indigenous species may not be brought into Antarctica, as these might upset the natural ecological balance.[172] A system for designating Specially Protected Species to receive additional protection is established,[173] although the designation has been used sparingly. The parties have designated only two species, the Ross seal and the Fur seal, as Specially Protected Species.[174]

The parties have made somewhat greater use of the system for designating sensitive areas.[175] A Specially Protected Area (SPA) designation affords protection for ecosystems that are unique or of outstanding scientific interest.[176] The coverage of SPA's has been criticized as not fully representative of the diversity of habitats and ecosystems in Antarctica,[177] although SPA's do cover many particularly vulnerable, small coastal localities.[178] An additional designation, Site of Special Scientific Interest (SSSI), was created later to protect areas where scientific investigations are at risk and areas of exceptional scientific interest that require long-term protection.[179]

Each country was required to adopt a permit system to regulate treatment of native species and interference with habitat under the Agreed Measures. The United States passed the Antarctic Conservation Act in 1978 to fulfill its obligations under the Agreed Measures.[180] The ACA makes it unlawful to engage in the following activities without a permit: to take, harm, or kill native animals; to introduce non-native species into Antarctica; to enter SPA's; or to discharge certain pollutants to be designated by the NSF.[181] Environmental groups have voiced loud criticism of the NSF's implementation

171. *Id.* art. VII, 17 U.S.T. at 998-99.

172. *Id.* art. IX, 17 U.S.T. at 1000.

173. *Id.* art. XII, para. 1, 17 U.S.T. at 1000-01.

174. *Id.* Annex A, 17 U.S.T. at 1002.

175. *Id.* art. VIII & Annex B, 17 U.S.T. at 999-1000, 1002.

176. *Id.* art. VIII, 17 U.S.T. at 999-1000.

177. Heap & Holdgate, *supra* note 33, at 208. Further action to extend the designated SPA's in relation to an objective scientific classification of the range of variation in Antarctic habitats is desirable under the principles of conservation. *Panel Discussion on Conservation and Environment, supra* note 158, at 217.

178. Heap & Holdgate, *supra* note 33, at 208.

179. Harris & Meadows, *supra* note 103, at 241. A number of other designations have since been devised, including: Sites of Historic Interest (SHI's), Areas of Special Tourist Interest, Marine Sites of Special Scientific Interest, Multiple-use Planning Areas (to protect locations where human activity may interfere with the environment), and Specially Reserved Areas (to protect areas of "outstanding geological, glaciological, geomorphological, aesthetic, scenic or wilderness value"). *Id.* As of August 1992, there were 19 SPA's, 35 SSSI's, 59 SHI's, and one Tomb at the 1979 crash site of a DC-10 tourist plane on Mt. Erebus. *Id.*

180. Pub. L. No. 95-541, 92 Stat. 2975 (codified as amended at 16 U.S.C. §§ 2401-2412 (1988).

181. *Id.* §§ 2402(3), (6), (7), (13), 2403.

and enforcement of the ACA, particularly as the Act applies to tourists and research stations.[182]

The Agreed Measures themselves have been criticized as overly permissive. Designated SPA's have not been respected by tourist expeditions, among others.[183] The limited definition of "harmful interference" in the Agreed Measures has not prevented damage to the Antarctic environment.[184] The Dumont d'Urville airstrip, in particular, serves as a visible example of the detrimental environmental effects allowed by the Agreed Measures.[185] The protocol restates most of the Agreed Measures in annex II (but supplements them with a comprehensive requirement for environmental impact assessments) and simplifies the system of protected areas in annex V.[186]

C. *Convention for the Conservation of Antarctic Seals*

The Seals Convention entered into force on March 11, 1978.[187] The form of an independent convention was used in order to avoid conflict with the Antarctic Treaty's provision preserving all high seas freedoms.[188] The Seals Convention allows harvesting, within annual limits, of three species of seals whose populations are relatively abundant.[189] The Seals Convention generally prohibits commercial harvesting of Ross seals, Southern Elephant seals, and Southern Fur seals, but allows killing or capture of limited quantities, with a permit, to provide food for humans or dogs or to provide specimens for scien-

182. *See, e.g.,* Manheim, *supra* note 44; *1993 Hearings, supra* note 1, at 34 (statement of Susan J. Sabella); *see also infra* part IV.A.1.

183. Heap & Holdgate, *supra* note 33, at 208.

184. Overholt, *supra* note 101, at 234-35. The following acts, among others, are considered to be harmful interference: flying aircraft in a manner that would disturb bird and seal concentrations; driving vehicles within 200 meters of concentrations of birds and seals; using explosives close to concentrations of birds and seals; and any disturbance of bird and seal colonies during breeding season by persistent attention from persons on foot. Agreed Measures, *supra* note 126, art. VII, para. 2, 17 U.S.T. at 999.

185. Overholt, *supra* note 101, at 234-35; *see also* Douglas M. Zang, *Frozen in Time: The Antarctic Mineral Resource Convention*, 76 CORNELL L. REV 722, 755 (1991). By contrast, another commentator believes that the Agreed Measures are sufficient at the present scale of human activities (as of 1985). Gulland, *supra* note 29, at 231. This view assumes that nearly any activity must have some immediate impact on the ecosystem, but that all ecosystems have some natural resilience; that is, if the impact is sufficiently small, it will be only temporary. *Id.*

186. *See infra* parts III.B.2 and III.B.5.

187. Seals Convention, *supra* note 50, 29 U.S.T. 441. The Seals Convention provides international legal protection for seals in the region south of 60 degrees south latitude. *Id.* art. 1, 29 U.S.T. at 443.

188. Overholt, *supra* note 101, at 237-38 & n.46; *see also supra* text accompanying note 165.

189. The annual limits are 175,000 for Crabeater seals (*Lobodon carcinophagus*), 12,000 for Leopard seals (*Hydrurga leptonyx*), and 5000 for Weddell seals (*Leptonychotes weddelli*). Seals Convention, *supra* note 50, Annex, para. 1, 29 U.S.T. at 478.

tific research, museums, or educational or cultural institutions.[190] The Seals Convention also establishes closed seasons and closed zones, seal reserves, hunting methods, and information exchanges.[191]

No commercial seal hunting has taken place in Antarctica since the Seals Convention entered into force.[192] Should sealing occur, the parties can review the Convention.[193] Yet, although commercial sealing in Antarctic has ceased, it should be stressed that the Seals Convention regulates rather than prohibits sealing. Some experts theorize that harvesting has not taken place because of technical and economic factors, as opposed to the protection of the Seals Convention.[194]

The Seals Convention's scope is inherently limited, in that it protects only seals. In the years since the Seals Convention entered into force, it has become apparent that more comprehensive and powerful measures are needed to protect all forms of Antarctic marine wildlife. The protocol does not provide this protection, other than for Specially Protected Species, probably because of its limited application to the high seas. Fortunately, a detailed regime wholly independent of the Antarctic Treaty has been developed to regulate and protect Antarctic marine wildlife in general.[195] This parallel regime, described next, will continue to have effect after the protocol enters into force.

D. Convention on the Conservation of Antarctic Marine Living Resources

CCAMLR entered into force on April 7, 1982.[196] This ambitious instrument aims to protect all marine living resources, including birds, in the Antarctic and Southern Ocean area, in accordance with principles of ecosystem conservation.[197] Consistent with its ecosystem approach, CCAMLR applies to a wider area than does any other Antarctic instrument. This area encompasses nearly all the waters and ice shelves south of the Antarctic Convergence.[198] CCAMLR ob-

190. *Id.* art. 4 & Annex, para. 2, 29 U.S.T. at 444-45, 478.
191. *Id.* Annex, para. 3-7, 29 U.S.T. at 478-79.
192. Heap & Holdgate, *supra* note 33, at 203.
193. Seals Convention, *supra* note 50, art. 6, 29 U.S.T. at 446.
194. Heap & Holdgate, *supra* note 33, at 199.
195. CCAMLR, *supra* note 63, 33 U.S.T. 3476.
196. *Id.* Twenty-eight states have ratified CCAMLR, and accession remains open to any state or regional organization comprised of sovereign states. *Id.* art. XXIX, 33 U.S.T. at 3512. The form of a convention was utilized here also to avoid conflict with the Antarctic Treaty's provision preserving high seas freedoms. Overholt, *supra* note 101, at 239, n.52.
197. Heap & Holdgate, *supra* note 33, at 203. The Convention covers finfish, mollusks, crustaceans, and all other species of living organisms. CCAMLR, *supra* note 63, art. I, para. 2, 33 U.S.T. at 3479. CCAMLR is unlike the previous agreements protecting marine resources—the Agreed Measures and the Seals Convention—in that it seeks to protect the entire marine ecosystem. *Id.* art. I, 33 U.S.T. at 3478.
198. CCAMLR, *supra* note 63, art. I, para. 1, 33 U.S.T. at 3479.

ligates party states to cooperate in achieving effective management and conservation of krill and other marine living organisms,[199] to prevent discord over fishing activity in the Southern Ocean, and to recognize that Antarctic Treaty nations have a special responsibility in the region.[200] In 1984, the United States passed the Antarctic Marine Living Resources Convention Act (AMLRCA) to implement CCAMLR, The Act established the Antarctic Marine Living Resources (AMLR) Program and granted NOAA authority to administer this program.[201]

The objective of the CCAMLR management regime is to achieve "rational use" of marine resources.[202] The regime does not institute a flat ban on hunting of marine animals. Rather, it seeks to maintain populations at stable levels in order to ensure the greatest net annual increment in breeding, to maintain ecological relationships among harvested, dependent, and related populations, and to avoid changes in the ecosystem that are potentially irreversible within two or three decades.[203] In practical terms, this means that hunting of some species is prohibited and that catch limits are set for other species.[204] CCAMLR has set a limit for krill fishing of 1.5 million metric tons per year; this limit is essentially precautionary since the total catch for 1991-92 was under 300,000 metric tons.[205]

Unlike the Agreed Measures, CCAMLR has formalized institutions and strong enforcement provisions. The main working bodies are the CCAMLR Commission, the scientific committee, and a secretariat.[206] The CCAMLR Commission is required to reach decisions by consensus on substantive issues and by simple majority on procedural matters.[207] At its 1992 meeting, the CCAMLR Commission

199. *See id.* art. II, 33 U.S.T. at 3479-80.

200. M. J. PETERSON, MANAGING THE FROZEN SOUTH: THE CREATION AND EVOLUTION OF THE ANTARCTIC TREATY SYSTEM 106 (1988).

201. Antarctic Marine Living Resources Convention Act, 16 U.S.C. §§ 2431-2444 (1988) [hereinafter AMLRCA].

202. CCAMLR, *supra* note 63, art. II, para. 2, 33 U.S.T. at 3479.

203. *Id.* art. II, para. 3, 33 U.S.T. at 3479-80.

204. For example, the United States began exploratory crab fishing in 1992, but the CCAMLR Commission adopted a conservation measure limiting the total take to 1600 metric tons. The commission determined that data submitted by the United States on sustainable fishing was insufficient. MARINE MAMMAL COMMISSION, *supra* note 57, at 140. CCAMLR also adopted conservation measures prohibiting the taking of certain species and setting catch limits for others in response to fishing by Bulgarian, Chilean, Russian, and Ukrainian vessels in the area around South Georgia Island. *Id.* at 139.

205. *Id.* at 139-40.

206. CCAMLR, *supra* note 63, arts. VII, XIV, XVII, 33 U.S.T. at 3482, 3487, 3489. These bodies are directed to form cooperative relationships with the ATCP's, other organs of the Antarctic Treaty System, and intergovernmental and nongovernmental groups. *Id.* art. XXIII, 33 U.S.T. at 3490.

207. *Id.* art. XII, para. 1-2, 33 U.S.T. at 3486. The question of whether a matter is procedural or substantive is itself a substantive issue. *Id.* art. XII, para. 1, 33 U.S.T. at 3486.

adopted a Scheme of International Scientific Observation, which allows placement of scientific observers on fishing vessels.[208] The commission's other functions include facilitating research, compiling population and harvest data, identifying conservation needs, and inspecting fisheries to ensure compliance with catch limits and restricted zones.[209] The scientific committee has a number of permanent working groups, one of which has carried out long-term ecosystem monitoring since 1984.[210]

The long-term nature of CCAMLR's goals hinders assessment of its environmental effectiveness. Scientists cannot conduct research of population and other biology dynamics overnight, and effective management of the Southern Ocean as a complete ecosystem needs to be based on high-quality, long-term, multidisciplinary research.[211] Some commentators have criticized CCAMLR's ecosystem approach as impractical, and debate continues over its management problems.[212] Despite such methodological shortcomings, CCAMLR has enormous potential, given its comprehensive scope, to provide protection to Antarctic wildlife. Since the Antarctic Treaty and its related instruments technically cannot extend protection to the living resources of the high seas, CCAMLR's management scheme has magnified importance. The Madrid Protocol's provisions relating to marine pollution, environmental impact assessment, and designated area protection may add limited, incidental coverage to marine living resources. As the protocol's provisions do not relate specifically to marine species, however, CCAMLR alone will continue to provide comprehensive, focused protection to the living creatures of the Antarctic marine environment.

E. Convention on the Regulation of Antarctic Mineral Resource Activities

CRAMRA[213] was opened for signature on November 25, 1988, after six years of negotiations. The Convention would have allowed closely regulated exploration and development of mineral and fuel resources in and around Antarctica. International support for CRAMRA began to erode, however, when a string of shipping accidents caused oil spills in Antarctica soon after the Convention was opened for signature.[214] The *Exxon Valdez* spill in Alaska especially

208. MARINE MAMMAL COMMISSION, *supra* note 57, at 141.
209. Harris & Meadows, *supra* note 103, at 243.
210. MARINE MAMMAL COMMISSION, *supra* note 57, at 141.
211. Gulland, *supra* note 29, at 227.
212. Harris & Meadows, *supra* note 103, at 243.
213. CRAMRA, *supra* note 41, 27 I.L.M. at 868.
214. *See supra* notes 98-101 (describing these accidents).

heightened public awareness regarding the need for environmental protection.[215] This swell of public opinion, added to the ongoing efforts of environmental groups, brought strong pressure to bear on national governments to withdraw their support from CRAMRA.[216]

France and Australia first declared opposition to Antarctic mining,[217] making it impossible to obtain the signatures of the seven nations holding territorial claims, as required for CRAMRA's entry into force.[218] A dozen other countries next demanded that Antarctic mining be permanently banned.[219] In November 1990, under pressure from environmental groups, President Bush signed the Antarctic Protection Act,[220] which imposed an indefinite ban on U.S. mining in Antarctica. The backlash against CRAMRA, and the perception that the Antarctic Treaty System lacks comprehensive and effective environmental protection and enforcement measures, provided the political will for countries to negotiate and sign the Protocol to the Antarctic Treaty.

III
THE PROTOCOL FOR ANTARCTIC ENVIRONMENTAL PROTECTION

The Protocol to the Antarctic Treaty promises to extend and improve the treaty's protection of the Antarctic environment.[221] The protocol designates Antarctica as a natural reserve, devoted to peace and science,[222] and prohibits all mineral resource activity, except for

215. In March 1989, the *Exxon Valdez* ran aground in Prince William Sound, Alaska, spilling over 11 million gallons of crude oil. *Environmental Timeline*, WASH. TIMES, Apr. 20, 1990, at H3.

216. Blay, *supra* note 142, at 378, 387.

217. On August 18, 1989, the French and Australian Prime Ministers issued a joint declaration that "mining in Antarctica is not compatible with protection of the fragile Antarctic environment." Overholt, *supra* note 101, at 247.

218. CRAMRA, *supra* note 41, art. 62, 27 I.L.M. at 896. Article 62 requires ratification by 16 ATCP's for entry into force, and it further requires that "that number includes all the States necessary in order to establish all of the institutions of the Convention in respect of every area of Antarctica." *Id.* It is deduced from this language that all states with territorial claims must ratify for the Convention to enter into force.

219. Overholt, *supra* note 101, at 247-48.

220. Antarctic Protection Act of 1990, Pub. L. No. 101-594, 104 Stat. 2975 (codified as amended at 16 U.S.C. §§ 2461-2466 (Supp. IV 1992) [hereinafter APA].

221. Madrid Protocol, *supra* note 3, art. 2, 30 I.L.M. at 1462. The signatory states were Argentina, Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, China, Colombia, former Czechoslovakia, Cuba, Denmark, Ecuador, Finland, France, Germany, Greece, Guatemala, Hungary, India, Italy, Japan, the Democratic People's Republic of Korea; the Republic of Korea, the Netherlands, New Zealand, Norway, Papua New Guinea, Peru, Poland, Romania, South Africa, Spain, Sweden, Switzerland, the former U.S.S.R., the United Kingdom, the United States, and Uruguay. Letter from U.S. Dep't of State to Jennifer Angelini (Mar. 1993) (on file with author).

222. Madrid Protocol, *supra* note 3, art. 2, 30 I.L.M. at 1462.

scientific research.[223] The parties agreed to the protocol in part because they recognized "the need to enhance the protection of the Antarctic environment and dependent and associated ecosystems."[224] The protocol creates an advisory Committee on Environmental Protection, institutes inspection and reporting duties, and establishes elaborate dispute resolution measures.[225] Parties to the protocol are obligated to follow environmental impact assessment procedures for proposed activities, both governmental and private, in Antarctica.[226] Parties must also develop joint contingency plans and provide for prompt and effective responses to environmental emergencies.[227] Besides creating these general obligations, the protocol establishes a framework for further decisionmaking and dispute resolution.[228] Fi-

223. Article 7 of the Madrid Protocol reads in full: "Any activity relating to mineral resources, other than scientific research, shall be prohibited." *Id.* art. 7, 30 I.L.M. at 1464. The ban on mining is not permanent, though it is potentially indefinite. Article 25 establishes two procedures for review and amendment of the protocol. *Id.* art. 25, 30 I.L.M. at 1469. The first procedure allows the protocol to be modified or amended at any time by unanimous agreement of the ATCP's. *Id.* The amendment or modification will enter into force when it has been ratified by all ATCP's. *Id.* art. 25, para. 4, 30 I.L.M. at 1470. This procedure literally allows the prohibition on mining to be amended at any time. Nonetheless, the adamancy of the anti-mining states, not to mention the divergence in interests among these states should they ever agree in principle to mining, makes it unlikely that the required unanimity will ever be achieved.

The second procedure can be employed only 50 years after the protocol's entry into force. *Id.* art. 25, para. 2, 30 I.L.M. at 1469. After this waiting period, a conference to review the operation of the protocol may be held at the request of any ATCP. *Id.* The review conference may adopt a modification or amendment by a majority of the parties, including three-quarters (20) of the states that were consultative parties as of the date that the protocol was adopted. *Id.* art. 25, para. 3, 30 I.L.M. at 1470. The modification or amendment thus adopted will enter into force upon ratification by three-quarters of the ATCP's, including all 26 states that were ATCP's as of the date the protocol was adopted. *Id.* art. 25, para. 4, 30 I.L.M. at 1470. Taken together, these provisions effectively grant any present ATCP a veto power.

Additionally, article 25(5) creates special conditions that must be met if article 7 is to be altered using this second procedure:

> With respect to Article 7, the prohibition on Antarctic mineral resource activities contained therein shall continue unless there is in force a binding legal regime on Antarctic mineral resource activities that includes an agreed means for determining whether, and, if so, under which conditions, any such activities would be acceptable.

Id. art. 25, para. 5(a), 30 I.L.M. at 1470. Any modification or amendment to article 7 proposed at a review conference must include such a binding legal regime. *Id.* In response to U.S. intimations that it might not sign the protocol, a "walk away" provision was added. Under this provision, if a proposed modification or amendment does not enter into force within three years, any party may withdraw from the protocol after two years' notice. *Id.* art. 25, para. 5(b), 30 I.L.M. at 1470. These combined provisions mean that the earliest Antarctic mining could occur is 55 years after the entry into force of the protocol, and then only under the binding legal regime required by article 25(5)(a).

224. *Id.* pmbl., 30 I.L.M. at 1461.

225. *Id.* arts. 11, 14, 17, 18-20, 30 I.L.M. at 1465, 1466-67, 1467-68, 1468-69.

226. *Id.* art. 8, 30 I.L.M. at 1464.

227. *Id.* art. 15, para. 1, 30 I.L.M. at 1464.

228. *Id.* arts. 18-20, 30 I.L.M. at 1468-69.

nally, five annexes to the protocol contain detailed rules concerning environmental impact assessment, conservation of Antarctic flora and fauna, waste disposal and waste management, prevention of marine pollution, and area protection and area management.[229]

The protocol differs in four important respects from the existing Antarctic Treaty System. First, it requires more stringent protection of the environment than do existing instruments. Second, the protocol regulates all activity in the Antarctic, both governmental and nongovernmental. The protocol rules will thus apply to tourism, which is currently unregulated. Third, the protocol focuses exclusively on environmental protection, unlike the existing Antarctic instruments, which relate only incidentally to the environment. The Antarctic Treaty, for instance, contains no provision specifically addressing environmental protection. Finally, the protocol provides a comprehensive approach to environmental protection, unlike the single issue, piecemeal approach of the other Antarctic instruments. CRAMRA, by contrast, contains some very stringent environmental protections, but they relate solely to mineral activities in the Antarctic. Thus, the protocol establishes comprehensive and single purpose regulation that stipulates uniform standards for all types of human activity on the continent.[230]

Technically, the protocol will not replace any preexisting instrument, since such instruments remain in force. In practice, however, the protocol may be expected to replace the morass of measures, codes of conduct, and recommendations having various legal effects.[231] The protocol is intended to strengthen and supplement the Antarctic Treaty System, to ensure that activities in the Antarctic are consistent with the purposes and principles of the Antarctic Treaty, and to reaffirm the conservation principles of CCAMLR.[232] The protocol codifies, with amendments, many ATCM recommendations and the Agreed Measures. The protocol does not, however, affect the separate operation of the Seals Convention and CCAMLR, for it cannot interfere with the high seas freedom of fishing.

The protocol will enter into force only after ratification by the twenty-six states that were ATCP's as of the Madrid meeting date.[233] As of January 1994, only six states had deposited their ratification of

229. *Id.* Annexes I-V, 30 I.L.M. at 1473-85.

230. *See generally* Blay, *supra* note 142, at 387-98.

231. *Id.* at 398.

232. Madrid Protocol, *supra* note 3, pmbl., 30 I.L.M. at 1461.

233. *Id.* art. 23, 30 I.L.M. at 1469. Given the protocol's subordinate status to the Antarctic Treaty, only states that are party to the Antarctic Treaty may become party to the protocol. *Id.* arts. 21-22, 30 I.L.M. at 1469. Moreover, the protocol provides that after its entry into force, a party to the Antarctic Treaty will be required to become a party to the protocol as a condition of gaining ATCP status. *Id.* art. 22, para. 4, 30 I.L.M. at 1469.

the protocol: Argentina, Ecuador, France, Norway, Peru, and Spain.[234] The U.S. position has shifted over time from active opposition to support of the final compromise version of the protocol. The Senate has given its consent to ratification,[235] and the only barrier remaining to U.S. ratification is the enactment of implementing legislation.[236] The following overview of the protocol's requirements will highlight issues that must be resolved for implementing legislation to be passed.

A. Regulatory Framework Created by the Protocol

1. Committee on Environmental Protection

Article 11 establishes the protocol's sole institutional body, the Committee on Environmental Protection (the CEP). Each state that becomes a party to the protocol is entitled to membership in this newly-created body, and may appoint one representative.[237] Observer status is open to any Antarctic Treaty party that is not a party to the protocol.[238] The CEP is charged with overseeing compliance with the protocol, but it has neither an independent role nor any compulsory enforcement tools.[239] Rather, article 12 defines for the CEP a subordinate and advisory role: "The functions of the Committee shall be to provide advice and formulate recommendations to the parties in connection with the implementation of this Protocol, including the op-

234. Telephone Interview with U.S. Dep't of State, *supra* note 4.

235. SENATE COMM. ON FOREIGN RELATIONS, PROTOCOL ON ENVIRONMENTAL PROTECTION TO THE ANTARCTIC TREATY, S. EXEC. REP. NO. 54, 102d Cong., 2d Sess. 1 (1992).

236. *Id.* at 6.

237. Madrid Protocol, *supra* note 3, art. 11, para. 2, 30 I.L.M. at 1465. The representative may be accompanied by experts and advisers. *Id.*

238. *Id.* art. 11, para. 3, 30 I.L.M. at 1465. Article 11(4) directs the CEP to extend an invitation to the President of SCAR and to the Chairman of the CCAMLR scientific committee to participate as observers at the sessions. *Id.* art. 11, para. 4, 30 I.L.M. at 1465. Further nongovernmental participation is possible. The CEP may, with ATCM approval, invite "such other relevant scientific, environmental and technical organisations [sic] which can contribute to its work to participate as observers." *Id.* Article 12(2) directs the CEP to consult as appropriate with SCAR, the CCAMLR scientific committee, and other relevant scientific, environmental, and technical organizations in carrying out its functions. *Id.* art. 12, para. 2, 30 I.L.M. at 1466.

239. The individual parties and the ATCM, not the CEP, are responsible for enforcement of the protocol. Each party is required to "draw the attention" of all other parties to any activity that, in its opinion, "affects" the implementation of the objectives and principles of the protocol. *Id.* art. 13, 30 I.L.M. at 1466. Parties must also exert appropriate efforts, consistent with the U.N. Charter, to the end that no one engages in any activity contrary to the protocol. *Id.* The ATCM is to draw the attention of any nonparty state to any activity undertaken by the state, or by any person subject to the state's jurisdiction, that affects the implementation of the protocol. *Id.* art. 13, para. 5, 30 I.L.M. at 1466.

eration of its Annexes, for consideration at Antarctic Treaty Consultative Meetings. . . ."[240]

The protocol may be criticized for failing to provide the CEP with a clear mandate and specific functions.[241] For instance, the CEP is directed to perform "such other functions as may be referred to it" by the ATCM.[242] This charge leaves unclear whether the CEP can solely carry out referrals, or whether it can also identify and pursue matters that it independently deems important.[243] The CEP's role in the environmental impact assessment process is limited to making comments at what is almost the final stage.[244] A greater role for the CEP could improve both the quality and consistency of environmental impact assessment.[245] Additionally, the CEP could play an important role by proposing protected areas under the protocol and helping to formulate their management plans.[246] The protocol does not recognize the CEP's potential to serve in these capacities, but instead requires the

240. *Id.* art. 12, para. 1, 30 I.L.M. at 1466. A list of particular areas on which the CEP is to provide advice includes:

(a) the effectiveness of measures taken pursuant to this Protocol;
(b) the need to update, strengthen or otherwise improve such measures;
(c) the need for additional measures, including the need for additional Annexes, where appropriate;
(d) the application and implementation of the environmental impact assessment procedures set out in Article 8 and Annex I;
(e) means of minimising [sic] or mitigating environmental impacts of activities in the Antarctic Treaty area;
(f) procedures for situations requiring urgent action, including response action in environmental emergencies;
(g) the operation and further elaboration of the Antarctic Protected Area system;
(h) inspection procedures, including formats for inspection reports and checklists for the conduct of inspections;
(i) the collection, archiving, exchange and evaluation of information related to environmental protection;
(j) the state of the Antarctic environment; and
(k) the need for scientific research, including environmental monitoring, related to the implementation of this Protocol.

Id.

Article 10 calls on the ATCM not only to define the general policy for comprehensive protection of the Antarctic environment in accordance with the provisions of the protocol, but also to adopt measures under article IX of the Antarctic Treaty for the implementation of the protocol. *Id.* art. 10, para. 1, 30 I.L.M. at 1465. In carrying out both tasks, the ATCM must review the work of the CEP and draw fully upon its advice and recommendations, as well as upon the advice of SCAR. *Id.* art. 10, para. 2, 30 I.L.M. at 1465.

241. *See, e.g.,* ASOC INFORMATION PAPER NO. 4, *supra* note 160, at 1.

242. Madrid Protocol, *supra* note 3, art. 12, 30 I.L.M. at 1466.

243. ASOC INFORMATION PAPER NO. 4, *supra* note 160, at 5.

244. *Id.* at 3. *See infra* part III.B.1. The protocol requires that a list of Initial Environmental Evaluations be provided to the CEP annually, but there is no formal channel for CEP input. Madrid Protocol, *supra* note 3, Annex I, art. 6, para. 1(b), 30 I.L.M. at 1475. Comprehensive Environmental Evaluations are circulated to the CEP, but only "for consideration as appropriate." *Id.* Annex I, art. 3, para. 4, 30 I.L.M. at 1474.

245. ASOC INFORMATION PAPER NO. 4, *supra* note 160, at 3.

246. *Id. See infra* part III.B.5.

CEP to collect and archive material[247]—a function that might better be entrusted to a secretariat.[248] Moreover, the protocol does not provide for funding, which is critical to the operation of any institution.[249] In sum, the CEP may lack the necessary support, both financial and institutional, to be an effective and efficient environmental protection body.

The institutional shortcomings give increased importance to the composition of the CEP. If the body acquires a political character because states appoint diplomatic personnel to serve as CEP representatives, then its value as an objective advisory body could be completely undermined. Furthermore, a lack of accurate and up-to-date information regarding the environment could prevent the CEP from carrying out even its advisory functions.[250] By contrast, if persons with environmental, scientific, and technical expertise are appointed to the CEP, then the body would be able to provide parties with relevant and instructive advice on the environment. Thus, the United States should carefully consider the example it is setting for other countries when it appoints its first representative to the CEP.

House bill 964 provides that the Secretary of State, with the concurrence of other appropriate federal officials, shall designate an officer or employee of the United States as the CEP representative.[251] House bill 1066 provides that the Secretary of State, in consultation with EPA and NOAA, shall appoint an officer or employee of the United States as the CEP representative.[252] It further requires that the person "shall have the technical qualifications required to serve in this capacity."[253] Senate bill 1427 requires the President, rather than the Secretary of State, to appoint the CEP representative, and it contains the same "technical qualifications" requirement as House bill 1066.[254] While the technical qualifications standard gives some guidance, each of the bills ultimately grants the appointing authority considerable discretion in choosing the U.S. representative to the CEP.[255] To minimize the risk that the CEP will become overly politicized, im-

247. Madrid Protocol, *supra* note 3, art. 12, para. 1, 30 I.L.M. at 1466.
248. ASOC INFORMATION PAPER NO. 4, *supra* note 160, at 4.
249. *Id.* at 5.
250. *Id.* at 4.
251. H.R. 964, *supra* note 7, § 10 (proposed 16 U.S.C. § 2408).
252. H.R. 1066, *supra* note 7, § 4.
253. *Id.*
254. S. 1427, *supra* note 7, § 4(a).
255. Former EPA Administrator William Reilly was of the opinion that the administration would nominate a U.S. representative with outstanding credentials in scientific, technical, and operational disciplines related to Antarctica, as well as a strong historical and foreign policy perspective on the operation of the Antarctic Treaty System. *1992 Hearings, supra* note 90, at 236 (statement of William K. Reilly, former Administrator, EPA).

plementing legislation should specify precise scientific, technical, or environmental qualifications for the representative.

Implementing legislation could strive further to bolster the effectiveness of the CEP's advisory functions. In providing advice and recommendations to the ATCM, the CEP is in effect required to identify and evaluate each party's implementation measures under the protocol. U.S. legislation should provide a means of integrating the CEP's advice and recommendations into the domestic regulatory scheme. One suggestion is that the domestic permitting agency be required to take the advice and recommendations of the CEP into account.[256] In addition, U.S. legislation should require that draft environmental impact assessments prepared in support of any permit application be provided to the CEP prior to the final permitting decision. If the CEP solicits international reaction to a statement, the U.S. agency responsible for permitting should take this reaction, as well as any advice from the CEP, into account when making permitting decisions.[257] If U.S. legislation thus enables the CEP's advice to inform the domestic regulatory process, it would ensure that the CEP is able to influence environmental practices despite its institutional and financial weaknesses.

2. *Inspection Procedures*

New inspection procedures set forth in the protocol may prove to be important compliance and enforcement tools. While the Antarctic Treaty established an ATCP *right* of inspection,[258] the protocol imposes a positive *duty* on ATCP's to arrange, individually or collectively, for inspections to be carried out by observers to promote environmental protection and to ensure compliance with the protocol.[259] Ideally, for enforcement purposes, systematic inspections of potentially noncomplying activities would be made on a regular basis.

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256. *1992 Hearings, supra* note 90, at 159-60, (statement of Christopher C. Joyner, Professor, George Washington University). None of the bills provides any such integration mechanism.

257. House bill 964 provides no such function for the CEP. House bill 1066 does require the Secretary of State to circulate draft Environmental Impact Statements to the CEP, as well as to all Antarctic Treaty parties. H.R. 1066, *supra* note 7, § 7(c)(1). Senate bill 1427 contains a similar circulation requirement. S. 1427, *supra* note 7, § 6(d)(2)(B). These bills do not indicate, however, that the permitting agency should consider the advice or recommendations of the CEP when making the decision to permit.

258. Antarctic Treaty, *supra* note 125, art. VII, para. 3, 12 U.S.T. at 797; *see also supra* text accompanying notes 156-64 (describing inspections under the Antarctic Treaty).

259. Madrid Protocol, *supra* note 3, art. 14, para. 1, 30 I.L.M. at 1467. The protocol incorporates the Antarctic Treaty right, and it goes further in requiring parties to cooperate fully to ensure that observers are given access to all parts of the stations, installations, equipment, ships, and aircraft, as well as to records. *Id.* art. 14, para. 3, 30 I.L.M. at 1467. The importance of these provisions becomes evident upon considering that resistance to an international team of inspectors authorized by the protocol could well create and/or escalate international tensions. Nevertheless, none of the bills contains any provisions requir-

The protocol's suggestion that countries conduct collective inspections may increase the frequency of inspections and allow more countries to conduct inspections, by reducing the costs to any single country.[260] Yet, it remains to be seen whether the protocol's new duty to inspect will indeed result in more frequent inspections.

Another innovation in the protocol is its requirement that a report be generated after all inspections. The inspection report is to be sent to the inspected party for comment, circulated to all the parties and the CEP, considered at the next ATCM, and finally made publicly available.[261] Given the potential value of inspection reports as a source of data and information regarding compliance with the protocol, it is to be hoped that the reports will have a standardized and understandable format. The usefulness of inspection reports could be further increased by including qualitative descriptions of any numerical data (e.g., the results of testing or sampling). Moreover, comparative data from previous inspections at the same site could allow even casual readers to judge whether progress is being made.

As under the Antarctic Treaty procedure, the protocol allows any ATCP to designate its nationals as observers.[262] In addition, the protocol appears to create a new class of observers, to be designated by the ATCM to carry out inspections under procedures to be established at an ATCM.[263] However, the protocol stops short of establishing a formalized inspectorate to enforce its provisions. Some observers believe that such a formalized inspection authority is essential to ensure compliance with the protocol's provisions.[264] It is true that international inspections have not played a significant role in environmental enforcement to date.[265] Thus, the United States and other countries should strive to utilize fully this enforcement mechanism under the protocol, if not go further to establish a formal inspectorate.

House bill 964 makes no provision for the international inspections required by article 14(1), or for the appointment of inspectors.[266] Both House bill 1066 and Senate bill 1427 grant the Secretary of State

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ing U.S. nationals to cooperate with international inspectors or to grant inspectors access to U.S. stations, installations, or equipment.

260. *Panel Discussion on Conservation and Environment, supra* note 158, at 217.

261. Madrid Protocol, *supra* note 3, art. 14, para. 4, 30 I.L.M. at 1467.

262. *Id.* art. 11, para. 3, 30 I.L.M. at 1465.

263. *Id.* art. 14, para. 2, 30 I.L.M. at 1467.

264. ASOC INFORMATION PAPER NO. 2, *supra* note 159, at 1. This view asserts that an inspection body could indeed be established under the protocol to provide data and information concerning compliance to the CEP. *Id.*

265. *See supra* text accompanying note 159.

266. H.R. 964 does not direct any U.S. entity to carry out inspections of international facilities or operators, nor does it require inspection reports to be prepared or circulated as required by article 14(4).

authority to agree on behalf of the United States to a system of observation and inspection "pursuant to Article 14."[267] These two bills direct the Secretary of State to circulate inspection reports to all parties to the Antarctic Treaty,[268] but do not require the Secretary to prepare the reports or otherwise indicate which agency should be responsible for preparing them. In sum, none of the proposed U.S. legislation takes steps to ensure the usefulness of international inspections for monitoring compliance with the protocol's environmental protections; indeed, House bill 964 does not even acknowledge the existence of international inspections under the protocol.

3. General Duties

The protocol contains various obligations relating to reporting, cooperation, consultation, contingency planning, and emergency response. Some of these duties are vaguely worded, and thus may not compel definite actions. Ironically, these very obligations may be key to international compliance with the protocol. Given the lack of any central enforcement mechanism, each country's willingness to report on its Antarctic activities, plan for and respond to emergencies, and engage in meaningful cooperation seems critical to the protocol's effectiveness. The fact that the parties agreed to cooperative duties indicates that they at least intend to undertake a good faith effort to comply with these obligations. Implementing legislation could do much to clarify and define these duties as they relate to U.S. activities in the Antarctic.

The protocol has no secretariat or central information agency, so individual parties will be responsible for transferring to other parties the information necessary to assess compliance with the protocol's provisions. Each party must notify other parties of (1) the adoption of laws and regulations, administrative actions, and enforcement measures to ensure compliance with the protocol; and (2) efforts taken,

267. H.R. 1066, *supra* note 7, § 4(c); S. 1427, *supra* note 7, § 8(b). House bill 1066 further indicates that NOAA or the Coast Guard is to exercise any enforcement powers conferred under such an agreed-upon system. H.R. 1066, *supra* note 7, § 12(a). It is not clear that the House or Senate bill provisions fully implement article 14(1). The Secretary of State is authorized to "agree to" a system, not directed to "arrange for" inspections. Thus, the system of observation and inspection seems to correspond to the ATCM inspections described in article 14(2)(b), rather than to the "individual or collective" inspections required by article 14(1).

268. H.R. 1066, *supra* note 7, § 8(d); S. 1427, *supra* note 7, § 8(d)(1). Both House bill 1066 and Senate bill 1427 provide for public notice and comment before circulation to Antarctic Treaty parties. H.R. 1066, *supra* note 7, § 8(d)(1); S. 1427, *supra* note 7, § 8(d)(1). This seems to run counter to article 14(4), which requires that the report first be sent to the inspected party, then circulated to all parties and the CEP, considered at the next ATCM, and only then made publicly available. Madrid Protocol, *supra* note 3, art. 14, para. 4, 30 I.L.M. at 1467. The reporting requirement of article 14(4) is thus arguably not implemented by these bills.

consistent with the United Nations Charter, to ensure that no one engages in activity contrary to the protocol.[269] In addition, parties must circulate annual reports on the steps taken to implement the protocol,[270] as well as the reports of any inspections conducted.[271] Finally, each party must immediately notify all other parties of any environmental emergency.[272]

These reporting and notification requirements present an opportunity for the United States to set an example for other parties and to further the protocol's goals. U.S. implementing legislation should require that the agency responsible for regulating Antarctic activities complies fully with the protocol's reporting and notification requirements. The United States has the largest presence in the Antarctic and perhaps the most resources to utilize in reporting. If it shirks its reporting responsibilities, other countries might use this to justify a failure to make information available for compliance or contingency planning purposes.

Despite these considerations, House bill 964 does not establish any international notification or reporting requirement. Hence, these U.S. obligations are not legislatively defined or required to be met under the bill. By contrast, both House bill 1066 and Senate bill 1427 require the Secretary of State to: (1) circulate to all parties to the Antarctic Treaty, after notice and public comment, all inspection and compliance reports and all actions taken to ensure compliance with the Protocol, including notice of activities undertaken in cases of emergency; and (2) bring promptly to the attention of other parties to the Antarctic Treaty all known incidents of noncompliance by the nationals of those parties.[273] Missing from these provisions is any requirement that an annual report be prepared. Also inconsistent with the protocol is the provision in each bill that reports first receive public notice and comment before being circulated to all parties.[274] This procedure interferes with the protocol's requirement that parties be

269. Madrid Protocol, *supra* note 3, art. 13, para. 3, 30 I.L.M. at 1466.

270. *Id.* art. 17, para. 1, 30 I.L.M. at 1467. The annual reports are to include notifications of domestic steps taken to ensure compliance and information about contingency plans, as well as any other notifications and information called for by the protocol for which there is no provision for circulation and exchange. The annual reports are to be circulated to all parties and the CEP, considered at the next ATCM, and then made publicly available. *Id.* art. 17, paras. 1-2, 30 I.L.M. at 1467-68.

271. *Id.* art. 14, para. 4, 30 I.L.M. at 1467.

272. *Id.* art. 15, para. 2(b), 30 I.L.M. at 1467. Each annex also contains a provision requiring that notice of activities undertaken in cases of emergency be circulated immediately to all parties and the CEP. *Id.* Annex I, art. 7, para. 2, Annex II, art. 2, para. 2, Annex III, art. 12, para. 2, Annex IV, art. 7, para. 2, 30 I.L.M. at 1475, 1477, 1482, 1485.

273. H.R. 1066, *supra* note 7, § 8(d); S. 1427, *supra* note 7, § 8(d).

274. H.R. 1066, *supra* note 7, § 8(d); S. 1427, *supra* note 7, § 8(d).

notified immediately of emergency actions.[275] The bills' failure to require reports to be submitted to the CEP, or to be considered at ATCM's, also potentially undermines the authority of those two institutions.

Even more important than reporting are the protocol's requirements concerning contingency planning and emergency response. Each party agrees to formulate and implement contingency plans for response to incidents with potentially adverse environmental effects,[276] and to provide prompt and effective response action to any environmental emergencies that may arise.[277] Parties must also establish procedures for cooperative response to such emergencies.[278] The importance of Antarctic contingency planning and cooperative emergency response seems self-evident. Even ordinary activities may have unexpected results, due to the extreme Antarctic conditions. The results of unplanned activities are still more difficult to foresee. Moreover, the effects of unplanned activities may be far more adverse to the fragile Antarctic environment than would be normal in temperate settings. U.S. legislation should call on the lead agency to begin immediately developing contingency plans and emergency procedures for Antarctic activities. Legislation should also require the periodic updating of such plans and procedures in light of past experience and new technology.

House bill 964 merely directs the Secretary of State to prescribe regulations "as necessary and appropriate" to require that nongovernmental activities provide for effective emergency response and comply with contingency plans in effect in Antarctica.[279] House bill 964 does not direct any entity to develop contingency plans or response procedures for the United States, as clearly required by the protocol.[280] Moreover, the bill exempts governmental activities from the planning requirement, contrary to the express inclusion of such activities in article 15(1)(a).[281] By contrast, House bill 1066 directs NOAA to "develop requirements for contingency plans for response to incidents

275. Madrid Protocol, *supra* note 3, art. 15, para 2(b), 30 I.L.M. at 1467.

276. *Id.* art. 15, para. 1(b), 30 I.L.M. at 1467. Parties are required to cooperate in the formulation and implementation of such contingency plans. *Id.* art. 15, para. 2(a), 30 I.L.M. at 1467.

277. *Id.* art. 15, para. 1(a), 30 I.L.M. at 1467.

278. *Id.* art. 15, para. 2(b), 30 I.L.M. at 1467.

279. H.R. 964, *supra* note 7, § 7(b) (proposed 16 U.S.C. § 2406(b)).

280. Also lacking in House bill 964 are legislative instructions for cooperative response procedures, as required by article 15(2). Madrid Protocol, *supra* note 3, art. 15, para. 2, 30 I.L.M. at 1467.

281. The protocol requires each party to "provide for prompt and effective response action to such emergencies which might arise in the performance of scientific research programmes, tourism, and all other governmental and non-governmental activities . . . ." *Id.* art. 15, para. 1(a), 30 I.L.M. at 1467.

with potential adverse effects caused by persons within Antarctica."[282] House bill 1066 further requires NOAA to prescribe regulations within two years to ensure that ships subject to U.S. jurisdiction have contingency plans for marine pollution incidents in Antarctica.[283] Senate bill 1427 contains similar directions, but divides land-based and marine-based contingency planning authority between the NSF and NOAA.[284] The provisions of House bill 1066 and Senate bill 1427 probably both satisfy the protocol's requirements concerning planning. The bills share the shortcoming, however, of not requiring a response to environmental emergencies.

The final set of general duties in the protocol relates to international cooperation. Article 6 requires parties to the protocol to cooperate in Antarctic activities, including the conduct of scientific research and environmental impact assessment.[285] The parties agree to share information relating to environmental risk and other information needed in planning and conducting Antarctic activities.[286] Each party must also endeavor to consult with other parties when choosing sites for prospective stations and other facilities, to avoid adverse cumulative impacts.[287] Finally, parties must cooperate with other parties that exercise jurisdiction in areas adjacent to the Antarctic Treaty area to ensure that activities in Antarctica do not have adverse environmental impacts on those areas.[288]

Given the general wording of most of the cooperative requirements, it may not be necessary, strictly speaking, for implementing legislation to make international cooperation a binding duty for the

282. H.R. 1066, *supra* note 7, § 8(c).

283. *Id.* § 14(f)(2).

284. Senate bill 1427 directs the NSF to develop contingency plans for response to land-based incidents with possible adverse effects. It directs NOAA to prescribe regulations within two years to ensure that all ships have contingency plans for marine pollution incidents in Antarctica. S. 1427, *supra* note 7, §§ 8(c), 15(e)(2).

285. Under article 6(1) each party must endeavor to: (1) promote cooperative programs of scientific, technical, or educational value concerning Antarctic environmental protection; (2) assist other parties in preparing environmental impact assessments; (3) provide, upon request, information regarding environmental risk and assistance to minimize the environmental effects of accidents; (4) consult with other parties when choosing prospective sites for stations and other facilities so as to avoid adverse cumulative impacts; (5) where appropriate, undertake joint expeditions and share use of facilities and stations; and (6) carry out such steps as may be agreed upon at ATCM's. Madrid Protocol, *supra* note 3, art. 6, para. 1, 30 I.L.M. at 1464.

286. *Id.* art. 6, paras. 1(c), 2, 30 I.L.M. at 1464.

287. *Id.* art. 6, para. 1(d), 30 I.L.M. at 1464.

288. *Id.* art. 6, para. 3, 30 I.L.M. at 1464. Article 5 obligates the parties to consult and cooperate with the parties to other instruments in force within the Antarctic Treaty System, and with their respective institutions, with a view to (1) ensuring that the protocol's principles and objectives are achieved, and (2) avoiding any interference with the objectives and principles of those instruments or any inconsistency between the implementation of those instruments and the protocol. *Id.* art. 5, 30 I.L.M. at 1463.

United States. Yet, the cooperative aims of the protocol would be furthered if the implementing legislation at least included some of the provisions relating to cooperation and information sharing as policy. Unfortunately, none of the bills contains provisions to implement these obligations relating to cooperative programs, information exchange, consultation, and the like.

4. *Environmental Principles of the Protocol*

Article 3, entitled "Environmental Principles," declares that environmental protection and the intrinsic value of Antarctica shall be "fundamental considerations in the planning and conduct of all activities in the Antarctic Treaty area."[289] Article 3(2) requires parties to plan and conduct activities so as to limit adverse impacts generally and to avoid certain specified impacts.[290] The article further requires parties to engage in "regular and effective" monitoring of activities so as to verify predicted impacts and identify unexpected effects.[291] By far the strongest provisions of article 3 are found in paragraph 4, which reads: "Activities undertaken in the Antarctic Treaty area . . . shall: (a) take place in a manner consistent with the principles in this Article; and (b) be modified, suspended or cancelled if they result in or threaten to result in impacts upon the Antarctic environment or dependent or associated ecosystems inconsistent with those principles."[292]

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289. *Id.* art. 3, para. 1, 30 I.L.M. at 1462. The article specifies that the intrinsic value of Antarctica includes its wilderness and aesthetic values and its value as an area for the conduct of scientific research. *Id.*

290. Article 3(2) provides that:

> (a) activities in the Antarctic Treaty area shall be planned and conducted so as to limit adverse impacts on the Antarctic environment and dependent and associated ecosystems;
> (b) activities in the Antarctic Treaty area shall be planned and conducted so as to avoid:
> (i) adverse effects on climate or weather patterns;
> (ii) significant adverse effects on air or water quality;
> (iii) significant changes in the atmospheric, terrestrial (including aquatic), glacial or marine environments;
> (iv) detrimental changes in the distribution, abundance or productivity of species or populations of species of fauna and flora;
> (v) further jeopardy to endangered or threatened species or populations of such species; or
> (vi) degradation of, or substantial risk to, areas of biological, scientific, historic, aesthetic or wilderness significance.

Id. art. 3, para. 2(a), (b), 30 I.L.M. at 1462.

291. *Id.* art. 3, para. 2(d)-(e), 30 I.L.M. at 1463.

292. *Id.* art. 3, para. 4, 30 I.L.M. at 1463. This article applies to "[a]ctivities undertaken in the Antarctic Treaty area pursuant to scientific research programmes, tourism and all other governmental and non-governmental activities in the Antarctic Treaty area for which advance notice is required in accordance with Article VII (5) of the Antarctic Treaty, including associated logistic support activities . . . ." *Id.* Article VII(5) of the Antarctic Treaty requires all contracting parties to give advance notice of: (1) all expeditions to and

On its face, article 3 seems to require that all Antarctic activities be evaluated and, if found inconsistent with the protocol, be modified or suspended.[293] Some might feel, however, that the title of article 3, "Environmental Principles," indicates that these provisions are merely aspirational in nature. Disagreement over the legal effect of article 3 has led to wide variances in the U.S. legislation proposed to implement the article. These differing interpretations and the proposed legislative responses will be discussed more fully in part IV.

5. *Dispute Resolution Under the Protocol*

The protocol establishes two distinct sets of dispute resolution procedures. The "cooperative" procedures of article 18 apply to any dispute concerning the interpretation or application of the protocol. They require the disputing parties to consult upon request, with a view to having the dispute resolved by negotiation, inquiry, mediation, conciliation, arbitration, judicial settlement, or other peaceful means to which the disputing parties agree.[294] While the initial consultation may be deemed compulsory, the parties are clearly free under article 18 to agree to nonbinding means of resolving disputes.

By contrast, the "mandatory" procedures under article 19 are compulsory and binding, but apply only to certain specified disputes.[295] Moreover, the mandatory procedures may be invoked only after the parties to the dispute have resorted to the procedures of article 18 and, then, only upon the request of one of the disputing par-

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within Antarctica, on the part of its ships or nationals, and all expeditions to Antarctica organized in or proceeding from its territory; (2) all stations in Antarctica occupied by its nationals; and (3) any military personnel or equipment intended to be introduced by it into Antarctica. Antarctic Treaty, *supra* note 125, art. VII, para. 5, 12 U.S.T. at 797. Taken together, these provisions may well encompass all activities in the Antarctic. *See, e.g.*, Blay, *supra* note 142, at 390 (referring to *"all* proposed activities in Antarctica") (emphasis added).

293. Madrid Protocol, *supra* note 3, art. 3, para. 4, 30 I.L.M. at 1463.

294. *Id.* art. 18, 30 I.L.M. at 1468. The Final Act of the ATCM adopting the protocol indicates that the ATCM agreed that an inquiry procedure should be elaborated to facilitate resolution of disputes concerning the interpretation or application of article 3 with respect to activities undertaken or proposed in the Antarctic Treaty area. Final Act of the Eleventh Antarctic Treaty Special Consultative Meeting, Oct. 4, 1991, *reprinted in* Madrid Protocol, *supra* note 3, 30 I.L.M. at 1461 (1992) [hereinafter Final Act].

295. *Madrid Protocol, supra* note 3, art. 19, para. 1, art. 20, para 1, 30 I.L.M. at 1468. Only disputes concerning the interpretation or application of the following articles of the protocol are subject to the mandatory settlement procedures: article 7 (the mining prohibition); article 8 (environmental impact assessment); article 15 (emergency response action); the provisions of any annex except to the extent the annex provides otherwise; and, insofar as it relates to these articles and annex provisions, article 13 (compliance with the protocol). *Id.* Article 20(2) explicitly removes any matter within the scope of article IV of the Antarctic Treaty (territorial claims) from the competence or jurisdiction of the arbitral tribunal, the International Court of Justice (the ICJ), or any other tribunal established to settle disputes between parties. *Id.* art. 20, para. 2, 30 I.L.M. at 1468-69.

ties.[296] Upon ratifying the protocol, each party may declare that it accepts either the arbitral tribunal established by the protocol[297] or the International Court of Justice (the ICJ), or both, to resolve disputes under article 19.[298] A nondeclaring party is deemed to accept the competence of the arbitral tribunal.[299] If disputing parties have accepted the same forum for settlement, the dispute may be submitted only to that forum.[300] If the parties have not accepted the same forum, or if they have all accepted both fora, then the dispute may be submitted only to the arbitral tribunal.[301]

An arbitral tribunal convened to decide a dispute[302] will consist of three arbitrators appointed by the parties to the dispute.[303] The

296. *Id.* art. 20, para. 1, 30 I.L.M. at 1468.

297. The arbitral tribunal is established by a "schedule" to the protocol. The schedule acts as the statute of the arbitral tribunal, and establishes the general procedure under which the Tribunal will operate. *Id.* sched., 30 I.L.M. at 1470.

298. *Id.* art. 19, para. 1, 30 I.L.M. at 1468. The former Czechoslovakia was the only state to indicate that it accepts the jurisdiction of the ICJ and the arbitral tribunal for dispute settlement upon its signing of the protocol on October 2, 1992. Letter from U.S. Dep't of State, *supra* note 221. The Czech and Slovak Republics presumably continue to be bound by the treaty obligations of Czechoslovakia. While the Vienna Convention on Succession of States in Respect of Treaties, *opened for signature* Aug. 22, 1978, 17 I.L.M. 1488, allows former colonial states (defined as "a dependent territory for the international relations of which the predecessor State was responsible," *id.* art. 2, para. (1)(f), 17 I.L.M. at 1490) a "clean slate," a merely "separated" state, such as Slovakia, is bound by prior agreements of the predecessor state. *Id.* arts. 16, 34-35, 17 I.L.M. at 1496, 1509.

299. Madrid Protocol, *supra* note 3, art. 19, para. 3, 30 I.L.M. at 1468.

300. *Id.* art. 19, para. 4, 30 I.L.M. at 1468.

301. *Id.* art. 19, para. 5, 30 I.L.M. at 1468. In either situation, if the parties agree, they can overcome the otherwise automatic submission to the tribunal. The operative language is the phrase "unless the parties otherwise agree." *Id.* It is not clear whether the parties could fulfill their obligations under the protocol by agreeing to resolve a dispute by arbitration established independently of the protocol's provisions. Especially troubling in light of the protocol's binding arbitration would be a situation where an independently established arbitral tribunal was only empowered to render a purely recommendatory award.

302. A party commencing arbitration must notify the other party or parties to the dispute and include the claim and the grounds on which the claim is based. *Id.* sched., art. 4, 30 I.L.M. at 1471-72. The party must also notify the Secretary General of the Permanent Court of Arbitration, who will transmit the notification to all parties to the protocol. *Id.* If one of the parties to a dispute does not appear, any other party to the dispute may request the tribunal to continue the proceedings and render its award. *Id.* sched., art. 9, 30 I.L.M. at 1472.

303. *Id.* sched., art. 3, para 1, 30 I.L.M at 1471. Every party to the protocol is entitled to designate up to three arbitrators, each of whom "shall be experienced in Antarctic affairs, have thorough knowledge of international law and enjoy the highest reputation for fairness, competence and integrity." *Id.* sched., art. 2, para. 1, 30 I.L.M. at 1470-71. The names of all designated arbitrators make up the list of arbitrators. *Id.* In a dispute involving only two parties, each party appoints one arbitrator from the list. *Id.* sched., art. 3, para. 1, 30 I.L.M. at 1471. When there are more than two parties, those parties "having the same interest" are to appoint one arbitrator by agreement. *Id.* sched., art. 3, para. 3, 30 I.L.M. at 1471. The third arbitrator must be chosen from the list by agreement of all parties to the dispute within 60 days. *Id.* sched., art. 3, para. 1, 30 I.L.M. at 1471. This third arbitrator cannot be a national of any party to the dispute, cannot have the same national-

tribunal will adopt its own rules of procedure, which must ensure that each party has a full opportunity to be heard and to present its case.[304] The parties to a dispute must facilitate the work of the tribunal, in particular by providing it with relevant documents and information and enabling it to call witnesses or experts as necessary.[305] The arbitrators will decide a dispute submitted to them by majority vote,[306] on the basis of the provisions of the protocol and other applicable rules and principles of international law compatible with such provisions.[307] A statement of reasons for the decision must accompany the tribunal's award and be communicated to all parties to the protocol.[308] The protocol provides that "[t]he award shall be final and binding on the parties to the dispute and on any Party which intervened in the proceedings and shall be complied with without delay."[309]

The mandatory and binding resolution of environmental disputes is a bold innovation of the protocol. The arbitral tribunal has the potential to be a forerunner of specialized institutions with expertise to decide questions of international environmental law. At the same time, the newness of such dispute resolution means that the procedures and remedies are largely untried and untested. Familiarity with the International Court of Justice may make states more willing to resolve disputes there, even though the court may have rather limited experience with modern environmental questions.

The decision whether to accept the competence of the arbitral tribunal is critical, but none of the proposed bills indicates whether the United States should choose the arbitral tribunal to resolve disputes. The bills presumably leave this choice to the discretion of the Secretary of State as a function of his or her foreign relations authority. Given the United States' traditional reluctance to submit to bind-

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ity of either of the other two arbitrators, and cannot have been designated under article 2 by any party to the dispute. *Id.*

304. *Id.* sched., art. 5, para. 1, 30 I.L.M. at 1472. Any party that believes it has a legal interest, whether general or individual, that may be substantially affected by the award of the tribunal may intervene in the proceedings unless the tribunal decides otherwise. *Id.* sched., art. 7, 30 I.L.M. at 1472.

305. *Id.* sched., art. 8, 30 I.L.M. at 1472.

306. *Id.* sched., art. 12, 30 I.L.M. at 1473. Article 6 allows a tribunal to issue provisional measures upon request by a party. *Id.* sched., art. 6, 30 I.L.M. at 1472.

307. *Id.* sched., art. 10, 30 I.L.M. at 1473. The tribunal may decide a submitted dispute *ex aequo et bono* if the parties to the dispute so agree. *Id.* Before making its award, the tribunal must satisfy itself that it has competence in respect of the dispute and that the claim or counterclaim is well founded in fact and law. *Id.* sched., art. 11, para. 1, 30 I.L.M. at 1473.

308. *Id.* sched., art. 11, para. 2, 30 I.L.M. at 1473.

309. *Id.* sched., art. 11, para. 3, 30 I.L.M. at 1473. Article 11(4) provides that an award has no binding force except in respect of the particular case. *Id.* sched., art. 11, para. 4, 30 I.L.M. at 1473. The system of precedent so familiar to American attorneys is thus explicitly rejected.

ing arbitration and the innovative nature of the arbitral tribunal, Congress should decide whether arbitration, the ICJ, or both, is the most appropriate choice.[310] Furthermore, implementing legislation should define the obligations of the United States if arbitration is entered into and an award rendered. None of the proposed bills requires the United States to produce records or witnesses or to accept an arbitration award as binding.[311] Litigation before foreign tribunals might be thought to be solely a function of the Secretary of State. Yet, legislation could substantially promote the purposes underlying the arbitral tribunal, without interfering with executive branch discretion, if it creates at least a general good faith duty to facilitate the tribunal's work and to comply with any award in arbitration to which the United States is a party.

B. Regulatory Regimes Created by Annexes to the Protocol

Annexes constitute an integral part of the protocol[312] and are the most likely form for future decisionmaking within the general framework of the protocol.[313] The five current annexes build upon and expand a number of existing Antarctic Treaty System measures. Significantly, all annexes are subject to the compulsory and binding dispute resolution procedures of article 19, except to the extent that an annex provides otherwise.[314] Insofar as the annexes contain specific and verifiable duties, use of the mandatory dispute resolution procedures, as well as international inspections, could prove a valuable means of monitoring and enforcing compliance.

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310. If arbitration is chosen, the legislation should direct the Secretary of State to designate three arbitrators on behalf of the United States, and to update the list as necessary. The legislation might also seek to define the desired qualifications for U.S. arbitrators. House bill 964 contains no provision for the appointment of arbitrators. By contrast, House bill 1066 and Senate bill 1427 charge the Secretary of State with designating three arbitrators and incorporate the protocol's standards of experience, knowledge, and reputation. H.R. 1066, *supra* note 7, § 4(b); S. 1427, *supra* note 7, § 4(b).

311. House bill 1066 does require NOAA and the Secretary of the department in which the Coast Guard is operating to take into account "the Protocol, and any awards issued thereunder by a competent tribunal" when promulgating regulations to implement the bill. H.R. 1066, *supra* note 7, § 9(a). This provides a means for arbitral tribunal awards possibly to affect domestic regulation, although it does not ensure this result. Neither House bill 964 nor Senate bill 1427 contains any provision requiring that domestic authorities conform their regulation or practice to awards issued by the arbitral tribunal.

312. Madrid Protocol, *supra* note 3, art. 9, para. 1, 30 I.L.M. at 1465.

313. The protocol provides that further annexes may be adopted and that existing annexes may be amended and modified in accordance with article IX of the Antarctic Treaty, which refers to consensus decisionmaking by the ATCM. *Id.* art. 9, paras. 2-3, 30 I.L.M. at 1465.

314. *Id.* art. 9, para. 5, 30 I.L.M. at 1465.

1. *Annex I: Environmental Impact Assessment*

Each party must follow the environmental impact assessment procedures of annex I when planning to undertake any activity, whether governmental or private, in the Antarctic.[315] The assessment procedures apply not only to new activities, but also to changes in existing activities.[316] The annex codifies several ATCM recommendations that called for environmental impact assessment and monitoring,[317] but goes substantially further in establishing a comprehensive assessment regime applicable to all Antarctic activities.

Assessment and monitoring of environmental impacts are required unless a party affirmatively determines that a planned activity "will have less than a minor or transitory impact."[318] Thus, the presumption under the protocol is that all activities will be assessed. The first level of assessment is the Initial Environmental Evaluation (the IEE), which must include a description of the proposed activity, alternatives to the activity, and any impacts the activity may have, including cumulative impacts.[319] If an IEE indicates that the activity is "likely to have no more than" a minor or transitory impact, the activity may proceed without further assessment, provided that the predicted impacts are verified by appropriate monitoring.[320] Otherwise, the party must proceed to the second level of assessment, the Comprehensive Environmental Evaluation (the CEE).[321]

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315. *Id.* art. 8, para. 2, Annex I, art. 1, para. 1, 30 I.L.M. at 1464, 1473. When activities are planned jointly the parties involved must nominate one of their number to coordinate the implementation of the annex I procedures. *Id.* art. 8, para. 4, 30 I.L.M. at 1464.

316. *Id.* art. 8, para. 3, 30 I.L.M. at 1464.

317. Recommendation XIV-2 (1987) outlined guidelines and procedures for assessment of the impacts of scientific and logistics activity. Abbott & Benninghoff, *supra* note 64, at 395. This recommendation is quite similar to the annex. *See* Harris & Meadows, *supra* note 103, at 241. Recommendation XV-16 called on governments, in cooperation with SCAR, to develop an Antarctic Scientific Data Directory. Recommendation XV-5 called on governments to continue, and as appropriate expand, programs for global and local monitoring; to maintain accurate records of materials introduced into and removed from Antarctica; and to establish cooperative working relationships with international organizations involved or interested in environmental monitoring. SCAR has stressed that monitoring will be most effective when organized on a standardized, multinational basis. *First Meeting of Experts on Environmental Monitoring in Antarctica*, June 1-4 1992, at 6, XVII ATCM/INFO 9 (submitted by Argentina, Nov. 11, 1992).

318. Madrid Protocol, *supra* note 3, Annex I, arts. 1-2, 30 I.L.M. at 1473-74. The procedures used in determining what is less than a minor or transitory impact must be forwarded to the CEP. *Id.* Annex I, art. 6, para. 1(a), 30 I.L.M. at 1475.

319. *Id.* Annex I, art. 2, para. 1, 30 I.L.M. at 1474.

320. *Id.* Annex I, art. 2, para. 2, 30 I.L.M. at 1474.

321. A CEE may be required at the outset, without the prior preparation of an IEE. A CEE must be prepared if a proposed activity is determined at any stage of the evaluation to be "likely to have more than a minor or transitory impact." *Id.* Annex I, art. 3, para. 1, 30 I.L.M. at 1474.

A CEE is a detailed and rigorous evaluation, which parties must submit for consideration to the ATCM before the activity begins.[322] The CEE must describe the initial environmental reference state and predicted changes, as well as identify the methods and data used in the overall CEE process.[323] The likely impacts must be estimated, and the possible secondary effects and cumulative impacts must be considered.[324] Measures, including monitoring, that can mitigate these impacts or detect unforeseen impacts must be identified, along with any unavoidable impacts, and gaps in knowledge.[325] Moreover, proceeding with an activity that triggers preparation of a CEE obligates the party to implement elaborate monitoring of key environmental indicators.[326]

It seems to be a weakness of the assessment process that the various threshold determinations are made entirely by the party wishing to initiate the activity. Moreover, as parties need circulate only a list of completed IEE's,[327] no opportunity exists for international or CEP input concerning the IEE process. Limited input is possible during the CEE process, for parties must circulate draft versions of CEE's, and allow a ninety-day period for public comments.[328] The ATCM must consider the CEE on the advice of the CEP before the party makes the final decision of whether to proceed with the activity.[329] The protocol requires that the party's decision of whether to proceed with the activity be "based on" the CEE, as well as other "relevant considerations."[330] The ultimate role of the CEP and ATCM vis-à-vis environmental impact assessment is ambiguous, although the review procedures do seem to stop short of collective decisionmaking.

2. *Annex II: Conservation of Antarctic Flora and Fauna*

Annex II essentially incorporates and updates the Agreed Measures,[331] while making some minor changes to strengthen the protections for Antarctic flora and fauna. The annex uses a permit system to regulate access to, and interference with, flora and fauna. Like the

322. *Id.* Annex I, art. 3, para. 4, 30 I.L.M. at 1474-75.
323. *Id.* Annex I, art. 3, paras. 2(b)-(c), 30 I.L.M. at 1474.
324. *Id.* Annex I, art. 3, paras. 2(d)-(f), 30 I.L.M. at 1474.
325. *Id.* Annex I, art. 3, para. 2, 30 I.L.M. at 1474.
326. *Id.* Annex I, art. 5, para. 1, 30 I.L.M. at 1475.
327. Parties must also report any decisions taken in response to these assessments. The list of IEE's and decisions taken must be circulated to the CEP and other parties to the protocol. It must also be made public. *Id.* Annex I, art. 6, para. 1(b), 30 I.L.M. at 1475. The IEE itself should be made available to other parties "on request." *Id.* Annex I, art. 6, para. 2, 30 I.L.M. at 1475.
328. *Id.* Annex I, art. 3, para. 3, 30 I.L.M. at 1474.
329. *Id.* Annex I, art. 3, para. 5, 30 I.L.M. at 1475.
330. *Id.* Annex I, art. 4, 30 I.L.M. at 1475.
331. *See supra* part II.B.

Agreed Measures, the annex prohibits the "taking" of or "harmful interference" with native species, except in accordance with a permit issued by a national authority.[332] The annex indicates that parties may issue permits only to provide specimens for scientific study, museums, and similar institutions, or to provide for the unavoidable consequences of scientific activities not otherwise authorized.[333]

Annex II also institutes a permit requirement for the introduction into Antarctica of non-native animals and plants.[334] Permits for importation must specify the precautions to be taken to prevent escape of non-native species and microorganisms.[335] Moreover, the permit must contain an obligation ultimately to remove the non-native species from Antarctica or else dispose of it in another manner that renders it sterile.[336]

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332. Madrid Protocol, *supra* note 3, Annex II, art. 3, para. 1, 30 I.L.M. at 1477. The protocol defines "taking" to mean "to kill, injure, capture, handle or molest, a native mammal or bird, or to remove or damage such quantities of native plants that their local distribution or abundance would be significantly affected." *Id.* Annex II, art. 1, para. g, 30 I.L.M at 1476. This definition is similar to the Agreed Measures general prohibition against killing, wounding, capturing, or molesting any mammal or bird except in accordance with a permit. Agreed Measures, *supra* note 126, art. VI, 17 U.S.T. at 998. The protocol defines "harmful interference," similarly to the Agreed Measures, to include activities that disturb concentrations of birds and seals, such as flying or landing helicopters or operating vehicles in close proximity. Madrid Protocol, *supra* note 3, Annex II, art. 1, para. h, 30 I.L.M. at 1476. The protocol adds a "catch-all" provision, which has no counterpart in the Agreed Measures, prohibiting "any activity that results in the significant adverse modification of habitats of any species or population of native mammal, bird, plant or invertebrate." *Id.* Annex II, art. 1, para. h(vi), 30 I.L.M. at 1476.

333. *Id.* Annex II, art. 3, para. 2, 30 I.L.M. at 1477. A heightened standard applies to designated Specially Protected Species. *Id.* Annex II art. 3, para. 4, 30 I.L.M. at 1477. These species can be taken or harmfully interfered with only for a compelling scientific purpose that will not jeopardize the survival or recovery of that species or the local population. *Id.* Annex II, art. 3, paras. 5(a), (b), 30 I.L.M. at 1477. Moreover, nonlethal techniques, where appropriate, should be used. *Id.* Annex II, art. 3, para. 5(c), 30 I.L.M. at 1477. Currently, only Ross seals and Fur seals are Specially Protected Species. *Id.* Annex II, app. A, 30 I.L.M. at 1479.

In no case should more native mammals, birds, or plants be taken than is strictly necessary, and the local population must be able to return to its prior level in one breeding season. *Id.* Annex II, art. 3, paras. 3(a), (b), 30 I.L.M. at 1477. The diversity of species, the balance of ecological systems, and habitats essential to species' existence should be maintained. *Id.* Annex II, art. 3, para. 3(c), 30 I.L.M. at 1477. All taking of animals and birds should be conducted so as to minimize pain and suffering. *Id.* Annex II, art. 3, para. 6, 30 I.L.M. at 1477.

334. *Id.* Annex II, art. 4, para. 1, 30 I.L.M. at 1477. People are forbidden to bring their dogs into Antarctica after April 1, 1994, and must remove any dogs that are currently there. *Id.* Annex II, art. 4, para. 2, 30 I.L.M. at 1477. Only domestic plants and laboratory animals and plants (including viruses, bacteria, yeasts, and fungi) may be brought into the Antarctic. *Id.* Annex II, art. 4, para. 3, Annex II, app. B, paras. (a)-(b), 30 I.L.M. at 1477, 1479.

335. *Id.* Annex II, art. 4, para. 6, Annex II, app. C, paras. 1-2, 30 I.L.M. at 1478, 1479.

336. *Id.* Annex II, art. 4, para. 4, 30 I.L.M. at 1477-78.

Finally, annex II contains reporting requirements that may effectively serve as enforcement mechanisms. Each party is to prepare and distribute to its nationals entering or already present in Antarctica information that describes prohibited activities, activities that require a permit, and lists of Specially Protected Species and protected areas.[337] Each party is also required to collect and exchange records on the numbers of each species of native mammal, bird, or plant taken annually.[338] A further requirement that states indicate the extent to which any species or population needs protection[339] may help the CEP or ATCM develop new species designations. Given the absence of any inspectorate or independent research body, such data collection and reporting by the parties to the protocol may prove critical to Antarctic species and areas protection.

3. *Annex III: Waste Disposal and Waste Management*

Annex III responds to many of the problems identified in part I concerning waste disposal and waste management in Antarctica. The annex builds upon recent ATCM recommendations to establish a comprehensive regulatory regime for waste.[340] The annex generally obligates parties to reduce the disposal of wastes into the Antarctic environment "as far as practicable so to minimise [sic] impact on the Antarctic environment," and to remove waste from Antarctica if possible.[341] More specifically, the annex provides that: (1) past and present waste disposal sites on land, and most abandoned work sites, must be identified and cleaned up by the responsible parties;[342] (2) certain types of waste generated after entry into force must be removed from the treaty area, including radioactive materials, electric batteries, fuel, heavy metals, and polyvinyl and most other plastic waste;[343] and (3)

337. *Id.* Annex II, art. 5, 30 I.L.M. at 1478.

338. *Id.* Annex II, art. 6, para. 1(a), 30 I.L.M. at 1478.

339. *Id.* Annex II, art. 6, para. 1(b), 30 I.L.M. at 1478.

340. Recommendation XV-3 was adopted in 1989 to strengthen the waste disposal guidelines contained in a code of conduct (recommendation VIII-11) adopted by the ATCM in 1987. Harris & Meadows, *supra* note 103, at 241.

341. *Id.* Annex III, art. 1, para. 2, 30 I.L.M. at 1479. The annex does not apply, however, in cases of emergency relating to the safety of "human life or of ships, aircraft or equipment and facilities of high value or the protection of the environment." *Id.* Annex III, art. 12, 30 I.L.M. at 1482.

342. *Id.* Annex III, art. 1, para. 5, 30 I.L.M. at 1479.

343. *Id.* Annex III, art. 2, para. 1, 30 I.L.M. at 1480. Some scientists have expressed concern that the removal provisions will prohibit balloon flights, which are "vital to be operational and scientific activities in Antarctica." *1993 Hearings, supra* note 1, at 55 (statement of Dr. Theodore J. Rosenberg, University of Maryland). In most instances, the electric battery used to power a balloon and the balloon material itself are not recovered after a flight because "it is impractical logistically and generally is far too costly compared to their value." *Id.* Since these wastes are required to be removed from Antarctica under annex III, "[a] strict interpretation of the Protocol on this matter would prohibit all such flights, to the detriment of both science and operations." *Id.* A proposed solution is for

open burning of wastes must be eliminated no later than the 1998-99 season.[344] A possible weakness of the annex is that it allows sewage and domestic wastes to be discharged directly into the sea, although the disposer must take into account the assimilative capacity of the receiving marine environment.[345]

Besides these substantive requirements, annex III establishes an information and recording system for waste. The annex requires that parties prepare annual waste management plans for each site, station, or vessel in Antarctica.[346] Parties must also inventory the locations of past waste disposal activities.[347] Finally, parties must identify a waste management official responsible for developing and monitoring waste management plans at each site.[348] This last provision in particular may improve accountability for decisionmaking concerning waste disposal and waste management. Hopefully it will deter such poor decisions as have been made in the past.

4. *Annex IV: Prevention of Marine Pollution*

Annex IV sets forth a regime to control the pollution of the marine environment of Antarctica by ships.[349] The annex obligates each party to institute measures regulating discharges from ships flying its flag or supporting its Antarctic operations.[350] This annex's strongest provisions prohibit absolutely the disposal of all plastics and other garbage into the sea.[351] The annex also requires parties to develop contingency plans for marine pollution response, particularly for ships carrying oil.[352] The parties are further required to take emergency response actions in accordance with cooperative procedures, which the parties are directed to develop.[353]

U.S. implementing legislation to exempt balloons, rockets, and their payloads from the category of waste. *Id.* The proponent, however, did not consider the environmental impacts of this solution or its consistency with the international obligations created by annex III.

344. Madrid Protocol, *supra* note 3, Annex III, art. 3, para. 2, 30 I.L.M. at 1480.

345. *Id.* Annex III, art. 5, para. 1, 30 I.L.M. at 1481. Such discharge should occur only "where conditions exist for initial dilution and rapid dispersal," and large quantities of such waste should be treated at least by maceration. *Id.* Parties may also dispose of wastes treated by certain biological processes into the sea. *Id.* Annex III, art. 5, para. 2, 30 I.L.M. at 1481.

346. *Id.* Annex III, art. 8, para. 2, 30 I.L.M. at 1481.

347. *Id.* Annex III, art. 8, para. 3, 30 I.L.M. at 1481-82.

348. *Id.* Annex III, art. 10, para. a, 30 I.L.M. at 1482.

349. The annex builds on recommendation XV-4, which was adopted in 1989 to prevent, control, and respond to marine pollution. Harris & Meadows, *supra* note 103, at 242.

350. Madrid Protocol, *supra* note 3, Annex IV, art. 2, 30 I.L.M. at 1483.

351. *Id.* Annex IV, art. 5, paras. 1-2, 30 I.L.M. at 1484.

352. *Id.* Annex IV, art. 12, para. 1, 30 I.L.M. at 1486.

353. *Id.* Annex IV, art. 12, 30 I.L.M. at 1486.

The annex's other provisions, however, contain a disturbing number of exceptions and conditions. Discharges of oily mixtures or oil are allowed in the many cases permitted under annex I of MARPOL 73/78.[354] No regulation applies at all in cases of accidents against which all reasonable precautions were taken and during which the ship master or owner did not act recklessly.[355] Annex IV prohibits the discharge of noxious liquid substances and any other chemical or substance, but only "in quantities or concentrations that are harmful to the marine environment."[356] Parties should eliminate sewage discharge from ships within twelve nautical miles of land or ice shelves, but only if doing so will not "unduly impair" Antarctic operations.[357] Vessels are allowed to dispose food wastes at sea, so long as the wastes are processed, and are discharged more than twelve nautical miles from land and ice shelves.[358] None of these provisions applies in cases of emergency relating to the safety of a ship or saving life at sea.[359]

Most debilitating of all is the annex's grant of sovereign immunity, which exempts all government ships from the annex's provisions.[360] The parties are directed only to "adopt appropriate measures not impairing the operations of such ships, so that the vessels act in a manner consistent, so far as is reasonable and practicable, with the Annex."[361] Given that government ships account for a substantial portion of the ship traffic in the Antarctic, the grant of sovereign im-

354. *Id.* Annex IV, art. 3, para. 1, 30 I.L.M. at 1483. The MARPOL annex regulates oil discharges based on ship size, date of construction, and location. Protocol of 1978 Relating to the International Convention of Pollution From Ships, 1973, Annex 1, May 1978, 17 I.L.M. 546, 550-52 [hereinafter MARPOL 73/78]. It is questionable whether the generally applicable MARPOL regulations provide sufficient protection for the unique waters of the Antarctic.

355. Madrid Protocol, *supra* note 3, Annex IV, art. 3, para. 2(a), 30 I.L.M. at 1483.

356. *Id.* Annex IV, art. 4, 30 I.L.M. at 1484. The annex also provides that parties "shall undertake to ensure" that their ships are fitted with tanks of sufficient capacity for the retention of sludge, dirty ballast, tank washing water, and other oily residues and mixtures. Ships should also have sufficient on-board capacity for the retention of garbage and noxious liquid substances. *Id.* Annex IV, art. 9, para. 1, 30 I.L.M. at 1485.

357. *Id.* Annex IV, art. 6, para. 1, 30 I.L.M. at 1484. Beyond 12 miles, sewage may be discharged at a moderate rate. Where appropriate, parties should keep sewage record books. *Id.* Annex IV, art. 6, para. 2, 30 I.L.M. at 1484.

358. *Id.* Annex IV, art. 5, para. 3, 30 I.L.M. at 1484. Food wastes may be discharged only in accordance with annex V of MARPOL 73/78, after having been passed through a communiter or grinder. *Id.* Discharge is to take place as far as practicable from land and ice shelves, but in no case within 12 nautical miles of ice shelves or the shore. *Id.* Parties are also required to keep garbage record books. *Id.* Annex IV, art. 6, para. 6, 30 I.L.M. at 1484. These provisions do not apply to accidents against which all reasonable precautions are taken. *Id.* Annex IV, art. 5, para. 5, 30 I.L.M. at 1484.

359. *Id.* Annex IV, art. 7, 30 I.L.M. at 1484-85.

360. *Id.* Annex IV, art. 11, 30 I.L.M. at 1485. Annex IV does not apply to "any warship, naval auxiliary or other ship owned or operated by a State and used, for the time being, only on government non-commercial service." *Id.*

361. *Id.*

munity threatens to curtail seriously the overall effectiveness of the protocol's marine pollution provisions. A mitigating consideration is that the annex should increase in importance as tourism traffic in Antarctica increases.

5. *Annex V: Area Protection and Management*

Annex V simplifies the current scheme developed under the Agreed Measures for protection of sensitive areas and sites in Antarctica.[362] Moreover, in a significant expansion of the current scheme, the annex extends protection to marine areas.[363] Under annex V, parties may designate Antarctic Specially Protected Areas (ASPA's), in order to protect "outstanding environmental, scientific, historic, aesthetic or wilderness values, any combination of those values, or ongoing or planned scientific research."[364] Entry into ASPA's is prohibited without a permit.[365] Parties may designate Antarctic Specially Managed Areas (ASMA's) "to assist in the planning and co-ordination of activities, avoid possible conflicts, improve co-operation between Parties or minimise [sic] environmental impacts."[366] Entry into ASMA's requires no permit,[367] but is conditioned upon compliance with a code of conduct. Finally, Sites and Monuments of recognized historic value are to be included in a list.[368] Once listed, Sites and Monuments may not be damaged, removed, or destroyed.[369]

The protocol establishes more stringent procedures than currently exist for designating sites. Any proposal to designate a new site as an ASPA or ASMA requires submission of a management plan. The plan must detail the merits of the site proposed for designation, the conditions of granting permits for access and activity within

362. *See supra* text accompanying notes 175-79. The annex redesignates existing SPA's and SSSI's as Antarctic Specially Protected Areas.

363. Annex V establishes a procedure to designate marine areas as Antarctic Specially Protected Areas (ASPA's) or Antarctic Specially Managed Areas (ASMA's). Consistent with the inability of the ATCM to interfere with parties' rights on the high seas, the prior approval of the CCAMLR Commission is required. Annex V to the Protocol on Environmental Protection to the Antarctic Treaty, *done* Oct. 17, 1991, S. TREATY DOC. NO. 22, 102d Cong., 2d Sess. 97, 103 (1992), art. 6, para. 2 [hereinafter Annex V]. ASPA's of the marine ecosystem will provide greater protection to marine living resources. One ground for the designation of such areas is an important or unusual assemblage of species, including major colonies of breeding native birds or mammals. Such an area can also be designated if it is the only known habitat of any species. *Id.* Annex V, art. 3, paras. 2(c)-(d), S. TREATY DOC. NO. 22 at 97.

364. *Id.* Annex V, art. 3, para. 1, S. TREATY DOC. NO. 22 at 97.

365. *Id.* Annex V, art. 3, para. 4, S. TREATY DOC. NO. 22 at 98.

366. *Id.* Annex V, art. 4, para. 1, S. TREATY DOC. NO. 22 at 99.

367. *Id.* Annex V, art. 4, para. 3, S. TREATY DOC. NO. 22 at 99.

368. *Id.* Annex V, art. 8, paras. 1-2, S. TREATY DOC. NO. 22 at 104.

369. *Id.* Annex V, art. 8, para. 4, S. TREATY DOC. NO. 22 at 105.

ASPA's, and codes of conduct for ASMA's.[370] The CEP will advise the ATCM on proposed management plans, and the ATCM may thereafter approve the plan by adopting a measure by consensus.[371] Management plans must be reviewed and updated as necessary every five years.[372] Most significant for enforcement purposes is the annex's requirement that parties issue permits to their nationals only in accordance with the management plan for an ASPA.[373] In sum, the party proposing an ASPA or ASMA designation is responsible for defining the environmental protections for the area, subject to CEP and ATCM approval. Every party must then require its nationals to comply with ASPA protections through domestic permitting procedures. Also of potential importance for purposes of assessing compliance are the annex's requirements of annual reporting and information exchange.[374]

C. *Evaluation of the Protocol*

The Madrid Protocol and its annexes promise to make the international protections of the Antarctic environment more effective and comprehensive. Annex I institutes sophisticated assessment and monitoring procedures. These procedures should help planners predict and mitigate the adverse environmental impacts of a project. They should also provide the formal mechanism for countries or environmental groups to express opposition to such harmful projects as the French airstrip or the U.S. nuclear reactor. The protocol's positive duty to inspect for environmental compliance has the potential to deter prohibited activities, such as dumping of chemical wastes or interference with animals and plants. This will be especially true if inspections are undertaken on a systematic basis, with regular followup reporting. The Environmental Principles of article 3, depending on their interpretation, could affect most Antarctic activities. The article calls on parties to cancel or modify activities that merely threaten to create environmental impacts inconsistent with the protocol. Finally, the compulsory and binding dispute resolution procedures are among the strictest of any international environmental instrument. The procedures could be employed to constitute perhaps

370. *Id.* Annex V, art. 5, S. TREATY DOC. No. 22 at 99-102.

371. *Id.* Annex V, art. 6, para. 1, S. TREATY DOC. No. 22 at 102-03.

372. *Id.* Annex V, art. 6, para. 3, S. TREATY DOC. No. 22 at 103.

373. *Id.* Annex V, art. 7, para. 1, S. TREATY DOC. No. 22 at 103-04. Relevant sections of the management plan should be supplied to the applicant with the granting of a permit. For those areas that do not have a management plan, permits may continue to be issued for a compelling scientific purpose that cannot be served elsewhere and that will not jeopardize the natural ecological system of the area. *Id.* Annex V, art. 7, para. 2, S. TREATY DOC. No. 22 at 104.

374. *Id.* Annex V, art. 10, S. TREATY DOC. No. 22 at 106-07.

the first multilateral specialized environmental tribunal. The regimes of substantive regulation embodied by annexes II and V consolidate and codify existing management schemes. Annexes III and IV establish much-needed provisions for waste disposal and marine pollution. These and other improvements of the Antarctic Treaty System indicate that the Madrid Protocol and its annexes could better protect the Antarctic environment.

Yet, the protocol is not without significant weaknesses. The CEP, even if composed of scientific and environmental personnel, may lack the authority and resources effectively to monitor compliance with the protocol. The legal effect of article 3 is ultimately unclear, and its set of Environmental Principles may prove to be ineffectual in practice. Some of the protocol's general duties are so vaguely worded as to be potentially unenforceable. Finally, the protocol does not prohibit a number of environmentally unsound activities. For example, stations may continue to dump raw sewage into the sea, and government ships are exempted from the marine pollution provisions.

In spite of its limitations, the protocol should be viewed as a positive step toward comprehensive protection of the Antarctic environment. By itself, the protocol may not suffice to completely protect the Antarctic environment from the impacts caused by ever-increasing human activity. The protocol does, however, establish a deliberative framework within which the parties can develop and enact new protections. The United States should act quickly to implement the protocol. Moreover, the United States may wish to exceed some provisions of the protocol to increase the instrument's effectiveness and further demonstrate a U.S. commitment to environmental protection. Part IV identifies specific issues that stand in the way of U.S. implementation and suggests possible compromise solutions in light of the legislative proposals from the 103rd Congress.

IV

EFFECTIVE U.S. IMPLEMENTATION OF THE PROTOCOL

The foregoing discussion of the protocol's requirements and its potential to protect the Antarctic environment raises the question: How can the United States effectively implement the protections of the protocol in light of its experience under the current regulatory regime? The following issues have proven the most divisive in the domestic debate on implementing legislation: (1) which regulatory agency should bear primary authority over Antarctic environmental protection; (2) what relation implementing legislation should have to existing legislation, in particular, regulation of government ships and NEPA; (3) what legal effect the Environmental Principles of article 3

should have; and (4) whether the United States should exceed certain norms of the protocol.

A. *Designation of the Lead Agency for Antarctic Environmental Protection*

The question of which agency should assume the lead regulatory role presents the greatest obstacle to the adoption of implementing legislation. The ideal solution might be to form an entirely new agency to deal exclusively with Antarctic or polar affairs. Existing agencies, however, may be unwilling to surrender current authority over Antarctic activities, and perhaps they should not be required to do so because of their expertise in Antarctic affairs. The National Science Foundation now has authority over the Antarctic science program, while the National Oceanic and Atmospheric Administration has authority over the Antarctic fisheries program. This subpart evaluates the relative abilities of the NSF and NOAA to exercise primary authority over the new regime of Antarctic environmental regulation, primarily by examining how the two agencies have handled their Antarctic responsibilities in the past.

1. *NSF Authority Over Antarctic Science*

Congress assigned the NSF overall responsibility for the USAP in 1971.[375] President Reagan subsequently charged the NSF with responsibility for the implementation of the Antarctic Conservation Act,[376] which protects Antarctic species and areas in accordance with the Agreed Measures for the Conservation of Flora and Fauna.[377] Environmentalists criticize the NSF's environmental record in Antarctica because the NSF has not fulfilled its regulatory responsibilities under the ACA. They also complain that USAP has engaged in numerous environmentally unsound practices, relating in particular to waste disposal and environmental impact assessment.[378]

The ACA institutes a permit system to protect Antarctic species and areas. The NSF Director is responsible for issuing the permits and enforcing permit provisions.[379] The NSF processes ACA permits

375. USAP FACTS, *supra* note 87, at 9.

376. White House Memorandum 6646 from President Reagan to Senior Administration Officials (Feb. 5, 1982) (on file with author).

377. *See supra* part II.B.

378. *1993 Hearings, supra* note 1, at 34-35 (statement of Susan J. Sabella, Greenpeace). Greenpeace also claims that its "unofficial inspections" of McMurdo Station have revealed numerous violations of the Antarctic Treaty recommendations concerning the environment. *Id.*

379. 16 U.S.C. §§ 2402(4), 2404 (1988). Permits are required for entry into protected areas or to "take" Antarctic species. *Id.* §§ 2403(a), 2404(a). Moreover, a permit may be required under generally applicable U.S. environmental legislation such as the Endangered

for scientists during the course of providing research grants and logistics support.[380] The NSF has not developed standard procedures for processing ACA permits for tourist expeditions. It is reported that three U.S. tour companies sponsored at least twenty-one trips without the required permits to a designated protected area in 1988 and 1989, but that the NSF declined to take enforcement actions against the companies.[381] In total, the NSF processed 243 ACA permit applications between 1978 and 1992.[382] Of these, just "several" have been denied by the NSF,[383] which suggests that the NSF may be lenient in reviewing activities subject to permit.

Environmentalists further question the adequacy of the NSF's enforcement of the ACA. As of 1992, the NSF had never assessed civil penalties or sought an injunction against violators of the ACA.[384] The NSF's only enforcement actions have been to issue written warnings and reprimands to violators.[385] The NSF claims that its managers routinely inspect permitted activities to ensure compliance with both ACA and Antarctic Treaty requirements.[386] The Agency attributes the lack of any prosecution to its emphasis on "education and prevention of violations and correction of inappropriate behavior rather than judicial enforcement of the Act."[387] Several incidents have been observed, however, which suggest that the NSF's enforcement record is poor. In 1988, a U.S. scientist reportedly violated ACA provisions by flying so close to a penguin colony as to cause some birds to abandon their nests, but the NSF did not pursue penalties.[388] In 1989, *The Economist* reported that tourist helicopter flights to Ardley Island were scattering penguins on each landing and takeoff, but the NSF did not investigate the incident or take any enforcement action.[389]

In addition to Antarctic species and site protection, the ACA contains provisions to prevent and control Antarctic pollution. The Act requires a permit for the discharge or disposal of pollutants within Antarctica[390] and charges the NSF with responsibility for administer-

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Species Act (the ESA), 16 U.S.C. §§ 1531-1544 (1988), the Marine Mammal Protection Act (the MMPA), 16 U.S.C. §§ 1361-1407 (1988 & Supp. IV 1992), and the Migratory Bird Treaty Act (the MBTA), 16 U.S.C. §§ 701-718 (1988 & Supp. IV).

380. 16 U.S.C. §§ 2403(7), 2404.
381. *1992 Hearings, supra* note 90, at 204 (statement of Bruce S. Manheim).
382. *Id.* at 130 (statement of Dr. Frederick M. Bernthal).
383. *Id.* at 138.
384. *Id.* at 139.
385. *Id.*
386. *Id.* at 132.
387. *Id.* at 137.
388. *Id.* at 204 (statement of Bruce S. Manheim).
389. *Freezing Out Tourism,* ECONOMIST, May 20, 1989, at 91, 91.
390. 16 U.S.C. § 2403(a)(1)(e).

ing the permit system.[391] The NSF has been extremely delinquent in fulfilling these responsibilities. The Agency delayed until 1992, more than fourteen years after the ACA was enacted, to publish proposed rules designed to implement the pollution control requirements of the ACA.[392] If enforced, the proposed NSF regulations could greatly strengthen waste disposal practices and pollution control in Antarctica. Moreover, the NSF regulations are almost congruent with the waste disposal and waste management provisions of annex III of the protocol. The NSF's delinquency in promulgating and enforcing the regulations gives rise to doubt, however, whether the Agency should continue to enjoy regulatory discretion over waste.

Beyond not fulfilling its regulatory responsibilities, the NSF has itself committed or allowed environmentally unsound practices in Antarctica. As described previously, USAP has had notoriously poor waste disposal and waste management practices, including dumping in McMurdo Bay, open burning of waste, and explosions of chemicals.[393] The NSF has recently made significant strides in improving waste disposal, upgrading fuel handling capabilities and storage facilities, and expanding its waste segregation and retrograde operations.[394] Nevertheless, problems persist, including the continued dumping of untreated sewage and the incineration of food waste and other garbage.[395]

The failure of the NSF to conduct environmental impact assessments is yet another ground for criticism. The NSF concluded that NEPA did not apply to its activities in Antarctica,[396] and it has not assessed the environmental impacts of many of its activities.[397] The NSF did not produce an Environmental Impact Statement (EIS) eval-

391. *Id.* § 2402.

392. 57 Fed. Reg. 33,918 (1992). The proposed rules are also designed to establish a waste management and waste disposal scheme consistent with the Madrid Protocol. The current legal status of these rules, however, is unclear. While the proposed rules provided that "the effective date of the final regulations will be March 1, 1993," *id.*, it appears that no final rules have been published to date.

393. *See supra* text accompanying notes 85-94 (describing USAP's waste disposal record).

394. *1993 Hearings, supra* note 1, at 34 (statement of Susan J. Sabella). The NSF reports that during the 1992-93 season, about 40 professionals were deployed to Antarctica to carry out various environmental activities, including waste management and planning, incinerator stack emission testing, hazardous waste retrograding, field camp impact assessment, McMurdo Bay water quality testing, and ambient air monitoring. Letter from Walter Massey, NSF Director, to Rick Boucher, Chairman, Subcomm. on Science of the House Comm. on Science, Space and Technology (Feb. 17, 1993) (on file with author).

395. *1993 Hearings, supra* note 1, at 35 (statement of Susan J. Sabella).

396. National Environmental Policy Act, 42 U.S.C. §§ 4321-4306 (1988). NEPA requires Federal Government agencies to follow environmental impact assessment procedures for "major Federal actions significantly affecting the quality of the human environment." *Id.* § 4332(C). *See infra* part IV.B.2.

397. OFFICE OF THE GENERAL COUNSEL, *supra* note 104, at 23.

uating USAP until 1980,[398] one year after President Carter enacted Executive Order 12,114, which was designed to ensure that major federal actions abroad are subject to environmental impact assessment procedures.[399] The NSF performed no further assessment during the 1980's, however, and it did not promulgate regulations to implement the Executive order in the ambit of Antarctic activities.[400] The NSF's extended procrastination has recently given way to a flurry of activity. The Agency prepared five IEE's and fifty environmental action memoranda on USAP activities during the 1990-93 seasons.[401] The NSF also finally published regulations designed to implement Executive Order 12,114, as well as annex I of the protocol, in September 1992.[402] It bears noting that on January 29, 1993, the Court of Appeals for the District of Columbia held that NEPA does apply to major federal projects in Antarctica.[403] In light of this lawsuit, the NSF's long-standing resistance to apply NEPA to its Antarctic activities seems little more than a ploy to avoid the citizen suit provisions of that Act.

In sum, the NSF's environmental record in Antarctica is characterized by delay, nonenforcement of its regulatory duties, and environmentally unsound practices. Recent improvements have been made, but only in response to heightened congressional and public scrutiny. There seems reason to doubt that the NSF will maintain its recent professed commitment to environmental protection once that scrutiny is diverted.

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398. This EIS examined the impact of the program as a whole and made a number of recommendations on improving the USAP environmental record, including reducing the solid waste at U.S. stations, eliminating pit burning of garbage, installing a macerator for sewage at McMurdo Station, improving briefings for all personnel in Antarctica, implementing Executive Order 12,114, and increasing energy conservation. FINAL EIS, *supra* note 80, at 2-31 to 2-35. The EIS was reprinted and reissued in 1984.

399. Exec. Order No. 12,114, 3 C.F.R. 356 (1979). While based on independent authority, the Executive order states that it "furthers the purpose of the National Environmental Policy Act . . . ." *Id.* The procedural requirements are identical to NEPA's for activities "significantly affecting the environment of the global commons outside the jurisdiction of any nation (e.g., the oceans or Antarctica)." *Id.* at 357. The responsible federal official is to prepare "environmental impact statements (including generic, program and specific statements)." *Id.* at 358. The most significant difference between the Executive order and NEPA is that the order does not create a private cause of action, while NEPA does. *Id.* at 359.

400. A former environmental protection advisor to USAP describes the failure of the NSF to implement Order No. 12,114 for over 13 years as resulting in compliance that is "desultory at best." Gerald S. Schatz, *Environmental Regulation in the Antarctic,* 1 DICKINSON J. ENVT'L L. & POL'Y 99, 105 (1992).

401. Sidney Draggan & Peter Wilkniss, *An Operating Philosophy for the US Antarctic Program,* 25 MARINE POLLUTION BULL. 250, 252 (1993).

402. 57 Fed. Reg. 40,339 (1992) (now codified at 45 C.F.R. § 641 (1992)).

403. Environmental Defense Fund v. Massey, 986 F.2d 528, 529, 533 (D.C. Cir. 1993); *see also infra* note 447.

2. *NOAA Authority Over Antarctic Fisheries*

NOAA carries out both regulatory responsibilities and research activities in Antarctica.[404] It heads the Antarctic Marine Living Resources Program, which Congress developed in 1984 to implement CCAMLR.[405] NOAA developed the Antarctic Ecosystem Research Group, located in La Jolla, California, to implement the AMLR Program.[406] The aim of this Group is to conduct research in the Antarctic using an ecosystem approach.[407] The research provides information to detect, monitor, and predict the effects of fishing and associated activities in the Southern Ocean.[408] When the CCAMLR Commission adopts resolutions setting fishing limits, NOAA publishes the resolutions in the *Federal Register* as federal regulations.[409] Moreover, NOAA exercises inspection and enforcement authority under the AMLR Program.[410]

The Agency is also responsible for enforcing the ban on Antarctic mineral activities[411] under the Antarctic Protection Act.[412] NOAA has not had occasion to take any enforcement action against mineral activities to date. The Act is probably provisional until the international mining ban established by the protocol becomes effective.

NOAA's environmental record in the Antarctic is far from perfect. For instance, it took five years to finalize regulations under AMLRCA, the legislation implementing CCAMLR.[413] Still, environmental groups favor giving NOAA lead authority to enforce the environmental protection regime established by the protocol.[414] NOAA

404. As part of its research activities, NOAA operates an atmospheric and monitoring station at the South Pole in cooperation with the NSF. *1992 Hearings, supra* note 90, at 114 (statement of Ned A. Ostenso). In 1986 and 1987, NOAA participated in the National Ozone Expeditions at McMurdo Station, which identified man-made chlorine as the likely cause of the hole in the Antarctic ozone layer. *Id.* at 117. A permanent instrument has now been established at McMurdo that measures chlorine, ozone, and nitrogen dioxide in the atmosphere. *Id.* NOAA's polar satellites provide weather and ocean forecasting for the Antarctic and provide emergency positioning signals in the event of ground emergencies. *Id.* at 117-18.

405. *Id.* at 119; *see also supra* part II.D.

406. *1992 Hearings, supra* note 90, at 119 (statement of Ned A. Ostenso).

407. *Id.*

408. *Id.*

409. *Id.* at 120.

410. *Id.*

411. AMLRCA, 16 U.S.C. § 2439 (1988).

412. 16 U.S.C. §§ 2463, 2465 (Supp. IV 1992). NOAA was selected as the lead agency for this legislation because of its experience under the Deep Seabed Hard Mineral Resources Act, 30 U.S.C. §§ 1401-1473 (1988 & Supp. IV 1992). *1992 Hearings, supra* note 90, at 121 (statement of Ned A. Ostenso).

413. *1992 Hearings, supra* note 90, at 202 (statement of Bruce S. Manheim).

414. For instance, EDF believes that NOAA has fulfilled its statutory regulatory duties satisfactorily: "[NOAA] has, for example, published regulations governing fishing activities in a timely manner and developed the means to enforce such rules." *Id.* The Antarctica

administrators, however, considered in the past that the Agency was not institutionally well-suited to assume lead authority for Antarctic environmental protection.[415] This self-evaluation of NOAA's capabilities may well have changed along with the political shift from the Bush to the Clinton administration.

3. *Relative Merits of the NSF and NOAA*

Environmentalist criticisms of the NSF's environmental record in Antarctica may be summarized as follows: (1) the NSF has poorly enforced the ACA provisions protecting wildlife and regulating access to designated areas; (2) the NSF procrastinated fourteen years to promulgate waste and pollution regulations required by the ACA; (3) the NSF's past waste management and disposal practices have themselves caused adverse environmental impacts; and (4) the NSF also procrastinated in implementing environmental impact assessment procedures. To its credit, the NSF has finally responded to criticisms, with definite results.[416] Critics discount such recent improvements in the NSF practice, however, citing the past record as ample evidence of the Agency's inability or unwillingness to enforce environmental regulation.[417]

Perhaps most serious is the environmentalists' contention that the NSF is institutionally ill-suited to exercise regulatory authority under the protocol.[418] The NSF's responsibility to promote and fund basic scientific research might take priority over its duty to protect and conserve the Antarctic environment.[419] Moreover, the NSF is neither a regulatory agency, nor an agency generally charged with natural resource management or environmental protection.[420] This lack of ex-

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Project believes that NOAA "has proved capable of implementing and enforcing [AMLRCA and the APA] by ensuring that the appropriate agencies have the necessary regulatory and management authority." *Id.* at 183 (memorandum from James N. Barnes to Paul DeGuisti, Oceanography Subcomm. of the House Comm. on Merchant Marine and Fisheries).

415. Ned A. Ostenso, an Assistant Administrator, stated in congressional testimony that "NOAA does have experience with the environmental stewardship activities contemplated by the Protocol. However, we also believe that effective implementation . . . is best achieved by continuing the current arrangement whereby a single agency, the NSF, provides integrated science support and has operational and regulatory responsibility." *Id.* at 122.

416. The NSF still has not used its new enforcement authority rigorously to enforce the ACA's wildlife and area protections. It did, however, propose rules in 1992 to implement the pollution control requirements of the ACA and institute a waste management and waste disposal scheme consistent with the protocol. Moreover, the Agency conducted environmental impact assessments in 1980 and 1991, and it identified a number of measures to improve its environmental practices. *See supra* part IV.A.1.

417. *See, e.g.*, Manheim, *supra* note 44, at 253-54.

418. *1993 Hearings, supra* note 1, at 35 (statement of Susan J. Sabella).

419. *Id.*

420. *Id.*

pertise may explain why the NSF has experienced difficulty in carrying out its environmental protection and pollution control responsibilities under the ACA.[421]

The environmentalists' preferred solution is to allow the NSF to continue operating the USAP, but to grant NOAA regulatory and enforcement authority under the protocol.[422] By separating regulatory and enforcement authority from the day-to-day operations of USAP, an element of independent oversight could be exercised as against the NSF's self-regulation.[423] Moreover, this proposal would utilize the regulatory and resource management expertise of NOAA to implement the protocol.[424]

In rebuttal, scientists raise the valid concern that parallel permitting procedures could jeopardize the viability of Antarctic science. A dual agency system could result in overregulation, undermine the freedom of scientific inquiry, and erode the primacy of scientific activity in Antarctica.[425] Scientists recount that it is already difficult to coordinate the various applications for ACA permits, research grants, and logistics support when dealing with just a single agency.[426] A dual agency system would result in additional layers of paperwork, added rules, and increased administrative personnel in Antarctica.[427]

Scientists further note that the NSF has conducted an excellent program of supporting scientific research in Antarctica.[428] They judge that the NSF is the agency best able to collect and analyze the technical information necessary to determine the environmental impacts of Antarctic activity.[429] Finally, scientists believe that "having the agency funding the scientific studies responsible for carrying out the

421. *Id.*
422. *Id.*
423. *Id.* at 35.
424. *Id.*
425. Don Siniff, University of Minn, Remarks at the Workshop, *supra* note 64 (notes on file with author). House bill 1066 seeks to ensure that increased regulation does not result in a diminished role for science in Antarctica by utilizing a system of peer review. H.R. 1066, *supra* note 7, § 6(g)(3)(B)(iv). This mechanism is designed to guarantee that lawyers or others without technical backgrounds would not disapprove permits for activities simply because they lacked understanding of the scientific merits of the proposed project.
426. Diane McKnight, U.S. Geological Survey, Remarks at the Workshop, *supra* note 64 (notes on file with author).
427. Jim Wilson, House Comm. on Science, Space and Technology, Remarks at the Workshop, *supra* note 64 (notes on file with author).
428. Bill Baker, Florida Inst. of Technology, Remarks at the Workshop, *supra* note 64 (notes on file with author).
429. Susan Solomon, NOAA, Remarks at the Workshop, *supra* note 64 (notes on file with author).

rules and regulations is the surest way of ensuring full and rapid compliance by the scientists."[430]

If an answer exists to the question whether the NSF or NOAA would more effectively enforce the environmental protections of the protocol, it lies far beyond the rhetoric that has piled up on both sides of the debate. Unfortunately, the proposed legislation is sharply divided on the issue of which agency should be responsible for Antarctic environmental protection. House bill 964 grants the NSF lead authority,[431] while House bill 1066 grants NOAA lead authority.[432] By contrast, Senate bill 1427 adopts a compromise division of authority, "by keeping the National Science Foundation in its lead agency role in managing scientific activities in Antarctica, and by assigning other roles to [NOAA] such as tourism and resource regulation."[433] Under the Senate bill's approach, the NSF, with the concurrence of NOAA, would establish permit application procedures.[434] Permits for tourism, base and facility activity, use of marine living resources, and any activity that has more than a minor or transitory impact would be issued by the NSF only with the concurrence of NOAA.[435] EPA would be given authority to implement the waste disposal and management provisions of annex III.[436] This division of authority may prove to be a satisfactory compromise. It responds to environmentalists' concerns that the NSF's record demonstrates a weaker commitment to protection of the Antarctic environment than does NOAA's record. It also appears to respond to scientists' fears that duplicate permitting would threaten Antarctic research. Regardless of the ultimate outcome, the authors urge that the political choice of which agency should assume lead regulatory authority not be allowed to derail U.S. ratification of the protocol.

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430. *1993 Hearings,* supra note 1, at 2 (statement of Brian L. Howes, Woods Hole Oceanographic Inst.).

431. *See, e.g.,* H.R. 964 *supra* note 7, § 5(8) (proposed 16 U.S.C. § 2404(e)(1)(A)(ii) (permitting authority); *Id.* § 11(1) (proposed 16 U.S.C. § 2407) (enforcement authority). House bill 964 responds to criticisms of the NSF's enforcement history, in part, by creating the Antarctic Environmental Protection Commission. *Id.* § 17. Composed of five members appointed by the President, the commission is to review compliance of all USAP stations, field camps, and operations. *Id.* A report on compliance is required to be submitted to the President and to Congress every two years. The NSF is required to respond within 90 days with a written report describing implementation of the commission's recommendations. *Id.* Greenpeace's evaluation of this commission is that biennial inspections alone cannot provide meaningful oversight for compliance with the protocol, in light of the frequent need for decisionmaking on the spot. *1993 Hearings, supra* note 1, at 36-37 (statement of Susan J. Sabella).

432. *See, e.g.,* H.R. 1066, *supra* note 7, § 6(d), (g) (permitting authority).

433. S. 1427, *supra* note 7, § 2(7).

434. *Id.* § 6(b)(1).

435. S. 1427, *supra* note 7, § 6(d)(4).

436. *Id.* § 6(i).

B. *Relation of Implementing Legislation to Existing U.S. Regulation*

The relation of implementing legislation to existing U.S. statutes and regulations has produced significant debate. The form that implementing legislation takes is not critical,[437] but legislation must mesh with the current regulatory regime.[438] Perhaps the two most difficult and important issues when defining the relation of implementing legislation to existing regulation are: (1) whether marine pollution legislation should be applied to government ships, despite the grant of sovereign immunity in annex IV; and (2) whether NEPA, as applied to Antarctic activities, complies with the environmental impact assessment requirements of annex I.

1. *Government Ship Exemption*

Annex IV of the protocol exempts government ships from its marine pollution provisions.[439] This grant of sovereign immunity is in accordance with generally accepted principles of public international law, which render vessels on the high seas immune from the prescriptive jurisdiction of any state other than the flag state.[440] The practice

437. House bill 964 proposes to amend the ACA, while House bill 1066 and Senate bill 1427 propose to repeal the ACA and enact an entirely new piece of Antarctic legislation. It is important that the implementing legislation guarantee the continued operation of all statutes that currently regulate Antarctic activities and that are not intended to be amended. The bills each contain a "savings clause" to the effect that nothing in the Act shall be construed as contravening or superseding (1) any international treaty, convention, or agreement, if such treaty, convention, or agreement is in force with respect to the United States on the date of the enactment of the Act; or (2) any statute that implements any such treaty, convention, or agreement. S. 1427, *supra* note 7, § 18(a); H.R. 1066, *supra* note 7, § 15(a); H.R. 964, *supra* note 7, § 8, proposed 16 U.S.C. § 2412.

438. All of the proposed bills would incorporate the ESA, 16 U.S.C. §§ 1531-1544 (1988), the MMPA, 16 U.S.C. §§ 1361-1407 (1988 & Supp. IV 1992), and the MBTA, 16 U.S.C. 701-718 (1988 & Supp. IV 1992), through coordinated permit procedures. H.R. 1066, *supra* note 7, § 6(e)(1)(A), S. 1427, *supra* note 7, § 6(c)-(d), H.R. 964, *supra* note 7, § 5(c)-(d) (proposed 16 U.S.C. § 2404(a)-(c)). Neither of the House bills addresses its relation to AMLRCA, 16 U.S.C. §§ 2431-2444 (1988), or the Ocean Dumping Act, 33 U.S.C. §§ 1401-1445 (1988). Additionally, House bill 964 does not address its relation to the Act to Prevent Pollution From Ships (APPS), 33 U.S.C. §§ 1901-1912 (1988), or the CAA, 42 U.S.C. §§ 7401-7671q (1988 & Supp. IV 1992). House bill 1066 would amend the APPS and fulfill at least one CAA requirement by enacting a ban on incineration in Antarctica. H.R. 1066, *supra* note 7, §§ 5(a)(8)(f), 14(d). The Senate bill goes the furthest toward making general U.S. legislation applicable to Antarctic activities. The bill would amend AMLRCA and the APPS to meet the requirements of the protocol. S. 1427, *supra* note 7, §§ 15-16. The bill would also require sewage discharges to meet the secondary treatment standards applicable to the navigable waters of the United States, and it would make the Federal Facilities Compliance Act of 1992, Pub. L. No. 102-386, 106 Stat. 1505 (codified in scattered sections of 42 U.S.C.), and the CAA entirely applicable to Antarctica. S. 1427, *supra* note 7, § 6(i)(2).

439. Madrid Protocol, *supra* note 3, Annex IV, art. 11(1), 30 I.L.M. at 1485; *see also supra* part II.B.4.

440. Convention on the High Seas (United Nations Conference on the Law of the Sea), *done* Apr. 29, 1958, arts. 8-9, 13 U.S.T. 2312, 2315.

of sovereign ship immunity has probably developed as a matter of comity.[441] International conventions typically do not bind government-owned vessels used for noncommercial purposes, although they may if the flag state consents to be bound by the international instrument. It is consistent with comity concerns that a state may waive its immunity either expressly or by implication.

Waiver of sovereign ship immunity would afford the Antarctic seas greater environmental protection by making the marine pollution measures of annex IV apply to a greater number of ships. Since most countries' Antarctic research stations are accessed by military or other government-owned ships, a significant number of ships in the Antarctic are government ships.[442] The United States operates a Coast Guard vessel, two NSF research vessels, and occasionally naval auxiliary vessels in the Antarctic.[443] The United States' waiver of its sovereign ship immunity would send an unmistakably clear signal to other countries that the United States is fully committed to protection of the Antarctic environment. If Congress determines that the pollution control measures would not unduly impair the operational capabilities of these U.S. ships, it should waive sovereign immunity under annex IV.

House bill 964 does not address the implementation of annex IV. By contrast, House bill 1066 would make the Act to Prevent Pollution From Ships (the APPS) apply in Antarctica to all ships of U.S. registry or nationality, ships operated under the authority of the United States, and other ships over which the United States has jurisdiction, including all ships engaged in or supporting USAP.[444] The bill thus effectively waives the immunity of government vessels, except in times of war.[445] Senate bill 1427 also waives government ship immunity.[446] By thereby subjecting government-owned vessels to the annex IV

441. One aspect of comity involves the perceived need of states to be able to operate their warships flexibly. This particular concern does not apply to Antarctic operations, since the Antarctic area is devoted to peaceful uses. Antarctic Treaty, *supra* note 125, art. 1, 12 U.S.T. at 795.

442. Statistics on the actual numbers of ships travelling to Antarctica, whether governmental or nongovernmental, are hard to come by. In 1983-84, the total number of ships involved in logistics, which are presumably governmental, was 31; of these, six were American. William F. Budd, *The Antarctic Treaty as a Scientific Mechanism (Post-IGY)—Contributions of Antarctic Scientific Research, in* ANTARCTIC TREATY SYSTEM, *supra* note 29, at 142.

443. FINAL EIS, *supra* note 80, at 2-23, 2-24.

444. H.R. 1066, *supra* note 7, § 14(c).

445. *Id.* § 14(d). House bill 1066 accomplishes this result by amending section 1902(b)(2)(B) of the APPS to read: "Notwithstanding any provision of the Antarctic Protocol and subject to subparagraph (C) [a wartime exception], the requirements of Annex IV to that Protocol shall apply to a ship referred to in paragraph (1)(A) [a warship, naval auxiliary, or other ship owned or operated by the United States when engaged in noncommercial service] operating in Antarctica."

marine pollution regulations, these two bills effectively extend the scope of the protocol's provisions.

2. *Relationship Between NEPA and Annex I*

The D.C. Circuit Court of Appeals held in *Environmental Defense Fund v. Massey*[447] that governmental agencies must comply with the environmental impact assessment procedures of NEPA when conducting activities in Antarctica.[448] House bill 964 proposes to limit this judicial interpretation of NEPA's reach, however, by providing that no citizen suit may be brought to enforce NEPA as applied to Antarctic activities.[449] Moreover, by its terms NEPA applies only to government, not private, actors, whereas the environmental impact assessment procedures of the protocol apply to both. Thus, Congress must decide the pair of questions: whether to prevent citizen suits against government actors in Antarctica under NEPA; and whether to allow citizen suits against private actors in Antarctica. Congress should also consider whether the NEPA procedures would indeed implement the procedures of annex I. The discrepancies in the activities covered, thresholds, and substantive consequences of the two sets of procedures might convince Congress that annex I would best be implemented by legislative procedures separate from NEPA.

Section 102 of NEPA requires all federal agencies to include an environmental impact statement (EIS) in proposals for "major Federal actions significantly affecting the quality of the human environ-

446. S. 1427, *supra* note 7, § 16(b). The bill would amend the APPS to make the Act apply in Antarctica to all ships over which the United States has jurisdiction, including all ships engaged in or supporting U.S. Antarctic operations. *Id.*

447. 986 F.2d 528 (D.C. Cir. 1993).

448. The court provided two alternative bases for its holding. First, NEPA regulates the process of U.S. decisionmaking which occurs, in regard to Antarctica, almost exclusively within the United States. *Id.* at 529. Therefore, no question of extraterritorial application is implicated. Second, the United States "has some real measure of legislative control over the region at issue," and no foreign sovereign exerts contradictory control on this region. *Id.* at 533. The policies underlying the presumption against extraterritorial effect therefore do not apply.

449. H.R. 964, *supra* note 7, § 9. The bill directs the NSF to promulgate regulations to implement the environmental impact assessment provisions of the protocol. *Id.* Since no assessment will be done under NEPA, presumably NEPA's citizen suit standing does not automatically apply. The bill appears to trump NEPA with the following provision: "The provisions of this section shall supersede all other provisions of law relating to the preparation of environmental evaluations or documents to the extent such laws might otherwise be construed to apply to decisions or actions affecting the Antarctic environment." *Id.* Moreover, the NSF's historic resistance to citizen suit enforcement of NEPA in Antarctica makes it unlikely that the regulations that the NSF promulgates will provide a citizen suit cause of action.

ment."[450] NEPA requires that the EIS accompany the proposal and be made available to the public.[451] The statute does not, however, impose any substantive obligation on government agencies to choose the most environmentally sound alternative.[452] The federal courts have concluded that NEPA does mandate an informed decisionmaking process and that NEPA's procedures are judicially enforceable.[453] Citizen suits have proven to be a principle means of enforcing NEPA.[454] Suits brought under NEPA have slowed development of some large public projects sufficiently to end the projects altogether.[455] The mere threat of NEPA litigation may lead agencies to prepare more thorough EIS's, and to negotiate project changes with potential litigants.

The *Massey*[456] decision itself illustrates the practical importance of a private cause of action under NEPA. Absent this action, the NSF would likely have continued unchallenged in its long-standing position that NEPA did not apply to its Antarctic activities.[457] Moreover, the value of private enforcement may be greater in Antarctica than elsewhere, because the enforcement agency may not possess adequate resources to patrol all of the vast Antarctic expanse to detect violations or to pursue enforcement actions against every violator.

Nonetheless, House bill 964 forecloses citizen suit enforcement of NEPA in Antarctica.[458] This legislative approach threatens to rob Antarctic environmental impact assessment of practical significance.

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450. 42 U.S.C. § 4332(2)(C) (1988). NEPA itself never uses the phrase "environmental impact statement," but instead requires a "detailed statement" that is to include discussions of various environmental impacts. *Id.*

451. *Id.*

452. *Id.*; Strycker's Bay Neighborhood Council v. Karlen, 444 U.S. 223, 227-28 (1979) (per curiam).

453. Calvert Cliffs Coord. Comm., Inc. v. AEC, 449 F.2d 1109, 1114-15 (D.C. Cir. 1971). Regulations promulgated by the Council on Environmental Quality (the CEQ) to implement NEPA provide: "The statement shall be prepared early enough so that it can serve practically as an important contribution to the decisionmaking process and will not be used to rationalize or justify decisions already made." 40 C.F.R. § 1502.5 (1992).

454. This is true even though judicial review of agency action under NEPA is limited. The Supreme Court, while upholding the validity of the judicially defined right to bring citizen suits under NEPA, clarified that "once an agency has made a decision subject to NEPA's procedural requirements, the only role for a court is to insure that the agency has considered the environmental consequences." Strycker's Bay Neighborhood Council, Inc., 444 U.S. at 227. Restrictive standing requirements may make it increasingly difficult for environmental groups to litigate NEPA cases. *See, e.g.*, Lujan v. Defenders of Wildlife, 112 S. Ct. 2130, 2138-40 (1992) (holding that members of environmental group lacked standing to challenge the rehabilitation of the Aswan High Dam on the Nile, despite testimony that the project would adversely affect them personally and professionally).

455. *See* Daniel Ackman, *Highway to Nowhere: NEPA, Environmental Review and the Westway Case,* 21 COLUMBIA J.L. & SOC. PROBS. 325, 332 (1988).

456. Environmental Defense Fund v. Massey, 528 F.2d 528 (D.C. Cir. 1993),

457. OFFICE OF THE GENERAL COUNSEL, *supra* note 104, at 22-23.

458. H.R. 964, *supra* note 7, § 9.

Already purely procedural, NEPA-type requirements might have little or no effect absent the independent oversight and pressure exercised by environmental groups. House bill 1066 does not specifically address citizen suits. The bill's language implies that citizen suits against government agencies would be allowed, while citizen suits against private actors would not.[459] By contrast, Senate bill 1427 expressly authorizes private enforcement of Antarctic environmental impact assessment. The bill provides a cause of action to any citizen against other citizens or the U.S. Government for the violation of, or failure to enforce, the implementing legislation.[460] This approach is potentially the most effective in ensuring that both governmental and private actors adequately assess the environmental impacts of their activities in Antarctica. It bears emphasizing that the cause of action granted by the Senate bill goes beyond enforcement of environmental impact assessment. Citizens may bring suit under the bill for violation of any of the protocol's requirements, including suit against the lead agency for not carrying out its enforcement responsibilities. This broad role for private enforcement could greatly strengthen the protocol's compliance and enforcement mechanisms.

In addition to defining the role of citizen suits, Congress must judge whether NEPA's assessment procedures are consistent with the procedures required by annex I of the protocol. As already noted, the respective procedures of NEPA and annex I apply to different actors. The protocol obligates parties to evaluate the impacts of both governmental and nongovernmental activity.[461] By contrast, NEPA applies only to governmental activity.[462] The CEQ's NEPA regulations establish that private actions requiring a federal permit are subject to the statute's requirements.[463] Moreover, the regulations broadly define

459. The bill instructs federal agencies to prepare an EIS "pursuant to Section 102(c)" of NEPA. *Id.* § 7(a)(2). Private actors need to conduct environmental impact assessment only "consistent with" NEPA. *Id.* § 7(b).

460. S. 1427, *supra* note 7, § 14(a)(1). The bill provides that before a suit may proceed, the NSF and the alleged violator must be given notice. The NSF can foreclose the citizen suit by "diligently pursuing action." *Id.* § 14(c)(2). The bill provides attorney fees and costs to the winning party. *Id.* § 14(e).

461. Madrid Protocol, *supra* note 3, art. 8, Annex I, art. 1, para. 1, 30 I.L.M. at 1464, 1473.

462. NEPA applies to agencies of the Federal Government. 42 U.S.C. § 4332(C).

463. 40 C.F.R. § 1502.5(b). A recurrent and significant issue is who prepares an EIS when a permit applicant is involved. ENVIRONMENTAL LAW INST., LAW OF ENVIRONMENTAL PROTECTION § 9.01[3][b][ix] (Sheldon M. Novick et al., eds., (1987)). In this situation, the goal of eliminating duplication between the work done by the agency and that done by the applicant conflicts with another desirable goal—that of insuring the agency's use of its independent judgment by doing its own work. *Id.* The regulations allow an applicant to prepare an environmental assessment (EA), *see infra* note 467, but the agency must evaluate the environmental issues and take responsibility for the EA's scope and content. 40 C.F.R. § 1506.5(b). An EIS must be prepared by the agency itself (or by a contractor). *Id.* § 1506.5(c).

"major Federal actions" subject to NEPA as including "projects and programs entirely or partly financed, assisted, conducted, regulated, or approved by federal agencies."[464] Thus, private activity in Antarctica that requires a permit or that is federally funded would come under NEPA. Some Antarctic activity, however, most notably tourist activity, would remain outside the scope of NEPA. By contrast, the protocol's broader scope of application requires that the impacts of such activity be assessed.

In addition, NEPA's "significantly affecting" threshold differs from the dual thresholds of the protocol. Under NEPA, if there will be no significant environmental impact, no EIS need be prepared.[465] Conversely, environmental impact assessment must be conducted if a significant impact is certain,[466] or if it is not known whether there will be such an impact.[467] A similarly precautionary approach is adopted under the protocol.[468] The term "significantly" under NEPA, however, is determined in large part by considering societal and cultural factors.[469] Environmental effect is also broadly defined, with reference to aesthetic, historic, cultural, economic, social, and health considerations.[470] Such considerations seem inapplicable in Antarctica, where a fully developed society and culture might be said not to exist. Moreover, NEPA's "significantly affecting" standard seems to refer to a more severe impact than the protocol's standard of "minor or transi-

464. 40 C.F.R. § 1508.18(a).

465. ENVIRONMENTAL LAW INST., *supra* note 463, § 9.01[3][a].

466. 42 U.S.C. § 4332(2)(c).

467. *Id.* In some situations, an agency may adopt categorical exclusions covering activities that do not individually or cumulatively have a significant effect on the environment. 40 C.F.R. § 1508.4. In other situations, an agency may adopt procedures for cases which normally do require EIS's. *Id.* § 1507.3(b)(2)(i). In the remaining situations, where the agency has not decided in advance whether it will or will not prepare an EIS, the agency must prepare an EA. *Id.* § 1501.4(b). The EA is a concise public document that provides sufficient evidence and analysis to determine whether to prepare an EIS or a finding of no significant impact (known as a FONSI). *Id.* § 1508.9(a).

468. Under the protocol, an IEE must be prepared unless an activity is determined to have less than a minor or transitory impact. Madrid Protocol, *supra* note 3, Annex I, art. 2, para. 1, 30 I.L.M. at 1474. A CEE is required unless the IEE indicates that the activity will have no more than a minor or transitory impact. *Id.* Annex I, art. 3, para. 1, 30 I.L.M. at 1474. *See supra* part III.B.1. (describing the annex I thresholds). These thresholds embody a precautionary approach in that no affirmative determination that an activity *will* have more than a minor or transitory impact is required. Rather, this is in part what a CEE is seeking to determine. Similarly to NEPA, the presumption under the protocol is that assessment is required for all activities.

469. The term "significantly" is defined by reference to both "context" and "intensity." 40 C.F.R. § 1508.27. Context refers to the significance of the action for society as a whole, the affected region, the affected interests, and the locality. *Id.* § 1508.27(a). Intensity refers to the severity of impact, and includes the degree to which the action may cause loss or destruction of significant scientific, cultural, or historical resources. *Id.* § 1508.27(b)(8).

470. *Id.* § 1508.8.

tory." If this is the case, full-scale assessment under the protocol would be triggered more easily than assessment under NEPA.

The information required in an EIS under NEPA appears to be comparable to the information required under the protocol.[471] NEPA and the protocol both require assessment of ongoing or continuing activities[472] and consideration of cumulative impacts.[473] An EIS and CEE must both include a description of indirect or second order impacts[474] and any measures considered or adopted to mitigate impacts.[475] Some differences in the information required by the two sets of procedures do exist,[476] but these appear outweighed by the similarities. Implementing legislation will need to enact international reporting and circulation requirements consistent with the protocol.[477]

An important difference between the two sets of environmental impact assessment procedures remains, however. The protocol has substantive consequences that are incompatible with the purely procedural nature of NEPA. Namely, parties to the protocol must monitor all activities requiring an IEE or CEE, so that the expected impacts can be verified, and any unexpected impacts can be detected.[478] By contrast, agencies are encouraged to provide for monitoring under

471. An EIS under NEPA must include a description of (1) the environmental impact of the proposed action; (2) any adverse environmental effects which cannot be avoided; (3) alternatives to the proposed action, including the alternative of no action; (4) the relationship between the long- and short-term uses of the environment; and (5) any irreversible and irretrievable commitment of resources. 42 U.S.C. § 4332(2)(c)(i)-(v). *See supra* part III.B.1 (describing information requirements of CEE's).

472. 40 C.F.R. §§ 1502.14, 1508.18; Madrid Protocol, *supra* note 3, art. 8, para. 3, 30 I.L.M. at 1464. The protocol requires assessment of ongoing activities whenever there is "any change" in the activity. *Id.* This may embody a more sensitive threshold than NEPA. *See, e.g.*, Marsh v. Oregon Natural Resources Council, 490 U.S. 360, 385 (1989) (holding that a U.S. Army Corps of Engineers decision that a supplemental EIS was not required for an operational dam based on previously unavailable evidence was not a "clear violation of judgement").

473. 40 C.F.R. §§ 1508.25(a)(2); Madrid Protocol, *supra* note 3, Annex I, art. 2, para. 1(b), 30 I.L.M. at 1474. The NEPA regulations define "cumulative impact" as the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. 40 C.F.R. § 1508.7. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. *Id.*

474. 40 C.F.R. §§ 1502.16(b), 1508.8(b); Madrid Protocol, *supra* note 3, Annex I, art. 3, para. 2, 30 I.L.M. at 1474.

475. 40 C.F.R. §§ 1502.14 & 1502.16(h); Madrid Protocol, *supra* note 3, Annex I, art. 3, para. 2, 30 I.L.M. at 1474.

476. For instance, the protocol requirement that the CEE describe the initial environmental reference state is not matched by any NEPA requirement. Madrid Protocol, *supra* note 3, Annex I, art. 3, para. 2, 30 I.L.M. at 1474.

477. Environmental evaluations under the protocol must be circulated to the CEP and the ATCM and to all other parties to the protocol. Evaluations must also be made publicly available. *Id.* Annex I, art. 3, paras. 3, 6, 30 I.L.M. at 1474, 1475.

478. *Id.* Annex I, art. 5, para. 1, 30 I.L.M. at 1475.

NEPA, but are under no obligation to do so.[479] Furthermore, under the Environmental Principles of article 3, parties should modify, cancel, or suspend any activity that is found to be inconsistent with the protocol.[480] NEPA has no similar requirement that activities be modified or altered in response to adverse environmental impacts.

The wider scope of application and substantive consequences of environmental impact assessment under the protocol promise to provide more protection than the NEPA procedures.[481] A drawback of implementing legislation not referencing NEPA is that the body of judicial decisions interpreting NEPA might not apply in cases where Antarctic environmental impact assessments are challenged. Judges need not necessarily be barred from referring to NEPA decisions, however, when ruling on the adequacy of other assessment procedures. The active involvement of EDF, Greenpeace, and other environmental groups in Antarctic affairs also means that a body of judicial doctrine may develop specifically for environmental impact assessment of Antarctic activities.

House bill 1066 would utilize NEPA to fulfill the protocol's environmental impact assessment requirements, but does not address the discrepancies between the two sets of requirements.[482] House bill 964 merely directs the NSF to implement necessary and appropriate assessment regulations within two years, thus leaving the Agency full discretion to decide how to conduct environmental impact assessment.[483] Senate bill 1427, by contrast, specifically directs the head of each agency to review activities in accordance with annex I of the protocol.[484] For an activity to proceed, the head of the agency and the Director of the NSF must agree that the activity will have less than a

479. CEQ's NEPA regulations tell agencies that they may provide for monitoring to assure that their decisions are carried out and that they should do so in important cases. 40 C.F.R. § 1505.3. An agency must adopt a monitoring and enforcement program where applicable for any measures that are adopted to mitigate the environmental impacts of its proposed activities. *Id.* § 1505.2(c).

480. Madrid Protocol, *supra* note 3, art. 3, para. 4(b), 30 I.L.M. at 1463.

481. Ironically, environmentalists have argued in court for the application of NEPA in Antarctica. *See, e.g.,* Environmental Defense Fund v. Massey, 986 F.2d 528 (D.C. Cir. 1993). This approach seems not to recognize that the annex I procedures are, or have the potential to be, more stringent than the NEPA procedures. EDF may have considered, however, that NEPA provides satisfactory assessment, or that other procedures would be, as a practical matter, weaker than NEPA.

482. House bill 1066 instructs each federal agency planning to conduct an activity in Antarctica to review the activity to determine whether it will have a minor or transitory impact. If an activity is determined to have "no more than a minor or transitory impact on the environment of Antarctica," the activity can proceed with monitoring to assess and verify the predicted impact. H.R. 1066, *supra* note 7, § 7(a)(1). If the agency determines that the activity will have more than a minor or transitory impact on the environment of Antarctica, it is required to prepare an EIS "pursuant to" NEPA. *Id.* § 7(a)(2).

483. H.R. 964, *supra* note 7, § 9.

484. S. 1427, *supra* note 7, § 7(a)(1).

minor or transitory impact.[485] This approach is highly favorable in light of the differences, possibly irreconcilable, between NEPA and annex I.

C. *Legal Effect of the Article 3 Environmental Principles*

Heated domestic debate exists over whether the Environmental Principles of article 3 of the protocol create legally binding obligations or merely express policy considerations. House bill 964 restates the Environmental Principles under the heading "Congressional Findings and Declaration of Policy,"[486] thereby apparently intending to make the principles a nonbinding component of U.S. environmental policy.[487] By contrast, House bill 1066 gives the article 3 provisions substantive effect. This bill makes it generally unlawful to violate the article[488] and gives force to most of the article's specific provisions in the context of permitting and environmental assessment.[489] Senate bill 1427 only suggests that article 3 should be legally binding, by providing that the NSF may modify, suspend, or revoke a permit for violation of article 3.[490]

Some of the language in article 3 appears sufficiently strong to have a binding effect,[491] but other language is so vague and indefinite as to raise doubts that it has more than a precatory nature.[492] Analysis of the purpose underlying the article may help clarify its intended effect.[493] Comprehensive environmental protection is the stated goal of the protocol,[494] and this goal will certainly be furthered if parties

485. *Id.*

486. H.R. 964, *supra* note 7, § 2 (proposed 16 U.S.C. § 2401(2)).

487. One environmentalist charged that this approach "would convert the Protocol's principles into essentially hortatory declarations that 'inform' implementation and enforcement of the annexes," and claimed that this "has absolutely no support in the plain language of the Protocol or its drafting history." *1992 Hearings, supra* note 90, at 213 (statement of Bruce S. Manheim).

488. H.R. 1066, *supra* note 7, § 5(a)(1) (making it unlawful for any person to conduct an activity within the Antarctic "in a manner inconsistent with the Protocol").

489. *Id.* § 6(b) (making consistency with the article 3 principles a precondition of granting a permit); *Id.* § 6(g) (containing article 3 language relating to information requirements).

490. S. 1427, *supra* note 7, § 6(g).

491. *See, e.g.,* Madrid Protocol, *supra* note 3, art. 3, para. 4(b), 30 I.L.M. at 1463 ("Activities shall . . . be modified, suspended or cancelled if they result in or threaten to result in impacts . . . inconsistent with those principles.").

492. *See, e.g., id.*, art. 3, para. 1, 30 I.L.M. at 1462 ("[T]he intrinsic value of Antarctica, including its wilderness and aesthetic values and its value as an area for the conduct of scientific research, shall be fundamental considerations in the planning and conduct of all activities in the Antarctic Treaty area.").

493. The history of negotiations could prove invaluable in determining what legal effect the states that drafted the article 3 provisions intended them to have. In the absence of a publicly available negotiating history, our analysis of article 3 must rely on the text of the article and the purposes underlying the protocol.

494. Madrid Protocol, *supra* note 3, pmbl., 30 I.L.M. at 1461.

are required to modify or suspend activities that are inconsistent with the protocol. Absent article 3, the protocol would regulate only the activities covered by annexes II-V.[495] By contrast, article 3 applies to all Antarctic activities. The article thus provides the basis for refusing to allow an activity in light of environmental impact assessment,[496] as opposed to violation of a specific provision of annexes II-V. The article would act as a "safety net" to reach potentially harmful activities that are not covered by the annexes.[497] The fact that many Antarctic activities would go unregulated absent article 3 cannot prove that the article has binding force, but it does add significant support, given the protocol's goal of comprehensive protection.

A final piece of evidence is the Final Act of the ATCM adopting the protocol, which reads: "[T]he Meeting [has] agreed that an inquiry procedure should be elaborated to facilitate resolution of disputes concerning the interpretation or application of Article 3 with respect to activities undertaken or proposed to be undertaken in the Antarctic Treaty area."[498] This statement seems to indicate that the ATCP's themselves may not agree what legal effect the Environmental Principles of article 3 should have. Therefore, the United States would indeed take a leadership role by making article 3 binding on its nationals.[499]

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495. These activities are ship-based pollution, waste disposal and waste management, interference with flora and fauna, and access to and activity within special areas. *See supra* parts III.B.2.-5.

496. Annex I appears to contemplate that activities will be suspended under article 3, because the annex requires that monitoring provide "information on the need for suspension, cancellation or modification of the activity." Madrid Protocol, *supra* note 3, Annex I, art. 5, para. 2(b), 30 I.L.M. at 1475.

497. For instance, suppose a nongovernmental organization establishes a summer camp in a dry valley, to be serviced by an airstrip. The facilities will not be near any wildlife, native plants, or protected areas; all wastes will be retrograded every season; and the required environmental documentation has been completed. It is conceivable that this operation, while falling within the letter of the annexes, could violate the protocol's environmental principles that guard against "significant adverse effects on air or water quality" and/or "degradation of, or substantial risk to, areas of biological, scientific, historic, aesthetic or wilderness significance." *1993 Hearings, supra* note 1, at 40 (statement of Susan J. Sabella).

498. Final Act, *supra* note 294, 30 I.L.M. at 1461.

499. Unlike domestic legislation, international obligations do not directly bind the nationals of a state. To the extent that the Environmental Principles are legally binding, the U.S. Government will be bound by them after it ratifies the protocol and the protocol enters into force. *1992 Hearings, supra* note 90, at 159 (statement of Christopher C. Joyner, Professor, George Washington University). A violation of the Environmental Principles will then be a violation of an international obligation by the United States. Yet, the extent to which the article 3 principles will legally bind U.S. *nationals* is a function of U.S. implementing legislation. *Id.* The dualism implicit in non-self-executing treaties means that Congress may choose to create domestic legal duties for U.S. nationals that fall short of the international obligations of the U.S. Government. In sum, the choice of what legal effect to give article 3 in implementing legislation is largely a matter of policy, although practical considerations concerning the U.S. foreign relations position should not be disregarded.

It is uncertain whether giving the provisions of article 3 substantive legal effect would cause delay or inflexibility in the permitting process or otherwise jeopardize scientific research in Antarctica. By contrast, clear environmental benefits would follow from enforcing the article 3(4) requirement that all activities be consistent with the protocol, or else be modified, suspended, or cancelled. Legislation that implements the provisions of article 3 as substantive measures has greater potential for environmental effectiveness than legislation that reduces article 3 to mere "policy." The authors strongly believe that the United States should make article 3 legally binding on U.S. nationals.

D. Exceeding the Norms of the Protocol

A final area of contention surrounding the protocol's implementation is whether the United States should exceed certain substantive requirements of the protocol. There appear to be no international or domestic legal reasons why the United States cannot adopt more stringent regulations than those provided in the protocol should Congress so decide.[500] Precedent for the practice is given by two pieces of domestic Antarctic-related legislation that differ from and exceed the international instruments they were intended to implement: the ACA[501] and AMLRCA.[502] Thus, the arguments for and against the adoption of regulation more stringent than the protocol are based solely on policy considerations.

The protection of the Antarctic environment does not implicate a free-rider problem, whereby the protective efforts of one state would create incentives for other states to ease their efforts.[503] The nonfungible nature of the harms to be prevented means that more stringent protective efforts by one state should not interfere with or hinder the efforts of other states. Indeed, the adoption of more stringent standards by the United States could promote international cooperation, because it would lessen the opportunities for conflict with

500. *Id.* at 158; *see also id.* at 184 (statement of James N. Barnes, Antarctica Project) (stating that no practical problem would be created internationally if the United States adopted regulations more stringent than those in the protocol).

501. 16 U.S.C. §§ 2401-2412 (1988).

502. 16 U.S.C. §§ 2341-2344 (1988).

503. An example of the so-called "free rider" or "collective action" problem in the environmental context is ozone depletion. Every reduction of CFC emissions lessens the rate of ozone depletion, and thus decreases the reductions that remain to be made. The incentive for any one state is to maintain its current level of emissions and rely on other states to reduce their emissions. The Montreal Protocol circumvents the free rider problem by establishing individual standards which each party must meet. Montreal Protocol, *supra* note 1, 26 I.L.M. 1550. The Madrid Protocol does not have a free rider problem because the harms it seeks to prevent are not fungible, but are rather individual, in nature.

other states that might result from environmentally unsound actions by U.S. nationals and agencies.

The perceived defects in the protocol that were identified earlier[504] provide one rationale why implementing legislation should exceed its norms.[505] The U.S. goal in legislating should be to strengthen the protocol to make it a more effective tool for the protection of the Antarctic environment. In so doing, the United States would take a leadership role and demonstrate its commitment to protection of the Antarctic environment.[506] The United States would also further its own interests in protecting the Antarctic environment for the conduct of important scientific research, as well as possibly encourage other countries to follow its example.

It should be emphasized that scientists are committed to the protection of the Antarctic environment because of their interest in maintaining clean baselines for research. Yet, scientists are also concerned that increased regulation may impose unreasonable demands and costs on Antarctic research.[507] Excessive or duplicative bureaucracy could lead to delays in permitting procedures. Heightened requirements could result in the imposition of overly inflexible permit terms and conditions. If requirements are formulated and imposed on Antarctic activities without the input of scientists, they might lack a valid scientific basis and be ill-suited to how research is really conducted in the field. Freedom, the essential characteristic of Antarctic science established by the Antarctic Treaty, may be lost if excessively rigid permit requirements prevent scientists from adapting their research to changing conditions in the field. The final irony is that such regulations could prove ineffective in preventing harm to the Antarctic environment.

Scientists are ultimately concerned that Antarctic research may be undermined or prevented altogether by the combination of overly stringent regulation, increased costs, and decreased funding. The best scientists might be deterred from pursuing research in the Antarctic because of the increased bureaucratic and regulatory demands. A lack of peer review might mean that scientific projects lacking merit

504. *See supra* part III.

505. As one environmentalist opined, "the Protocol is not a flawless agreement. It contains many loopholes, particularly in the annexes, and condones some environmentally unsafe practices. Some considerable gaps also exist . . . ." *1993 Hearings, supra* note 1 at 33 (statement of Susan J. Sabella).

506. One environmental group agrees that "[t]he United States must use its ratification procedures, especially the enactment of implementing legislation to show leadership on the Protocol, and to demonstrate the importance and significance that the United States attaches to this agreement." *Id.*

507. *See, e.g., 1993 Hearings, supra* note 1, at 46 (Statement of Dr. Brian L. Howes, Woods Hole Oceanographic Inst.).

are permitted and/or funded, while more meritorious projects are denied. Similarly, the need for environmental monitoring may divert resources from research projects that seek to further human knowledge, as opposed to merely verifying environmental impacts.

The environmentalists' response to these concerns is that the very goal of the protocol is to preserve Antarctica as a natural laboratory for science.[508] Science maintains its priority in the Antarctic under the protocol.[509] Moreover, while overall evaluations of the proposed bills differ,[510] it should be noted that all the bills generally exceed the protocol insofar as they institute civil and criminal penalties.[511] Environmental groups call on legislators to incorporate a number of further measures that exceed the norms of the protocol.[512] It may be that some of these measures would enhance environmental protections without unduly burdening Antarctic science. If so, legislators should consider enacting such measures in addition to the protocol's literal requirements.

House bill 1066 incorporates some of the specific measures suggested by environmentalists, including an immediate ban on open burning and landfill operations,[513] a ban on the use of leaded fuel,[514] a

508. One commentator goes beyond the assertion that significant Antarctic science will not be blocked by the protocol to claim that science will reap practical benefits from a focusing of scientific priorities by way of implementing the protocol. These perceived potential benefits to science include: (1) more efficient science; (2) more effective science; (3) more funding for science; (4) more long-term monitoring programs; and (5) more direct research. Barnes, *supra* note 29, at 1.

509. Madrid Protocol, *supra* note 3, art. 3, para. 1, 30 I.L.M. at 1462 (describing scientific research as an intrinsic value of Antarctica).

510. Inconsistent evaluations of the proposed legislation have been offered. The U.S. Coast Guard has expressed the concern that House bill 5459 (now H.R. 1066) "goes far beyond the requirements of the Protocol that it seeks to implement." *1992 Hearings, supra* note 90, at 221 (statement of record, U.S. Coast Guard). By contrast, the Antarctica Project expressed the view that "H.R. 5459 does not exceed the requirements of the Protocol in any significant way." *Id.* at 184 (statement of James N. Barnes, the Antarctica Project). As for House bill 964, Greenpeace opines that this Act "does not take the approach of doing more to protect the Antarctic environment, and forwards no new initiatives . . . ." *1993 Hearings, supra* note 1, at 39 (statement of Susan J. Sabella).

511. *1992 Hearings, supra* note 90, at 158 (statement of Christopher C. Joyner).

512. These measures include the following: a ban on open burning of all wastes; a ban on the installation of new waste incinerators and a phase out of existing incinerators; a prohibition on the use of landfills and a commitment to clean up past and present waste disposal sites; a restriction on the use of leaded fuels or fuels containing ethylene bromide and ethylene chloride; a halt to the discharge of untreated sewage from land-based facilities into Antarctic waters; a commitment by USAP to a system of retrograding all solid waste from Antarctica; an extension of the protocol's marine pollution measures to government vessels used in support of USAP or other U.S. science programs occurring in the Antarctic; an extension of the area of application of the legislation beyond the area of application of the protocol; and provisions that an annex on state liability be negotiated, that an international inspectorate be established, and that an international secretariat be formed. *1992 Hearings, supra* note 90, at 196-218 (statement of Bruce S. Manheim).

513. H.R. 1066, *supra* note 7, § 5(a)(3).

waiver of sovereign immunity for government ships,[515] and a ban on incineration after December 1994 (unless there is no feasible and practicable alternative).[516] Senate bill 1427 goes even further in exceeding the norms of the protocol. For instance, it institutes an immediate ban on incineration,[517] extends the protections of several U.S. environmental statutes to Antarctica,[518] waives sovereign ship immunity,[519] and grants citizen suit standing to enforce all of the bills' provisions against both private and governmental actors.[520] The legislative approach of expanding the protocol's protections is commendable, since the United States thereby potentially increases the instrument's environmental effectiveness.

CONCLUSION

This comment provides just a glimpse of the manifold and complex issues facing the legislators who undertake to implement the protocol on Antarctic environmental protection. A fully informed decisionmaker would possess a complete understanding of the region's physical and political character, including its importance for scientific inquiry, and of the threats facing the region's environment. There is good reason to hope that such informed decisionmaking will take place—Congress has engaged in numerous hearings on the Antarctic environment, and it has considered competing bills for two consecutive sessions. Yet, contentious domestic issues that have arisen during the debate over implementation threaten to stall U.S. ratification of the protocol still further.

Speed in ratification is important. In the more than two years since the protocol's signing, just six of the twenty-six countries required for entry into force have completed ratification. With the passage of time and the waning of public attention, the risk grows ever greater that the protocol will remain devoid of legal effect. Ironically, another environmental disaster such as the *Bahia Paraiso* oil spill could respark public and governmental support for the protocol. Yet, it is to be hoped that the protocol's provisions, which are designed to

514. *Id.* § 5(a)(6).

515. *Id.* § 14(d)(1).

516. *Id.* § 6(g)(8)(c). In addition, the bill indicated the sense of Congress that information from scientific investigations of geological processes and structures should be made publicly available, *id.* § 17(3), and that an annex on liability should be promptly negotiated. *Id.* § 17(2).

517. S. 1427, *supra* note 7, § 6(i)(A).

518. The Senate bill requires sewage discharges to meet the secondary treatment standards applicable to the navigable waters of the United States, and makes the Federal Facilities Compliance Act and the CAA entirely applicable to Antarctica. *Id.* § 6(i).

519. *Id.* § 16(b).

520. *Id.* § 14(a)(1).

prevent such harms, will come into force in time to prevent any further degradation of the Antarctic environment.

The significance of U.S. action should not be underestimated. Our country has long had the largest Antarctic populations of scientists and tourists and now remains the sole superpower in the region. The past environmental practices of the U.S. research bases leave much room for improvement. The increasing numbers of U.S.-led tourist expeditions raise new and not fully identified environmental concerns. Compliance with the protocol's provisions by U.S. scientists and especially by U.S. tourists, who are now unregulated, could greatly reduce the adverse impacts on the Antarctic environment. The large U.S. presence adds to our responsibility to lead the environmental effort. The importance of Antarctic science makes it in our interest to ensure that Antarctica is preserved in a pristine state. Finally, U.S. ratification could encourage other states to complete the ratification process.

Powerful as they may be, the arguments in favor of ratification have not swept away the obstacles blocking the passage of legislation to implement the protocol. The most bitter point of contention involves the choice between the NSF or NOAA as the lead agency to administer and enforce the new environmental regime. We conclude, on the basis of the NSF's past environmental record and institutional nature, that NOAA would better be charged with this regulatory authority, while the NSF continues its basic mission of funding and operating scientific programs.

The issue whether NEPA should apply in Antarctica was recently answered in the affirmative by *Environmental Defense Fund v. Massey*.[521] Unlike NEPA, however, the environmental impact assessment procedures of the protocol apply to private actors, contain a different threshold, and have substantive consequences. For these reasons, legislation should contain specific assessment requirements, rather than implement annex I by a wholesale reference to NEPA. The legislation should also authorize citizen suits to enforce the assessment procedures, as private enforcement is invaluable to ensure that meaningful assessment is undertaken.

Other issues relate to the effect and extent that the protocol's provisions will assume in U.S. law. We think that the Environmental Principles of article 3 should be codified as legally binding norms. Article 3 contains the only general requirement that any kind of Antarctic activity be consistent with the protocol or else be suspended. Absent this general requirement, the law would allow certain activities damaging to the Antarctic environment to proceed with im-

521. 986 F.2d 528 (D.C. Cir. 1993).

punity. We also suggest that legislators close a large loophole in the protocol by requiring government ships, otherwise immune, to comply with the protocol's marine pollution provisions. The United States may wish to bolster further the protocol's effectiveness by exceeding any number of the protocol's other requirements. In particular, our country should take legislative steps to ensure that the protocol's Committee on Environmental Protection, inspection duties, and arbitration procedures achieve their full potential as compliance mechanisms.

More important than our specific recommendations is that the United States take implementation action soon. Domestic political considerations have stalled for too long the start of the new regime for comprehensive protection of the Antarctic environment. We call on the Clinton administration, whose platform stressed environmental protection, to act quickly and decisively to settle the debate, so that future generations of scientists and visitors may experience the pristine Antarctic conditions.