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Recommended Citation

Joyner, Christopher C. (1986) "Protection of the Antarctic Environment: Rethinking the Problems and Prospects," *Cornell International Law Journal*: Vol. 19: Iss. 2, Article 6.
Available at: <http://scholarship.law.cornell.edu/cilj/vol19/iss2/6>

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PROTECTION OF THE ANTARCTIC ENVIRONMENT: RETHINKING THE PROBLEMS AND PROSPECTS

*Christopher C. Joyner**

I. INTRODUCTION

The Antarctic is an area of extremes and superlatives. It is the highest, most remote, inaccessible, and barren region on earth; it is also the last continent that man has explored. Because of this delay, coupled with the harsh physical and climatic conditions, the Antarctic environment remains in relatively pristine condition. The need to minimize the environmental effects of research activities, logistics operations, and extended settlement on the continent has long been recognized as a major concern by the Antarctica Treaty Consultative Parties.¹ In recent years, however, enhanced prospects for resource-related activities such as harvesting of circumpolar fisheries, mineral exploration, and hydrocarbon development have posed potentially significant threats to the indigenous Antarctic environment.²

The purpose of this paper is to place these threats into clearer perspective, to assess their likelihood, and to survey the possible legal and political options available to prevent their occurrence. Toward this end, this study addresses three principal aspects of protecting the Antarctic environment. First, the multifaceted nature of man's effects on the Antarctic environment is examined with respect to activities on the continent and in the circumpolar seas.³ Second, the existing legal

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1. For a list of Antarctic Treaty Consultative Parties, see Barcelò, *Introduction*, 19 CORNELL INT'L L.J. 155 (1986). The Consultative Parties are the eighteen parties with decision-making power under the Antarctic Treaty. Antarctic Treaty, Dec. 1, 1959, 12 U.S.T. 794, T.I.A.S. No. 4780, 402 U.N.T.S. 71. The complete text of the Antarctic Treaty appears in the Appendix, *infra*. While the Antarctic Treaty does not expressly encompass preservation and protection of the Antarctic environment, Joyner, *The Southern Ocean and Marine Pollution: Problems and Prospects*, 17 CASE W. RES. J. INT'L L. 165, 181-82 (1985), the Consultative Parties have acted in this realm for over two decades. See *infra* notes 24 to 33 and accompanying text.

2. See generally, Joyner, *supra* note 1; J. BARNES, LET'S SAVE ANTARCTICA (1983).

3. See *infra* notes 9-22 and accompanying text.

regime for protecting the Antarctic environment is described.⁴ Third, the recent project undertaken by the French government to build an airstrip at Pointe Geologie is presented as a case study of environmental impacts.⁵ This contemporary example of development on the continent illustrates how the Antarctic environment may be detrimentally affected as well as a harbinger of activities to come for the region. Finally, some policy and institutional recommendations regarding protection of the Antarctic environment are offered.⁶ There is one fundamental objective of this study: to point out that man's activities can and do threaten the high productivity and ecology of the Southern Ocean, as well as the pristine, fragile ecosystem of the Antarctic's land and ice-covered areas. The governments carrying out activities in Antarctica must recognize the environmental cost of exploiting the region's natural resources. Only then will a political dialogue aimed at effective protection of the Antarctic environment be possible.

II. POLLUTION ACTIVITIES IN THE ANTARCTIC

A. GENERAL OBSERVATIONS

The Antarctic environment is dominated by physical conditions of extreme cold, high wind, and scant precipitation. Ninety-eight percent of the continent's 13.5 million square kilometers (5.7 million square miles) is covered by an ice mantle averaging more than 2,000 meters in thickness. Save for brief periods in the summer, the continent's interior remains locked in sub-freezing temperatures, which average between -30 and -65 degrees Centigrade. Precipitation is very low—only about seven centimeters annually. Hence, the Antarctic continent is a vast desert of ice, snow and subglacial barren rock.⁷

In sharp contrast to the harsh continent, the circumpolar seas of the Southern Ocean, which cover 36 million square kilometers (15.2 million square miles), are nutrient rich and highly productive. Tremendous stocks of plant and animal plankton abound to support sizable quantities of higher species, including whales, seals, squid, fish, penguins and various sea birds.⁸

4. See *infra* notes 23-45 and accompanying text.

5. See *infra* notes 46-53 and accompanying text.

6. See *infra* notes 54-56 and accompanying text.

7. See CENTRAL INTELLIGENCE AGENCY, POLAR REGIONS ATLAS 36-39 (1978).

8. See КНОХ, *The Living Resources of the Southern Ocean: A Scientific Overview*, in ANTARCTIC RESOURCES POLICY: SCIENTIFIC, LEGAL AND POLITICAL ISSUES 21 (F. Vicuña ed. 1983); U.S. DEP'T OF STATE, FINAL ENVIRONMENTAL IMPACT STATEMENT ON THE NEGOTIATION OF AN INTERNATIONAL REGIME FOR ANTARCTIC MINERAL RESOURCES 5-10 (1982); and B. BREWSTER, ANTARCTIC: WILDERNESS AT RISK 78-86 (1982).

For purposes of this analysis, "environmental impact" means those changes in the natural environment that result from human activity. In evaluating the impact of pollution on the environment, the relative resilience or sensitivity of disparate Antarctic ecosystems must be taken into account. For example, a pollutant spill on land is likely to remain confined and concentrated. At sea, the same spill will often disperse rapidly, though not without detectable local effects. In this regard, the marine environment is generally considered to be more stable because it possesses greater buffering capacity.

B. LAND-BASED IMPACTS OF POLLUTION IN ANTARCTICA

The Antarctic's frigid climate poses serious problems for waste disposal. Because the biodegradation process is severely inhibited, waste materials tend to remain in place. Some pollutants are already present in the Antarctic environment. Solid wastes, including discarded machinery, although aesthetically noxious, present few adverse biological consequences. The disposal of plastic wastes, however, is a more serious problem. Particles of plastic are increasingly present in the digestive tracts of indigenous sea birds.⁹ DDT has also been discovered in Antarctic wildlife and radioactive materials from atomic bomb tests have been found in Antarctic snow. Although these pollutants are at relatively low levels, their existence is noteworthy nonetheless.

Numerous other activities could threaten the Antarctic land environment absent adequate regulatory safeguards for preservation and conservation. They include the establishment of additional bases, stations or airstrips in the region, increases in personnel and increased transcontinental movement of personnel, major changes in fuel consumption and power generation, any operations which interfere with Specially Protected Areas¹⁰ or Sites of Special Scientific Interest,¹¹ and introduction of radionuclides into the environment when their recovery and removal cannot be reasonably ensured. In particular, mineral exploitation could exert severe impacts on the thermal balance of the Antarctic region. For example, litter and dust deposition from mining or drilling could cause rapid melting of the continent's snow fields.¹²

Technology used for waste disposal may create its own impacts upon the environment which may be greater than the wastes themselves. Because stations require re-supply and relief on a regular basis,

9. BENNINGHOFF & BONNER, MAN'S IMPACT ON THE ANTARCTIC ENVIRONMENT: A PROCEDURE FOR EVALUATING IMPACTS FROM SCIENTIFIC AND LOGISTIC ACTIVITIES 44 (1985).

10. See *infra* text accompanying note 32.

11. See *infra* text accompanying note 33.

12. BENNINGHOFF & BONNER, *supra* note 9, at 45.

supply ships could be used for transporting waste from the coastal stations. Such a solution, though impracticable, costly, and inconvenient, is justified by the need to preserve Antarctica's pristine environment. Removal also allows for recycling of the waste elsewhere.

While settlements, resident populations and tourists do not create additional adverse impacts, they do aggravate existing pressures on the environment. For example, settlements increase power consumption and exacerbate waste production. The process of settlement is in fact beginning on the fringes of the region. Chile has established a town, Villa Las Estrellas, on King George Island in the South Shetlands Group, as a colony to bolster legal grounds for its territorial claim in Antarctica.¹³ Chile is also attempting to attract tourists to the region. Construction of a supermarket and a 40-bed hotel is planned in hope of promoting visitors. There is already a Chilean bank in the town. Argentina has a counterpart colony at Esperanza.

Regardless of these outposts and their sponsor's assertions, article IV of the Antarctic Treaty¹⁴ provides that such settlements neither enhance nor exert any positive legal influence on the status of Chile's or Argentina's claims in the region. The major concern is not the posturing of these claimant states, but rather the adverse physical impact that these developments could have on the fragile Antarctic environment. Furthermore, such settlements set a dangerous precedent for mining towns on the Antarctic continent should mineral exploitation become a reality.

C. MARINE-BASED POLLUTION IN THE SOUTHERN OCEAN

The Southern Ocean ecosystem has many unique characteristics. The circumpolar waters adjacent to the continent are covered by pack ice year round, and the winter ice pack often extends seaward as far as 800-1600 kilometers. Where the cold Antarctic surface water meets and sinks beneath the less dense sub-Antarctic water, a polar frontal zone called the Antarctic Convergence is created.¹⁵ Along the Convergence there occurs steep temperature gradients, accompanied by an increase in nutrient salts. This condition serves as the source of the rich, productive marine ecosystem south of the Convergence. This ecosystem and the thriving krill population that it supports could be jeopardized by pollution activities in the Southern Ocean. The possible effects of pollution activities on the Antarctic marine ecosystem

13. *Tourism and Colonisation in Antarctica*, ECO, vol. XXX, No. 3 (Apr. 22-26, 1985) (Greenpeace newsletter), at 1.

14. Antarctic Treaty, Appendix, *infra*, art. 4(2). See Conforti, *Territorial Claims in Antarctica: A Modern Way to Deal With an Old Problem*, 19 CORNELL INT'L L.J. 249 (1986).

15. See Map, Appendix, *infra*.

must be considered from two perspectives: coastal zones and open ocean.

Coastal zones encompass (a) shoreline and spacially restricted regions; (b) enclosed water areas, such as bays or fjords, where free circulation of water is curtailed; and (c) the sea floor. These coastal zones are susceptible to serious localized impacts from pollution activities, similar to those repercussions affecting land areas. For instance, oil spills tend to accumulate on shorelines, land-based facilities release toxic waste to the sea near the shore and sewage is discharged into coastal waters. Inshore areas, particularly sheltered bays, possess neither great dispersion capability nor the size necessary to assimilate these types of pollutants quickly and effectively, resulting in long-term effects.

The Southern Ocean, in contrast to the coastal zones, is a rough, intensely dynamic system with constant rushing currents and churning water. This pervasive mixing permits these open waters to disperse and dissipate pollutants easily and effectively. Therefore, the stormy conditions of the Southern Ocean provide a buffering capacity that breaks up pollutants and prevents serious widespread environmental degradation.

Hydrocarbon development in Antarctica on a commercial scale would threaten the environment of both the coastal region and the open ocean. Offshore hydrocarbon exploitation and production involves drilling, extraction, storage, and transportation processes. Undoubtedly, support facilities would be required for the ventures, including construction of a port, refinery, housing, and other services for the personnel. All these activities would surely take additional tolls on the Antarctic environment.¹⁶

Perhaps the gravest threat to the ocean environment lies in the possibility of a well blow-out. According to a U.S. Department of State study, an oil blow-out could create "one of the most serious environmental hazards that could occur from mineral exploitation in Antarctica."¹⁷ The situation is further aggravated by the physical conditions of the potential drilling sites. The steep and narrow Antarctic continental shelf is covered by sea ice ten months of the year, making drilling difficult and hazardous. Moreover, while the potential for hydrocarbons is greatest over the ice shelves, the 25-meter thick sheets of ice can shift as much as one meter per day, thereby hampering recovery operations.¹⁸ Finally, the icebergs that

16. U.S. DEP'T OF STATE, *supra* note 8, at 6-18.

17. *Id.*, at 6-20.

18. *Petroleum and Mineral Resources of Antarctica*, 909 U.S. GEOLOGICAL SURVEY CIRCULAR 21-22 (J. Brehendt ed. 1983).

populate Antarctic waters pose especially intractable problems. Icebergs have been sighted that measure 70 by 100 kilometers in area—approximately the size of Connecticut or the country of Luxembourg. These massive chunks of floating ice are capable of scouring the ocean floor to depths of 400 meters, and they could easily demolish drilling platforms, or decapitate capped wells situated on the seabed.¹⁹

In addition, the severe storms, high winds, cold temperatures, drifting icebergs, freezing structures, and inevitable mental and physical stress imposed upon humans under such conditions enhance the probability of tanker accidents in the Southern Ocean area. It is currently impossible to predict the extent of environmental damage resulting from such an accident. Unknown variables include the speed and direction of local wind and ocean currents, the season of the year, the amount and kind of crude spilled, and the proximity of the accident to land.²⁰

Finally, little knowledge is available regarding the dissipation and degradation impacts of oil in Antarctic conditions. Crude oil is lethal to marine organisms such as plankton and nekton. In addition, marine ecosystems have required as long as ten years to fully recover from previous spills.²¹ There is little evidence to posit the precise effects of toxicity, decomposition, and persistence rates of hydrocarbons on the Antarctic; however, frigid conditions tend to produce thicker films of oil covering smaller areas on the ocean surface. This effect may appear better for the region as a whole, but the impact on the local area would be severe, and the biodegradation rate for polar marine ecosystems prolonged.²² Such prospects are bad news for the phytoplankton, zooplankton, and fish near a Southern Ocean spill.

III. LEGAL SOURCES OF PROTECTION FOR THE ANTARCTIC ENVIRONMENT

Protection of the Antarctic environment is at present being carried out in piece-meal fashion. Although there is obvious room for improvement, the progress should be viewed positively as a process in evolution. The critical question that emerges is whether this protection process is going to be too little, too late. Obviously, the answer lies as much in the efficacy of proposed environmental safeguards,

19. U.S. DEP'T OF STATE, *supra* note 8, at 6-19 to 6-20.

20. *Id.*, at 6-23.

21. See Joint Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP), *The Health of the Oceans*, 16 UNEP REGIONAL SEAS REP. & STUD. 44-48 (1982).

22. B. BREWSTER, *supra* note 8, at 91. Compare POSSIBLE ENVIRONMENTAL EFFECTS OF MINERAL EXPLORATION AND EXPLOITATION IN ANTARCTICA 17 (J. Zumberge ed. 1979).

such as those contained in the Antarctic Mineral Agreement under negotiation by the Consultative Parties,²³ as in existing controls.

A. EXISTING ENVIRONMENTAL AGREEMENTS

Several international instruments already contribute specifically toward protection of the Antarctic region's marine environment.²⁴ In addition, there are important antipollution provisions in the Convention produced by the Third United Nations Conference on the Law of the Sea.²⁵ The Convention, upon entry into force, would obligate states to adopt rules and regulations to prevent, reduce and control pollution of the marine environment, irrespective of whether the activities originated from sources on land, the seabed, vessels or the atmosphere.²⁶

The Antarctic Treaty System expressly contributes to safeguarding the resources and the environment of the Antarctic marine ecosystem. In 1972, the Convention on the Conservation of Antarctic Seals was promulgated.²⁷ Eight years later, the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR)²⁸ was also negotiated, and in 1982 it entered into force. Though strictly not an antipollution agreement, CCAMLR nevertheless aims at the "rational use" of Antarctic living marine resources, through the "ecosystemic approach."²⁹ Toward these conservation ends, pollution-causing activities are clearly discouraged and prohibited.³⁰

For the Antarctic continent, the Consultative Parties, in cooperation with the Scientific Committee on Antarctic Research, formulated

23. See Joyner, *supra* note 1, at 185-91.

24. See, e.g., International Convention for the Prevention of Pollution of the Sea by Oil, May 12, 1954, 12 U.S.T. 2989, T.I.A.S. No. 4900, 327 U.N.T.S. 3 (*entered into force* July 26, 1958); Convention on the High Seas, Apr. 29, 1958, arts. 24-25, 13 U.S.T. 2312, T.I.A.S. No. 5200, 450 U.N.T.S. 82 (*entered into force* Sept. 30, 1962); Convention on the Prevention of Marine Pollution by Dumping Wastes and Other Matter, Dec. 29, 1972, arts. 1, 3-4, 26 U.S.T. 2403, T.I.A.S. No. 8165 (*entered into force* Aug. 30, 1975); International Convention for the Prevention of Pollution from Ships of 1973, as modified by Protocol of 1978, Nov. 2, 1973 (*entered into force* Oct. 2, 1983) reprinted in 12 I.L.M. 1319 (1973).

25. United Nations Convention on the Law of the Sea (UNCLOS), opened for signature Dec. 10, 1982, arts. 194, 235, U.N. Doc. A/CONF. 62/122, reprinted in 21 I.L.M. 1261 (1982) [hereinafter cited as UNCLOS]; see generally Joyner, *Oceanic Pollution and the Southern Ocean: Rethinking the International Implications for Antarctica*, 24 NAT. RES. J. 1 (1984); see also Oxman, *Antarctica and the New Law of the Sea*, 19 CORNELL INT'L L.J. 211 (1986).

26. See UNCLOS, *supra* note 25, arts. 207-22.

27. Convention for the Conservation of Antarctic Seals, June 1, 1972, 27 U.S.T. 441, T.I.A.S. No. 8826 (*entered into force* Mar. 11, 1978) [hereinafter cited as Seals Convention].

28. Convention on the Conservation of Antarctic Marine Living Resources, May 20, 1980, 80 Stat. 271, T.I.A.S. No. 10240 (*entered into force* Apr. 7, 1982) [hereinafter cited as CCAMLR].

29. *Id.*, art. 2.

30. *Id.* See Frank, *The Convention on the Conservation of Antarctic Marine Living Resources*, 13 OCEAN DEV. & INT'L L. 291, 303-05 (1983).

proposals and recommended guidelines concerning certain activities having environmental implications. These include, *inter alia*, guidelines for the conduct of expeditions, construction of bases, waste disposal, and protection of species. These principally constitute a voluntary code of conduct for the Consultative Parties.

The most comprehensive instrument for wildlife conservation on the continent is the 1964 Agreed Measures for the Conservation of Antarctic Flora and Fauna.³¹ This agreement aims to prevent any animal from being harmed, captured or molested, with specific protection accorded to certain species. Toward these ends, Specially Protected Areas are authorized and since 1964, at least fifteen of them have been designated.³² In addition, eight Sites of Special Scientific Interest (SSSI) have been declared outside the ambit of the Agreed Measures, albeit with closely related conservation intentions.³³ The SSSI areas were created to prevent interference with scientific research, as well as to protect local birds and mammals.

B. PROPOSED MINERALS REGIME

Notwithstanding these wide-ranging antipollution and conservation provisions, adequate protection of Antarctica's terrestrial environment could be jeopardized by commercial exploitation of the continent under the auspices of an Antarctic Minerals Regime.

As of Autumn 1985, no complete draft treaty text for an Antarctic minerals regime has been publicly or officially released by any of the negotiating governments. However, a copy of the working draft prepared by Ambassador Chris Beeby ("the Beeby Draft") of New Zealand was unofficially released and published in 1983 by Greenpeace International.³⁴

Article III of the Beeby Draft enumerates environmental principles that would guide the regime. The Draft states that "Antarctic mineral activities should not result in significant or irreversible changes in the distribution, abundance or productivity of living resources . . . unique biological communities or sites of special biological or scientific importance should receive special protection . . . and

31. Agreed Measures for the Conservation of Antarctic Flora and Fauna, June 2-13, 1964, 17 U.S.T. 996, 998, T.I.A.S. No. 6058, *modified in* 24 U.S.T. 1802, T.I.A.S. No. 7692 (1973). For discussion, see F.M. AUBURN, *ANTARCTIC LAW AND POLITICS* 270-73 (1982).

32. *See id.*, at 273-77.

33. *Id.*

34. Beeby Draft: Antarctic Mineral Resource Regime, Jan. 28, 1983, *revised* Mar. 29, 1984 (on file at the offices of the *Cornell International Law Journal*) [hereinafter cited as Beeby Draft]. *See also* *The Antarctica Minerals Regime: The Beeby Draft*, reprinted in Greenpeace Int'l, *The Future of the Antarctic: Background for a U.N. Debate* (Appendix 8).

environmental decisions should be based on adequate data.”³⁵ Article XIII of the Beeby Draft contains the proposal for an Antarctic Minerals Resources Commission to fulfill these principles. Among the functions of the Commission are the needs:

to determine . . . whether proposed Antarctic mineral activities pose an unacceptable risk to the Antarctic environment; . . . to determine those areas where for historic, ecological, environmental or scientific reasons Antarctic mineral resource activities should not be permitted . . . and . . . to formulate, adopt and revise measures . . . relating to the protection of the Antarctic environment and the promotion of safe and effective exploration and development techniques.³⁶

The Beeby Draft also proposes creation of a Scientific, Technical and Environmental Advisory Committee,³⁷ which ostensibly could serve as a forum for exchange and appraisal of the information required to evaluate and monitor potential environmental impacts of mineral activities on the continent. It must be recognized, however, that the Committee would have only advisory power and not the authority to articulate standards, formulate policy, or enforce environmental regulations.³⁸

In May, 1984, at the Tokyo Minerals Meeting, a revised version of the Beeby Draft was introduced.³⁹ Known as “Son of Beeby” or “Beeby II,” this version improved upon its predecessor in environmental matters in at least four respects. First, “Beeby II” added an inspection provision to cover stations, installations, and equipment relating to mineral activities.⁴⁰ Such a provision should enhance efforts to protect the integrity of established ecostandards. Second, a new provision would permit the Commission to create certain “protected areas,” where minerals activities would be prohibited in any area protected by the Antarctic Treaty,⁴¹ CCAMLR,⁴² the Seals Convention,⁴³ or any other specially designated area. A third amendment would require that mineral developmental activities respect and safeguard other activities in the region, including scientific research, conservation and rational use of marine life, preservation of historic monuments and freedom of navigation.⁴⁴ Finally, a new article would require the Scientific, Technical and Environmental Advisory Committee to present notice of matters being considered and to review recommendations

35. Beeby Draft, *supra* note 34, art. III.

36. *Id.*, art. XIII.

37. *Id.*, art. XVI.

38. *Id.*

39. See also Beeby Draft, *supra* note 34. *The Antarctic Minerals Regime: Beeby Draft II*, reprinted in Greenpeace Int'l, *The Future of the Antarctic: Background for a 2nd U.N. Debate* (Appendix 8) (Oct. 22, 1984) [hereinafter cited as Beeby Draft II].

40. *Id.*, art. VIII.

41. Antarctic Treaty, Appendix, *infra*, art. 9(1).

42. CCAMLR, *supra* note 28.

43. Seals Convention, *supra* note 27.

44. Beeby Draft II, *supra* note 39, art. VIII.

and opinions submitted from concerned international organizations.⁴⁵

The most recent Beeby Draft still contains problems for environmentalists. For example, regulatory committees comprised of claimant and non-claimant states are empowered to oversee exploration and development of mineral resources. These committees invite political bargaining and trade-offs, conceivably at the expense of an ecosystemic approach to the licensing application process. Furthermore, by classifying the participants in the Regulatory Committees as claimant and non-claimant states, the Draft tacitly or implicitly recognizes the claimant states' territorial claims. In any event, this classification scheme of distinguishing claimant states from the other parties to the agreement is an approach which had previously not been permitted. Furthermore, the key agency in the proposed regime, the Commission, is relegated to a secondary level in decision-making for the licensing of applicants. Under Beeby II, it is the Regulatory Committee, rather than the Minerals Commission, which would decide whether or not a license should be granted. The Minerals Commission role of setting and enforcing environmental standards is seriously undermined by the Regulatory Committee. The Regulatory Committee's proposed management of mining areas may provide a simple and convenient solution for political accommodation, but it neither necessarily strengthens environmental standards nor contributes to stricter, more ecologically conscious safeguards in licensing qualifications.

IV. THE FRENCH AIRSTRIP: A CASE STUDY OF ENVIRONMENTAL IMPACTS

The Antarctic Treaty System, as it presently stands, lacks a centralized review mechanism or regulatory authority to oversee national activities affecting the Antarctic environment.⁴⁶ The recent experience of France in constructing an airstrip in the Pointe Geologie area of their claimed sector clearly underscores the problematic nature of the situation.

The Pointe Geologie region is one of Antarctica's richest in fauna. It is home to the Emperor penguin, one of the rarest penguin species. In addition, eight of the ten species of birds found on the continent populate Pointe Geologie as well as numerous Weddell, Leopard, and Crabeater seals. Consequently, the region is important for researchers and scientists who study this wildlife, and the region

45. *Id.*, art. XVI(7).

46. Control of activities is particularly problematic in the claimed sectors of Argentina, Australia, Chile, France, New Zealand, Norway, and the United Kingdom. F.M. AUBURN, *supra* note 31, at 5-84 (1982); see Conforti, *supra* note 14, at 249.

has been recommended by scientists as a priority site for monitoring changes in the Southern Ocean's ecosystem.

Work on the Pointe Geologie airfield began in early 1983. The construction strategy called for the removal of 450,000 cubic meters of earth in the initial phase of the plan. Additionally, two adjacent islands were to be leveled, with the rubble being used to link them together with five larger islands. The result would have been an 1100 meter hard rock strip which could serve as an aircraft runway. The noise of planes, in particular, would harm all birds in the area. Thus, environmental groups and scientists who felt the airfield would adversely affect the fauna in the Pointe Geologie area, particularly the Emperor penguins, opposed its construction.⁴⁷

Although French law requires an environmental impact assessment prior to initiating any project such as the Pointe Geologie airstrip,⁴⁸ none was performed until after construction had begun. Once published, the report was widely criticized as inadequate. Because of the deficient assessment, in March, 1983, the French National Academy of Sciences unanimously passed a resolution calling upon the government to conduct an in-depth study of the project's environmental repercussions.⁴⁹ Although a revised impact statement was released in late 1984, it failed to examine alternatives to constructing the airstrip. During the past year, reports by concerned environmental groups such as Greenpeace and the Federation Francaise des Societes de Protection de la Nature indicated that some work, albeit not substantial, may have been done on the project. The French government denies any progress.⁵⁰

The French airstrip episode is especially disturbing for two reasons. First, the French appear to have breached the Antarctic Treaty System's environmental protection mandate.⁵¹ In the process of early construction, some penguins reportedly were killed when land areas were dynamited to level the islets and create archipelagic fill. Furthermore, several eggs were crushed, and a number of birds were removed by truck from their nesting sites. If the reports are accurate, these actions clearly violate article six of the Agreed Measures for the Conservation of Antarctic Fauna and Flora: "Each Participating Government shall prohibit within the Treaty Area [defined as an area south of

47. See *Action Now on the French Airstrip*, ECO, vol. XXX, No. 3 (Apr. 22-26, 1985) (Greenpeace newsletter); Antarctic and Southern Ocean Coalition (ASOC), *Background Paper on the French Airfield at Pointe Geologie*, Antarctica, (Mar. 1, 1985) (mimeographed).

48. Environmental Law of July 10, 1976. 1976 J.O. 4203 (France).

49. ASOC, *Background Paper*, *supra* note 47, at 3-4.

50. *Id.*

51. See *supra* notes 24-33 and accompanying text.

60 degrees South Latitude, including all ice shelves] the killing, wounding, capturing or molesting of any native mammal or native bird, or any attempt at any such act, except in accordance with a permit."⁵² Second, based upon public announcements and actions, the responses of the Antarctic Treaty Consultative Parties have been disappointing. Most governments are either unconcerned with France's violation of the Treaty's environmental provisions or feel that opposition to it may not be worth antagonizing France. While New Zealand and Australia made private overtures to France regarding the issue, the other fifteen Consultative Parties have opted to voice no official public opposition. This rather apathetic reaction to the French airstrip case has prompted one concerned group, the Antarctic and Southern Ocean Coalition (ASOC), to reach the following disturbing conclusion about the Antarctic Treaty Party governments:

The handling of this case raises a question of credibility for the Antarctic Treaty System. If member governments fail to take any collective action—even to investigate allegations of a breach—the public can have little confidence in the commitments of governments pursuant to the Antarctic Treaty and related instruments.⁵³

Though these sentiments may be harsh or rash, they do suggest an important point. Namely, what environmental attitudes would the Consultative Parties assume if they acquired substantial political or economic stakes in the mineral development of the Antarctic continent? Opposition to the Pointe Geologie airstrip on environmental grounds carries relatively few political costs for the Consultative Parties, yet they are nonetheless unwilling to oppose it. What will happen to environmental concerns when opportunities for potentially large economic gains are made plainly available for governments willing to exploit the Antarctic environment? The answer is self-evident and leaves but scant room for optimism among concerned conservationists.

V. RECOMMENDATIONS

The French airstrip case demonstrates the ineffectiveness of existing measures to protect the Antarctic environment. A comprehensive system for ensuring compliance with conservation measures will be essential. In this vein, a new institution seems appropriate. What is proposed here is the creation of an independent institution functioning within the Antarctic Treaty System specifically to protect the Antarctic environment—Antarctic Environmental Protection Agency (AEPA). AEPA would be responsible for comprehensive environmental impact assessments for all projects in the region poten-

52. Agreed Measures, *supra* note 31, art. VI.

53. ASOC, *Background Paper*, *supra* note 47, at 8.

tially having adverse effects upon the environment. To carry out this responsibility, the AEPA would investigate and assess proposed activities within the Treaty area, including scientific research, expeditions, logistic support facilities, bases, and minerals development. The AEPA would also prepare environmental regulations for such proposed activities. Once the activity was underway, the AEPA would have the power to investigate and monitor operations and report on the extent of compliance with the established rules and regulations to the appropriate segment of the Antarctic Treaty System, e.g., to the CCAMLR Commission or a prospective Minerals Commission.⁵⁴

The organizational structure for an Antarctic EPA could be drawn from the experience of both Treaty members and other countries, given that more than seventy states have created EPAs within their governments since 1970. It would seem appropriate, however, to include in an Antarctic EPA special divisions to oversee particular aspects of the pollution threat to the region. For instance, special agencies should supervise water quality, solid waste disposal, air quality conditions, and toxic substances. An administrative branch for conducting antipollution research and abatement development would also seem useful. In addition, a separate bureau would be desirable to enforce set standards and monitor state compliance with them. The AEPA would be given a mandate to preserve the Antarctic region for the benefit of the entire international community, and would be staffed by full-time scientists and professionals.

In sum, an AEPA would serve as a valuable information conduit for the public and interested organizations, as well as a forum to raise and answer questions regarding protection, conservation and preservation of the environment in the Antarctic region.⁵⁵ The critical problem would be to prevent the AEPA from becoming overly politicized. Otherwise, the Antarctic environment would be jeopardized by compromises for the sake of national, rather than international interests. This possibility would severely undercut the gains already made in Antarctic regional ecological protection and resource conservation.

On the Antarctic continent, there is need for circumspection and caution in formulating a minerals regime that could sacrifice the environment for the sake of large scale exploitation of resources. In this regard, a long-term moratorium on all minerals activities would seem an appropriate interim strategy for the Consultative Parties. It would be unwise to fix an expiration date for the moratorium because such a date might invite an eventual "land grab" or "resources rush" to the

54. See *Antarctic EPA Debated*, ECO, May 22-31, 1984, at 1.

55. See generally Barnes, *Environmental Protection and the Future of the Antarctic—New Approaches and Perspectives Are Necessary* (Mar. 1, 1985) (mimeographed).

continent. Rather, an open-ended moratorium containing a provision for withdrawal after a specified period, perhaps five years after making the pronouncement, would be preferable. This would allow for more flexibility and opportunity for adjustment as the situation requires. Even so, if only one principal actor did exercise its notification to withdraw, political reverberations conceivably could be sent throughout the entire Antarctic Treaty System. Aside from this political risk, a moratorium would permit the luxury of sufficient time to consider carefully the possible adverse costs of on-shore mineral mining and offshore hydrocarbon drilling. More importantly, these costs should be carefully compared to the benefits of maintaining the Antarctic in perpetuity as a scientific preserve and wildlife sanctuary.⁵⁶

VI. CONCLUSION

In appraising man's activities in the Antarctic region, an important lesson can be learned from the paraphrased maxim, "for every action, there is some reaction." For every gain made in the Antarctic for the sake of human action, there comes some loss in the quality of the natural environment. Consequently, there is a real need for close collaboration among concerned scientists studying ecosystems, the technical and economic experts assessing harvesting capacities and environmental thresholds and government officials developing policies and setting regulations.

Given the profound harshness of the climate, the tremendous economic costs involved, and the current availability of land-based minerals and hydrocarbons, it seems unlikely that any serious effort will be made to exploit the region for minerals and hydrocarbons within the next two or three decades. Thereafter, alternative technologies such as coal gasification, liquefaction and shale oil processes, may be more economically attractive and less risky for energy corporations than engaging in frigid Antarctic ventures. If that is indeed the case, so much the better for Antarctica as a natural environmental preserve.

The critical factor, however, in promoting effective environmental protection in the Antarctic rests in the political will of those governments carrying out activities in the region. If they are genuinely willing to exert the necessary political force and commitment for fashioning a legal regime capable of preserving the Antarctic environment, then such an objective can be successfully obtained. If on the other hand these governments lack that will, or give undue preference to exploitative practices which enhance short-term national economic gain at the expense of long-term environmental conditions in the

56. See Clark, *Antarctica: A Wilderness Compromised*, 11 INT'L STUD. NOTES 29-33 (1985).

region, then it is only a matter of time before the Antarctic falls victim to man's self-serving rapacity and myopic avarice. Such a course of events would indeed be regrettable and would stand as a tragic commentary on the perverted "progress" of man's dominion over nature.

