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# Oceanic Pollution and The Southern Ocean: Rethinking the International Legal Implications for Antarctica

## INTRODUCTION

A popular and recurrent theme during the last decade has been that the international community seems on the verge of impending natural resource scarcities.<sup>1</sup> As one might expect, the stark portents of this profound economic transition have fostered serious reconsideration by industrialists and governmental policymakers alike about the possible opportunities in exploring and exploiting living and non-living natural resources in untapped regions. Perhaps not surprisingly, foremost among the regions speculated about as being lucrative for commercial development are the world's oceans and the pristine continent of Antarctica.

At the same time, however, a growing sense of competing nationalism pervades international relations. As cogently expressed by one commentator,

[T]here is increasing international pressure to exploit their [i.e., the oceans' and Antarctica's] resources, and also to change their legal status, in response to a newly articulated nationalism directed at areas of the globe traditionally considered to be open to use by all nations.<sup>2</sup>

Yet, if past is prologue, these new nationalistic pressures, catalytically propelled by the twin aspirations of industrial development and societal modernization, strongly suggest a profound realization: inextricably linked to the economic development process are the concomitant costs of non-renewable resource consumption, attendant population growth, and widespread environmental degradation. In the absence of viable international legal regimes for supervising and regulating natural resource development

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1. See, e.g., L. BROWN, *THE TWENTY NINTH DAY* (1978); H. DALY, *STEADY-STATE ECONOMICS* (1977); D. MEADOWS, *THE LIMITS TO GROWTH* (1972); W. OPHULS, *ECOLOGICAL AND THE POLITICS OF SCARCITY* (1977); and B. WARD & R. DUBOS, *ONLY ONE EARTH* (1972).

2. Charney, *Introduction* in *THE NEW NATIONALISM AND THE USE OF COMMON SPACES* (J. Charney, ed. 1982). [Hereinafter cited as Charney].

in the oceans and Antarctica, these costs conceivably eventually could negate for all the benefits gained by some.<sup>3</sup>

Environmental pollution and resource depletion both are direct manifestations of growth conflicts in the planet's finite ecosystem. Accordingly, international law must operate efficaciously and expeditiously to prevent further degradation of the earth's common spaces, especially the oceans and Antarctica. Accepting this premise, the purpose of this article is to examine the political, economic, and legal nuances associated with pollution abatement for the marine environment and resource conservation/contamination prevention for the Antarctic ecosystem.

From this analysis and assessment, two chief aims are intended: first, to make more clearly appreciated the geopolitical problems implicit in global marine pollution and Antarctic resource exploitation, and second, to place into bolder perspective the political challenges which international law must confront if it is to operate more effectively in the coming years to safeguard the earth's common space regions.

#### THE MARINE ENVIRONMENT: RESTORATION, LIMITATION AND PREVENTION

##### *General Observations*

In a real sense, the ocean environment constitutes a shared public good or common resource. It does not belong to any person or State; it is immune legally from private appropriation; and, it is available for use to all peoples. In the spirit of this revelation, nearly four centuries ago, the eminent Dutch jurist, Hugo Grotius, posited that the oceans comprised the "Outer Sea." They were in his words,

that expanse of water which antiquity describes as the immense, the infinite, bounded only by the heavens, parent of all things; the ocean which the ancients believed was perpetually supplied with water not only by fountains, rivers, and seas, but by the clouds, and by the very stars of heaven themselves; the ocean which, although, surrounding this earth, the home of the human race, with the ebb and flow of its tides, can be neither seized nor inclosed; nay, which rather possesses the earth than is by it possessed.<sup>4</sup>

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3. Colin W. Clark expressed this point well nearly a decade ago when he observed,

Indeed, man's increasing capacity to seriously deplete the world's natural resources appears to be reaching a critical stage; if this is not imminent for the nonrenewable resources, it certainly appears so for many of the renewable ones. The problems of environmental pollution that loom so large today, for example, often result from a process of overexploitation of the regenerative capacity of our atmospheric and water resources.

Clark, *The Economics of Overexploitation*, 181 *SCIENCE* 630 (1974) (Footnotes omitted).

4. H. GROTIUS, *MARE LIBERUM* 37 (R. Magoffin trans. 1916).

Today, the antithesis of Grotius' observations is true. Regrettably, since 1608, global interdependence, increased technological sophistication, and the multifaceted dynamics of pervasive industrialization have rendered the oceans conspicuously finite. The oceans have been transformed from an aquatic meadow in equilibrium into a modern day "tragedy of the commons."<sup>5</sup> Creeping nationalization over the oceans has spawned more extensive and intensive demands upon their environmental capacity.<sup>6</sup> Whereas man once served the oceans, today they serve him.

Paradoxically, the highly vaunted Grotian doctrine of the freedom of the seas<sup>7</sup> must in large measure bear the onus of responsibility for the marine environment's progressive denigration. Literally exercising freedom of seas essentially has been tantamount to precluding any legal conditions for rationally exploiting the oceans' bounty. That is, while admittedly freedom of the seas preserves the common property distinction of the ocean, it has been sinisterly perverted into breeding confusion, waste, and conflict over appropriating and protecting marine resources. Hence, not surprisingly, national governments increasingly have turned to using the oceans as natural sinks for society's wastes. Pesticide runoffs,<sup>8</sup> industrial effluents,<sup>9</sup> sewage outflows,<sup>10</sup> oil discharge and spillage from routine maritime transport,<sup>11</sup> deliberate dumping of radioactive<sup>12</sup> and other

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5. The "tragedy of the commons" as a concept was initially articulated by William Forster Lloyd in 1883, and referred to the common use by herders of a village green. That is, a common grazing area benefitted all so long as the number of animals grazing did not exceed the land's carrying capacity. Though a herdsman conceivably realized that it would be in everyone's interest for the number of animals using the green to remain limited, there was no special incentive promoting restriction of his animals. If he were to limit his animals, there was no assurance others would not increase their herds at his expense. Thus, the sum of individual shepherds' decisions to maximize their personal gains by increasing their own herd size would eventuate tragically into the ecological destruction of the common green. See Lloyd, *Two Lectures on the Checks to Population* (1833), reprinted in *MANAGING THE COMMONS* 8 (G. Hardin & J. Baden eds. 1977). For contemporary applications of this notion, see Hardin, *The Tragedy of the Commons*, 162 *SCIENCE* 1243 and OPHULS, *supra* note 1, at 145-55.

6. See Teclaff, *International Law and the Protection of the Oceans from Pollution*, 40 *FORDHAM L. R.* 529 (1972).

7. "Freedom of the Seas" as a legal principle simply affirms that the high seas are common property and open to the use of all States. For general discussion of the concept, see M. WHITEMAN, 4 *DIGEST OF INTERNATIONAL LAW* 501-42 (1965) and Allen, *Freedom of the Sea*, 60 *AM. J. INT'L L.* 814 (1966).

8. See generally, R. CARSON, *SILENT SPRING* (1962); K. MELLANBY, *PESTICIDES AND POLLUTION*; and F. GRAHAM, JR., *SINCE SILENT SPRING* (1970).

9. S. GERLACH, *MARINE POLLUTION: DIAGNOSIS AND THERAPY* 37-52 (1981).

10. Officer & Ryther, *Secondary Sewage Treatment versus Ocean Outfalls: An Assessment*, 197 *SCIENCE* 1056-60 (1977).

11. See generally, J. POTTER, *DISASTER BY OIL* (1973) and S. GERLACH, *supra* note 9, at 53-70.

12. Between 1946 and 1970, the Atomic Energy Commission authorized dumping 14,000 Curies (Ci) into the Pacific Ocean and 80,000 Ci into the Atlantic. Between 1951 and 1966, Great Britain dumped 45,000 Ci of radioactive waste into the Atlantic. S. GERLACH, *supra* note 9, at 112.

toxic wastes,<sup>13</sup> and atmospheric pollution fallout<sup>14</sup> are patent evidence of man's gross intrusion into the ecological sanctity of Grotius' "Outer Sea."

Humans must realize, therefore, that the earth is a closed system, a global biosphere in essence, to appreciate the need for effecting considerate management and legal regulation over the oceans' use or, stated more appropriately, their ongoing abuse. A constant, reciprocal interrelationship transpires between human activities on land, in the air, and in the water. Respective to this, the oceans comprise 71 percent of the planet's surface area.<sup>15</sup> Consequently their commercial utility becomes readily apparent: the oceans furnish food, mineral and energy resources for man's consumption; they provide integral conduits for transnational transportation, commerce, and communication; they are a convenient depository for wastes; they proffer renewable water supplies (through desalinization processes); and, certainly not least, the oceans serve as the habitat for those photoplankton which refurbish three-fourths of the earth's oxygen supply.<sup>16</sup> Notwithstanding the obvious intrinsic value of these opportunities, within recent years economic and political institutions spawned by industrialization have impacted deleteriously upon the oceans' ecological salubrity. Done selfishly and myopically, this degradation can be attributed principally to pronounced pollution of the marine environment.

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13. Sebastian Gerlach, professor of Benthos Ecology at Kiel University, recently assessed the gravity of toxic waste dumping on the high seas:

Oil spills irritate the tourist at the shore and send the bird ecologist to the barricades. Unnoticed by the public, however, thousands of barrels with residue of chemical production in various industrial nations have been dumped in the ocean. In 1968, 14,000 t [tons] of waste matter from pesticide plants on the Mississippi were dumped into the Gulf of Mexico every month. This figure is just a fraction of the estimated total of 330,000 t of pesticide waste matter that was dumped by the U.S.A. in various ocean areas, together with 560,000 t of waste matter from oil refineries, 140,000 t from the paper industry, 940,000 t of various waste matter and 2.7 million t of waste acids (Fig. 35). Approximately 40 t of chlorinated hydrocarbons in this period were dumped in the Atlantic every month by the Federal Republic of Germany. In the period from 1963 to 1969, 38,000 barrels containing cyanide compounds, arsenic, and other poisons from Great Britain were dumped. Containers repeatedly turned up in fishermen's nets, not only on the high seas but also in Dutch and German coastal water areas. This gives rise to the speculation that some boat captains made quick money by throwing the drums containing poison overboard shortly after leaving the harbor and saved themselves the trip out to sea.

S. GERLACH, *supra* note 9, at 53.

14. See Atlas & Giam, *Global Transport of Organic Pollutants: Ambient Concentrations in the Remote Marine Atmosphere*, 211 SCIENCE 163-65 (1981) and Williston, *Mercury in the Atmosphere*, 73 J. GEOPHY. RES. 7051 (1968).

15. Of the earth's surface, some 361 million sq. km., or 70.8 percent, is covered by ocean water. W. ANIKOUCHINE & R. STERNBERG, *THE WORLD OCEAN* 10 (1973).

16. See generally, W. MARX, *THE FRAIL OCEAN* (1967); *The Ocean*, 221 SCIENTIFIC AM. (July 1969); D. ROSS, *OPPORTUNITIES AND USES OF THE OCEAN* (1980); and E. WENK, JR., *THE POLITICS OF THE OCEAN* (1972).

### Vessel-Source Pollution

The radical rise in shipping volume ploughing the oceans since World War II<sup>17</sup> has carried with it an aggravated increase in vessel-source marine pollution. As one expert stated, "As more and larger ships carry greater amounts of hazardous cargo, the potential and consequences of accidents have escalated accordingly."<sup>18</sup> Perhaps most dramatic manifestations of this liability were several sensational tanker accidents, in particular the *Torrey Canyon* in 1967,<sup>19</sup> the *Argo Merchant* in 1976,<sup>20</sup> the *Amoco Cadiz* in 1978,<sup>21</sup> and most recently, the Spanish tanker *Castillo de Bellvar* in August 1983.<sup>22</sup> Yet, intentional dumping and operational discharge also have contributed significantly to the problem.<sup>23</sup>

17. In 1960, approximately 36,000 ships weighing at least 100 gross registered tons (grt) and totaling 125 million grt were available for transoceanic commerce. By the late 1970s, the world's fleet had increased to 70,000, with a combined tonnage of 400 million grt. Regarding tankers, in 1954, the world fleet consisted of 3,500 vessels; by 1977 the number had increased to 7,000, and their aggregate dead weight tons in the same period had grown from 37 million dwt to an astounding 340 million dwt. IMCO, THE INTERNATIONAL CONFERENCE ON TANKER SAFETY AND POLLUTION PREVENTION 2-4 (1978), cited in Schneider, *Prevention of Pollution from Vessels or Don't Give Up the Ship* in Charney, *supra* note 2, at 7, n. 1-5. See Comment, *Post Torrey Canyon: Toward a New Solution to the Problem of Traumatic Oil Spills* 2 CONN L. REV. 632 (1970); McManus & Schneider, *Shipwrecks, Pollution & the Law of the Sea*, NATIONAL PARKS & CONSERVATION MAGAZINE 10 (June 1977); and *Tanker Pollution: An Ocean World Special*, OCEAN REPORTER (April-May 1978).

18. Schneider, *supra* note 17, at 8.

19. *Huge Tanker in Danger on Rocks Off Britain*, N.Y. Times, Mar. 19, 1967, at 79, Col. 6.; Brown, *The Lessons of the Torrey Canyon*, 21 CURRENT LEGAL PROBLEMS 113 (1968); Utton, *Protective Measures and the Torrey Canyon*, 9 BRIT. COLUM. INDUS. & COM. L. REV. 613 (1968).

20. Kifner, *Split Tanker Leaves 60-Mile Oil Slick Off Nantucket*, N.Y. Times, Dec. 22, 1976, at 1, col. 3.

21. Lewis, *Oil From Wrecked Tanker Pollutes 70-Mile Stretch of Brittany's Coast*, N.Y. Times, Mar. 19, 1978, at 1, col. 3. The *Amoco Cadiz* disaster resulted in the spillage of 220,000 metric tons of crude oil and 3,600 tons of bunker fuel off the Brittany Coast of France, and led to some \$2 billion in lawsuit claims lodged against Standard Oil of Indiana. Kiechel, *The Admiralty Case of the Century*, 99 FORTUNE 79 (Apr. 23, 1979). In metric tons (mt), other substantial oil spills between 1970 and 1980 involving tankers include the following vessels: *Wafra* (1971), 60,000 mt; *Sea Star* (1972), 60,000 mt; *Metula* (1974), 50,000 mt; *British Ambassador* (1975), 45,000 mt; *Argo Merchant* (1976), 29,000 mt; *Caribbean Sea* (1977), 32,000 mt; and *Adros Potria* (1978), 45,000 mt. Vielvoye, *Spills Worsen Problems in Global Oil Movements*, 77 OIL & GAS J. 25,36 (June 25, 1979) (Chart). From 1962 through 1978, fifty-eight major spills from tankers were recorded, with twenty-nine of those occurring between 1975-1978. *Id.* at 36 (Chart). For additional data on pre-1975 oil spills, see generally SENATE COMM. ON COMMERCE, SCIENCE AND TRANSPORTATION, AN ANALYSIS OF OIL TANKER CASUALTIES: 1969-74, 95th Cong., 2d Sess. (1978).

22. *Oil Tanker Breaks Apart Off S. Africa*, Washington Post, Aug. 7, 1983, at A17, col. 1. The Spanish supertanker carrying 252,000 tons of crude broke up off the Atlantic coast of South Africa, reportedly leaked 40,000 tons of crude, a "major threat" to the coastal region. *Id.*

23. The precise amount of petroleum annually discharged is unknown, but it is believed to be significant. The National Academy of Science has estimated that 34.9 percent of all petroleum hydrocarbons introduced into the oceans come from transportation sources. NATIONAL ACADEMY OF SCIENCES, PETROLEUM IN THE MARINE ENVIRONMENT 6 (1975)(Chart).

To curtail and to control more effectively vessel-source pollution, States have worked together on a number of policymaking levels to develop appropriate international law. Obviously, the broadest framework utilized to shape standards for preventing vessel-source pollution has been shaped by the Third United Nations Conference on the Law of the Sea (UNCLOS III).<sup>24</sup> Indeed, Part XII, a substantial portion of the proposed 1982 Draft Convention on the Law of the Sea,<sup>25</sup> contains measures intended to deter pollution of the marine environment.<sup>26</sup> These measures are specifically

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24. UNCLOS III has been an ongoing negotiation process since late 1973. For representative accounts of the protracted proceedings, the contentious issues involved, and the attitudes of participant diplomats, see the following: Stevenson & Oxman, *The Preparation for the Law of the Sea Conference*, 68 AM. J. INT'L L. 1 (1974); Stevenson & Oxman, *The Third United Nations Conference on the Law of the Sea: The 1974 Caracas Session*, 69 AM. J. INT'L L. (1975); Stevenson & Oxman, *The 1975 Geneva Session*, 69 AM. J. INT'L L. (1975); Oxman, *The Third United Nations Conference on the Law of the Sea: The 1976 New York Session*, 71 AM. J. INT'L L. 247 (1977); Oxman, *The 1977 New York Sessions*, 72 AM. J. INT'L L. 1 (1979); Oxman, *The Eighth Session* (1979), 74 AM. J. INT'L L. 1 (1980); Oxman, *The Ninth Session* (1980), 75 AM. J. INT'L L. 211 (1981); Oxman, *The Third United Nations Conference on the Law of the Sea: The Tenth Session* (1981), 76 AM. J. INT'L L. 1 (1982).

25. Convention on the Law of the Sea and Resolutions I-IV (Working Paper 1, June 1982), U.N. Doc. A/CONF. 61/122 (Oct. 7, 1982), reprinted in 21 INT'L L. MATERIALS 1261 (1982). [Hereinafter cited as UNCLOS III Convention (1982)]. For earlier versions of the draft treaty's text, compare Draft Convention on the Law of the Sea (Informal Text), U.N. Doc. A/CONF. 62/W.P. 10 (1978); Revised Single Negotiating Text, 5 UNCLOS III Off. Rec. 125, U.N. Doc. A/CONF. 62/W.P. 8 Rev. 1 (1976); and Informal Single Negotiating Text, 4 UNCLOS III Off. Rec. 137, U.N. Doc. A/CONF. 62/W.P. 8 (1975).

26. UNCLOS III Convention (1982), *supra* note 25, at art. 194. In full, Article 194 would mandate that:

1. States shall take, individually or jointly as appropriate, all measures consistent with this Convention that are necessary to prevent, reduce and control pollution of the marine environment from any source, using for this purpose the best practicable means at their disposal and in accordance with their capabilities, and they shall endeavour to harmonize their policies in this connection.

2. States shall take all measures necessary to ensure that activities under their jurisdiction or control are so conducted as not to cause damage by pollution to other States and their environment, and that pollution arising from incidents or activities under their jurisdiction or control does not spread beyond the areas where they exercise sovereign rights in accordance with this Convention.

3. The measures taken pursuant to this Part shall deal with all sources of pollution of the marine environment. These measures shall include, *inter alia*, those designed to minimize to the fullest possible extent:

(a) the release of toxic, harmful, or noxious substances, especially those which are persistent, from land-based sources, from or through the atmosphere or by dumping;

(b) pollution from vessels, in particular measures for preventing accidents by dealing with emergencies, ensuring the safety of operations at sea, preventing intentional and unintentional discharges, and regulating the design, construction, equipment, operation and manning of vessels;

(c) pollution from installations and devices used in exploration or exploitation of the natural resources of the sea-bed and subsoil, in particular measures for preventing accidents and dealing with emergencies, ensuring the safety of operations at sea, and regulating the design, construction, equipment, operation and manning of such installations or devices;

aimed at land-based sources,<sup>27</sup> seabed activities,<sup>28</sup> dumping,<sup>29</sup> and atmospheric sources,<sup>30</sup> as well as vessel-sources.<sup>31</sup> Though admittedly generalized, in tandem these provisions tend to reaffirm the international

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(d) pollution from other installations and devices operating in the marine environment, in particular measures for preventing accidents and dealing with emergencies, ensuring the safety of operations at sea, and regulating the design, construction, equipment, operation and manning of such installations or devices;

4. In taking measures to prevent, reduce or control pollution of the marine environment, States shall refrain from unjustifiable interferences with activities carried out by other States in the exercise of their rights and in pursuance of their duties in conformity with this convention.

5. The measures taken in accordance with this Part shall include those necessary to protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of marine life.

27. *Id.* art. 207. See notes 56-69 *infra*.

28. *Id.* art. 208, 209.

29. *Id.* art. 210.

30. *Id.* art. 212.

31. *Id.* art. 211. To the extent that international law pertaining to vessel-pollution is codified generally for the international community, this provision is most noteworthy. Accordingly, once the UNCLOS III Treaty enters into force, Article 211 in full will stipulate that:

1. States, acting through the competent international organization or general diplomatic conference, shall establish international rules and standards to prevent, reduce and control pollution of the marine environment from vessels and promote the adoption, in the same manner, wherever appropriate, of routing systems designed to minimize the threat of accidents which might cause pollution of the marine environment, including the coastline, and pollution damage to the related interests of coastal States. Such rules and standards shall, in the same manner, be re-examined from time to time as necessary.

2. States shall adopt laws and regulations for the prevention, reduction and control of pollution of the marine environment from vessels flying their flag or of their registry. Such laws and regulations shall at least have the same effect as that of generally accepted international rules and standards established through the competent international organization or general diplomatic conference.

3. States which establish particular requirements for the prevention, reduction and control of pollution of the marine environment as a condition for the entry of foreign vessels into their ports or internal waters or for a call at their off-shore terminals shall give due publicity to such requirements and shall communicate them to the competent international organization. Whenever such requirements are established in identical form by two or more coastal States in an endeavour to harmonize policy, the communication shall indicate which States are participating in such co-operative arrangements. Every State shall require the master of a vessel flying its flag or of its registry, when navigating within the territorial sea of a State participating in such co-operative arrangements, to furnish, upon the request of that State, information as to whether it is proceeding to a State of the same region participating in such co-operative arrangements and, if so, to indicate whether it complies with the port entry requirements of that State. This article is without prejudice to the continued exercise by a vessel of its right of innocent passage, or to the application of article 25, paragraph 2.

4. Coastal States may, in the exercise of their sovereignty within the territorial sea, adopt laws and regulations for the prevention, reduction and control of marine pollution from foreign vessels, including vessels exercising the right of innocent passage. Such laws and regulations shall, in accordance with Part II, section 3, not hamper innocent passage of foreign vessels.

5. Coastal States, for the purpose of enforcement as provided for in section 6, may in respect of their exclusive economic zones adopt laws and regulations for the pre-



rights and responsibilities embodied in Principle 21 of the Stockholm Declaration:<sup>32</sup>

States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other states or of areas beyond the limits of national jurisdiction.<sup>33</sup>

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vention, reduction and control of pollution from vessels conforming to and giving effect to generally accepted international rules and standards established through the competent international organization or general diplomatic conference.

6. (a) Where the international rules and standards referred to in paragraph 1 are inadequate to meet special circumstances and coastal States have reasonable grounds for believing that a particular, clearly defined area of their respective exclusive economic zones is an area where the adoption of special mandatory measures for the prevention of pollution from vessels is required for recognized technical reasons in relation to its oceanographical and ecological conditions, as well as its utilization or the protection of its resources and the particular character of its traffic, the coastal States, after appropriate consultations through the competent international organization with any other States concerned, may, for that area, direct a communication to that organization, submitting scientific and technical evidence in support and information on necessary reception facilities. Within 12 months after receiving such a communication, the organization shall determine whether the conditions in that area correspond to the requirement set out above. If the organization so determines, the coastal States may, for that area, adopt laws and regulations for the prevention, reduction and control of pollution from vessels implementing such international rules and standards or navigational practices as are made applicable, through the organization, for special areas. These laws and regulations shall not become applicable to foreign vessels until 15 months after the submission of the communication to the organization.

(b) The coastal States shall publish the limits of any such particular, clearly defined area.

(c) If the coastal States intend to adopt additional laws and regulations for the same area for the prevention, reduction and control of pollution from vessels, they shall, when submitting the aforesaid communication, at the same time notify the organization thereof. Such additional laws and regulations may relate to discharges or navigational practices but shall not require foreign vessels to observe design, construction, manning or equipment standards other than generally accepted international rules and standards; they shall become applicable to foreign vessels 15 months after the submission of the communication to the organization, provided that the organization agrees within 12 months after the submission of the communication.

7. The international rules and standards referred to in this article should include *inter alia*, those relating to prompt notification to coastal States, whose coastline or related interests may be affected by incidents, including marine casualties, which involve discharges or probability of discharges.

UNCLOS III Convention (1982), *supra* note 25, art. 211.

32. REPORT OF THE UNITED NATIONAL CONFERENCE ON THE HUMAN ENVIRONMENT, U.N. Doc. A/CONF. 48/14 (1972). The text of the Declaration is reprinted in 11 INT'L LEGAL MATERIALS 1416 (1972). Also see Joyner & Joyner, *Global Eco-Management and International Organizations: The Stockholm Conference and Problems of Cooperation*, 14 NAT. RES. J. 533 (1974); Sohn, *The Stockholm Declaration on the Human Environment*, 14 HARV. INT'L L. J. 423 (1973); and Handl, *The Environment: International Rights and Responsibilities*, 74 PROCEEDINGS AM. SOC'TY INT'L L. 223 (1980).

33. Stockholm Declaration, *supra* note 32, Principle 21.

More pointedly pertinent to vessel-source pollution, Principle 7 of the same instrument provides that:

States shall take all possible steps to prevent pollution of the sea by substances that are liable to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea.<sup>34</sup>

Thus, the international community had deemed pollution of the oceans, including that attributable to shipping activities, to be a priority concern for enhancing the health of the human habitat.

On a somewhat more limited multilateral level, several landmark agreements have been negotiated and opened for signature, *e.g.*, *inter alia*, the 1954 Convention for the Prevention of Pollution of the Sea by Oil,<sup>35</sup> the 1958 Geneva Convention on the High Seas,<sup>36</sup> the 1969 International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties,<sup>37</sup> the 1969 International Convention on Civil Liability for Oil Pollution Damage,<sup>38</sup> the 1972 Convention of the Prevention of Marine Pollution by Dumping of Wastes and Other Matter,<sup>39</sup> and the 1973 International Convention for the Prevention of Pollution from Ships.<sup>40</sup>

Similarly, at the regional level, States have undertaken specific negotiations to establish vessel anti-pollution law. For the Northeast Atlantic area, eight littoral States<sup>41</sup> are signatories to the 1969 Agreement Con-

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34. *Id.*, Principle 7.

35. May 12, 1954 [1961] 3 U.S.T. 2989, T.I.A.S. No. 4900, 327 U.N.T.S.3; with amendments adopted April 11, 1962 [1966] 2 U.S.T. 1523, T.I.A.S. No. 6109, 600 U.N.T.S. 332; Oct. 21, 1969 [1977] 1 U.S.T. 1207, T.I.A.S. No.8505; Oct. 15, 1971, reprinted in 11 INT'L LEGAL MATERIALS 267 (1972).

36. April 29, 1958 [1962] 2 U.S.T. 2312, T.I.A.S. No. 5200, 327 U.N.T.S. 3. Of salient note, three additional international agreements were direct products of the 1958 Geneva Conference on the Law of the Sea, *vis.*, the: Convention on the Continental Shelf, April 29, 1958 [1964] 1 U.S.T. 471, T.I.A.S. No. 5578, 499 U.N.T.S. 311; Convention on Fishing and Conservation of the Living Resources of the High Seas, April 29, 1958 [1966] 1 U.S.T. 138, T.I.A.S. No. 5969, 599 U.N.T.S. 285; and Convention on the Territorial Sea and Contiguous Zone, April 29, 1958 [1964] 2 U.S.T. 1606, T.I.A.S. No. 5639, 516 U.N.T.S. 205.

37. Nov. 29, 1969, [1975] 1 U.S.T. 765, T.I.A.S. No. 8068.

38. Nov. 29, 1969, reprinted in 9 INT'L LEGAL MATERIALS 45 (1970). *See also* Protocol to the International Convention on Civil Liability for Oil Pollution Damage, Nov. 29, 1976, in 16 INT'L LEGAL MATERIALS 617 (1977).

39. Dec. 29, 1972, [1975] 2 U.S.T. 2403, T.I.A.S. No. 8165. *See generally*, Leitzell, *The Ocean Dumping Convention—A Hopeful Beginning*, 10 SAN DIEGO L. REV. 502 (1973) and McManus, *Ocean Dumping: Standard in Action*, in ENVIRONMENTAL PROTECTION: THE INTERNATIONAL DIMENSION 119 (D. Kay & H. Jacobson, eds. 1983).

40. Nov. 2, 1973, reprinted in 12 INT'L LEGAL MATERIALS 1319 (1973). In 1978, a protocol was added in response to the numerous tanker accidents during the two years prior. *See* Protocol of 1978 relating to the International Convention for the Prevention of Pollution from Ships, 1973, Feb. 16, 1978, reprinted in 17 INT'L LEGAL MATERIALS 546.

41. Namely, Belgium, Denmark, France, the Federal Republic of Germany, the Netherlands, Norway, Sweden, and the United Kingdom.

cerning Pollution of the North Sea by Oil.<sup>42</sup> In 1974, seven Baltic States<sup>43</sup> adopted an anti-pollution treaty, the Convention on the Protection of the Marine Environment of the Baltic Sea area (Helsinki Convention).<sup>44</sup> The treaty covered marine pollution caused by vessels, and also pollution which stemmed from activities on land, the seabed, and in the air. In 1976, eighteen countries<sup>45</sup> bordering on the Mediterranean hammered out the Convention for the Protection of the Mediterranean Sea against Pollution (Barcelona Convention)<sup>46</sup> and two supplementary protocols.<sup>47</sup> Finally, the littoral States along the Persian Gulf, under the auspices of the United Nations Environmental Program, adopted the Kuwait Regional Convention for Co-operation in the Protection of the Marine Environment from Pollution in 1978.<sup>48</sup>

Transnational cooperation at anti-vessel source pollution has been augmented by national efforts as well. Yet, although most industrialized coastal states have passed such legislation,<sup>49</sup> Canada's Arctic Waters Pollution Prevention Act of 1970<sup>50</sup> and the United States' Clean Water Act of 1977<sup>51</sup> retain especial importance in demonstrating the need for and far-reaching implications of these national acts.

Though this proliferation of multilateral instruments and concomitant national legislation may seem impressive, it nevertheless fails in filling some blatant lacunae in present marine environmental law: relatively

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42. June 9, 1969, reprinted in 9 INT'L LEGAL MATERIALS 359 (1970).

43. Namely Denmark, the Federal Republic of Germany, Finland, the German Democratic Republic, Poland, Sweden, and the Soviet Union.

44. March 22, 1974, reprinted in 13 INT'L LEGAL MATERIALS 544 (1974). For an insightful analysis, see Boczek, *International Protection of the Baltic Sea Environment Against Pollution*, 72 AM. J. INT'L L. 782 (1978).

45. Namely, Albania, Algeria, Cyprus, Egypt, France, Greece, Israel, Italy, Lebanon, Libya, Malta, Monaco, Morocco, Spain, Syria, Tunisia, Turkey, and Yugoslavia. Save for Syria, all signed the agreement, which entered into force February 12, 1978.

46. Feb. 16, 1976, reprinted in 15 INT'L LEGAL MATERIALS 290 (1976). For pertinent discussion, see Boxer, *Mediterranean Action Plan: An Interim Evaluation*, 202 SCIENCE 585 (Nov. 1978).

47. Protocol on Prevention of Pollution of the Mediterranean Sea by Dumping from Ships and Aircraft, and the Protocol Concerning Co-operation in Combatting Pollution of the Mediterranean Sea by Oil and Other Harmful Substances in Cases of Emergency, reprinted in 15 INT'L LEGAL MATERIALS 300, 306 (1975).

48. April 23, 1978, reprinted in 17 INT'L LEGAL MATERIALS 511 (1978).

49. See e.g., the pieces of national legislation enumerated in Hayashi, *Comparative National Legislation on Offshore Pollution*, 1 SYRACUSE J. INT'L L. & COM. 250 (1973).

50. CAN. REV. STAT. c.2 (1st Supp. 1970). For relevant analyses, see Bilder, *The Canadian Arctic Waters Pollution Prevention Act: New Stresses on the Law of the Sea*, 69 MICH. L. REV. 1 (1970) and Dwivedi, *The Canadian Government's Response to Environmental Concern*, 28 INT'L J. 134 (1972-73).

51. Pub. L. No. 95-215, 91 Stat. 1566 (codified at 33 U.S.C. §§ 1251-1376 (Supp. I 1977)). See Note, *The Clean Water Act of 1977: Expanded Competence over Vessel-Source Pollution*, 18 VA. J. INT'L L. 289 (1978).

unrestricted resort to flags of convenience in shipping;<sup>52</sup> ambiguities regarding the precise obligations and enforcement duties of states;<sup>53</sup> the inherent difficulties of assigning responsibility and liability for environmental damage;<sup>54</sup> and, certainly not unimportant, the fact that some of the aforementioned international accords were unduly delayed or remain not in force.<sup>55</sup> This underscores the recognition that much still could be done to protect the oceans from pollution effluents discharged from ships.

### *Land-Based Pollution*

As averred earlier, the proliferation of human activities impinging upon ocean space has brought about a detectable deterioration in the quality of the earth's marine environment. In this respect, the relative gravity of a pollutant's effects appears to depend upon four critical variables, *viz.*, its (1) persistence level in the marine ecosystem, (2) degree of toxicity, (3) concentration and locality of discharge, and (4) bioaccumulation potential.<sup>56</sup> Not unexpectedly, recent scientific studies have concluded that land-based pollution sources, located primarily in heavily industrialized coastal cities and which appear principally as petroleum,<sup>57</sup> municipal sewage,<sup>58</sup> metallic effluents,<sup>59</sup> chlorinated hydrocarbons,<sup>60</sup> and radioactive

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52. By resorting to flags of convenience, shipping owners may register their vessels with nations having lower tax scales, lower minimum wages, and more lax safety requirements. See generally, B. BOCZEK, *FLAGS OF CONVENIENCE: AN INTERNATIONAL LEGAL STUDY* (1962).

53. Handl, *Territorial Sovereignty and the Problem of Traditional Pollution* 69 AM J. INT'L L. 50 (1975).

54. Handl, *State Liability for Accidental Transnational Environmental Damage by Private Persons*, 74 AM. J. INT'L L. 525 (1980).

55. The 1969 IMCO Convention, *supra* note 38, took six years to come into force, and the London Dumping Convention, *supra* note 39, took three years. The 1973 Pollution from Ships Convention, *supra* note 40, with its protocol did not enter into force jointly until October 1, 1983. Not to be overlooked as well is that neither the 1974 International Convention for the Safety of Life at Sea, Nov. 1, 1974, reprinted in INT'L LEGAL MATERIALS 959 (1975) nor its Protocol [Protocol of 1978 relating to the International Convention for the Safety of Life at Sea, 1974, Feb. 16, 1978, reprinted in 17 INT'L LEGAL MATERIALS 579 (1978)] have yet entered into force.

56. See generally NATIONAL ACADEMY OF SCIENCES, *supra* note 23.

57. Some estimates put petroleum components entering the oceans via the atmosphere to be as high as 10 million tons annually. It is suspected, however, that most land-based oil reaches the oceans by being washed into rivers with other domestic effluents from street sewers. Reliable calculations put the total at 2.5 million tons per annum. S. GERLACH, *supra* note 9, at 81.

58. In 1973, it was reported that in the New York Bight (i.e., the area between Long Island, N.Y. and New Jersey) 480 million gallons per day (mgd) of untreated wastewaters, 540 mgd of primary treatment plant effluent, and 920 mgd of "intermediate" treatment effluent were being discharged. ENVIRONMENTAL PROTECTION AGENCY, *OCEAN DUMPING IN THE NEW YORK BIGHT, FACTS AND FIGURES* (1973). Gerlach notes that as much as 4 million cubic meters, or 200,000 tons, of organic sewage sludge annually is dumped into the Bight area. S. GERLACH, *supra* note 9, at 64. See Steimle & Sindermann, *Review of Oxygen Depletion and Associated Mass Mortalities of Shellfish in the Middle Atlantic Bight in 1976*, 40 MAR. FISH REV. 19-26 (1978).

59. Copper, silver, mercury, lead, and cadmium are considered particularly toxic metals and the

wastes,<sup>61</sup> exacerbate and compound greatly the problem of marine pollution.<sup>62</sup> Admittedly alarmed by these potential dangers during the 1970s, some nations legislated controls for land-based pollution sources, especially those States bordering on semi-enclosed sea basins and those having heavily concentrated industrial cities on their coasts.<sup>63</sup> Notwithstanding these efforts, restoring the oceans' environment and preventing it from further pollutant degradation has been seriously hampered, and indeed impeded, by the dearth of available scientific data. In this connection, one analyst has observed:

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latter three have sufficiently polluted the marine environment to be of global concern. Bryan, *Heavy Metal Continuation in MARINE POLLUTION* (R. Johnson ed. 1976). See generally ASSOC. EUROPEANNE OCEANIQUE, *METALLIC EFFLUENTS OF INDUSTRIAL ORIGIN IN THE MARINE ENVIRONMENT* (1977). Between 1953 and 1975, 798 persons from the town of Minamata, a fishing village in Japan, were diagnosed as having Mercury poisoning. The cause for this so-called "Minamata Disease" was eventually traced to the Shin Nikon Chisso Hiryo Company, which had been discharging methylmercury into the bay. See MINAMATA, *A WARNING TO THE WORLD* (W. Smith & A. Smith eds. 1975).

60. Chlorinated hydrocarbons constitute a major pollution hazard due to their longevity and extreme toxicity to marine organisms. Among these types of chemical compounds constantly entering the marine ecosystem are dicloethane, vinylchloride, carbontetrachloride, polychlorinated bipheyles (PCB's), and the ubiquitous insecticide, dichlorodiphenyl trichlorethane (DDT). See generally, E. GOLDBERG, *THE HEALTH OF THE OCEANS* (1976); U.S. NATIONAL RESOURCES COUNCIL, *CHLORINATED HYDROCARBONS IN THE MARINE ENVIRONMENT* (1971); and R. SHINN, *THE INTERNATIONAL POLITICS OF MARINE POLLUTION* (1974).

61. Although radioactivity occurs naturally in the marine environment, processing plants and the dumping of radioactive wastes have introduced manifold additional amounts into the oceans. Disposal of radioactive isotopes, e.g., plutonium-239, strontium-90, and caesium-137, comprise the principal concern. See NATIONAL ACADEMY OF SCIENCE, *ASSESSING POTENTIAL OCEAN POLLUTANTS* (1975); Woodhead, *Levels of Radioactivity in the Marine Environment and the Dose Commitment to Marine Organisms* in *RADIOACTIVE CONTAMINATION OF THE MARINE ENVIRONMENT* 499-535 (Int'l Atomic Energy Agency, 1973); and GERLACH, *supra* note 9, at 104-19.

62. In assessing the gravity of reaching viable solutions for curtailing land-based sources of marine pollution, Robert McManus has observed:

One probable reason for the international community's hesitancy to grapple with sources of land-based pollution is the stupefying scope of the problem. Except for discharges from ships and offshore drilling rigs, the rubric "land-based sources" includes virtually all modes of contamination of the world's ocean. It includes, for example, all outfalls, both coastal and inland, into the oceans or into agricultural runoff (with special reference to that containing pesticides). And it includes atmospheric fallout and wash-out—for example, of unburned hydrocarbons from automobiles. It even includes "ocean dumping"—that is, ocean transport of wastes produced on land for the sole purpose of getting rid of them. Although this subject was dealt with by a widely accepted treaty in 1972, it represents an arbitrary subdivision of a broader problem, in order to permit politically realistic international agreement. In fact, restrictions on ocean dumping should be based, at least in part, on the control strategy applicable to all other wastes produced on land.

McManus, *Legal Aspects of Land-Based Sources of Marine Pollution*, in Charney, *supra* note 2, at 90-91 (footnote omitted).

63. Whipple, Jr., *Land-Based Sources of Marine Pollution and National Controls* in Charney, *supra* note 2, at 47-49. Preeminent among these countries are the United States, the Federal Republic of Germany, Great Britain, France and Japan. *Id.* at 50-57.

The inadequate data base, the lack of standards by which to assess damage to the marine environment, and the difficulties of obtaining critical entry information fail to address yet another critical problem, the difficulty of fashioning solutions: who shall be responsible for data collection, interpretation, monitoring and detection, and ultimately issuing the warnings; and what are the responsibilities of nations in assisting this process?<sup>64</sup>

Ostensibly, one near-term solution for alleviating this dearth of data acquisition would be widespread legal acceptance and implementation of 200-mile exclusive economic zones (EEZs) seaward from coastal States.<sup>65</sup> Presumably, adoption of EEZs could act as catalysts for promoting national pollution abatement policies and programs, as well as serve as motivation for states to work toward preventing contamination of coastal waters through stricter legislative curbs on the release of toxic effluents into the marine ecosystem.

Nonetheless, creation of national EEZs should not be touted as an all-encompassing legal panacea for land-based marine pollution. A perceived need for some international regulatory mechanism and perhaps a uniform liability register, as well, continue to persist to deal with pollution on and in the "high sea" areas of the oceans.<sup>66</sup> The Maritime Consultative Organization (formerly the Inter-Governmental Maritime Consultative Organization, IMCO) has attempted, with some notable success,<sup>67</sup> to address this need since the early 1950s. Yet, one must realistically conclude that "a workable international scheme for the abatement of land-

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64. Kildow, *Political and Economic Dimensions of Land-Based Sources of Marine Pollution* in Charney, *supra* note 2, at 74.

65. As articulated in the 1982 UNCLOS III Convention, the exclusive economic zone is an area extending seaward not more than 200 nautical miles (Article 57) in which the coastal State has:

- a) sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or non-living, of the sea-bed and subsoil and the superjacent waters, and with regard to other activities for the economic exploitation and exploration of the zone, such as the production of energy from the water, currents and winds;
- b) jurisdiction as provided for in the relevant provisions of this convention with regard to:
  - i) the establishment and use of artificial islands, installations and structures;
  - ii) marine scientific research;
  - iii) the protection and preservation of the marine environment;
- c) other rights and duties provided for in this Convention.

UNCLOS III Convention (1982), *supra* note 25, art. 56.

66. McManus, *supra* note 62, at 104-108.

67. See Schneider, *supra* note 17, at 10-12. Cf. Greenberg, *IMCO: An Environmentalist's Perspective*, 8 CASE W. RES. J. INT'L L. 131 (1976) and Sielen & McManus, *IMCO and The Politics of Ship Pollution* in ENVIRONMENTAL PROTECTION: THE INTERNATIONAL DIMENSION (H. Jacobson & D. Kay eds. 1983). IMCO's early efforts prompted some commentators to believe it would have a viable role in regulating ocean law. See Joyner & Joyner, *Prescriptive Administrative Proposal: An International Machinery for Control of the High Seas*, 8 INT'L LAWYER 57 (1974).

based sources of marine pollution could be adopted and implemented only after formidable political obstacles had been overcome."<sup>68</sup> Given the current climate of ascendant nationalism vis-à-vis strategies of acquiring natural resources, it appears dubious at best that States today would demonstrate sufficient political will for surrendering more of their sovereignty to an international marine-pollution regulatory regime.

Determination of whether present and future international agreements will be adequate for precluding effectively the world's oceans from succumbing eventually to man-induced toxic collapse remains relegated to the vicissitudes of time. Nonetheless, integrally affected by the outcome of this process will be the environmental conditions in Antarctica and its circumpolar waters. Accordingly, the study now turns to examine the economic, political, and legal ramifications which resource exploitation could portend for the Antarctic region's environs.

## THE ANTARCTIC ENVIRONMENT: PROTECTION, PRESERVATION AND CONSERVATION

### *General Observations*

Little doubt persists that an international law for regulating pollution of the global environment generally,<sup>69</sup> and that of the oceans in particular,<sup>70</sup> is well into the process of evolution and acceptance. Nonetheless, this "conventional" source of law has proved to be somewhat ponderous and protracted vis-à-vis State implementation and practice. For Antarctica's regional environs, proceeding commercially with resource exploration and exploitation could render international controls for protecting the environment there too little, too late, or perhaps in the long term, even nugatory.

Antarctica is a continent of meteorological,<sup>71</sup> topological<sup>72</sup> and ecological<sup>73</sup> extremes. Geological evidence has suggested that Antarctica 200 million

68. McManus, *supra* note 62 at 107.

69. See generally, THE INTERNATIONAL LAW OF POLLUTION (J. Barros & D. Johnson eds. 1974); LAW, INSTITUTIONS, AND THE GLOBAL ENVIRONMENT (J. Hargrove ed. 1972); INTERNATIONAL ENVIRONMENTAL LAW (L. Teclaff & A. Utton eds. 1974); and ENVIRONMENTAL PROTECTION, *supra* note 39.

70. See, e.g., Teclaff, *International Law and the Protection of the Oceans from Pollution*, in INTERNATIONAL ENVIRONMENTAL LAW, *supra* note 69, at 104; Caffisch, *Some Aspects of Oil Pollution from Merchant Ships*, 4 ANNALES D'ETUDES INTERNATIONALES 213 (1973); Moore, *Legal Aspects of Marine Pollution Control* in MARINE POLLUTION 589 (R. Johnston ed. 1976); and Goldie, *International Principles of Responsibility for Pollution*, 9 COLUM. J. TRANS-NAT'L L. 283 (1970).

71. Antarctica's weather and climate is dominated by low temperatures, intense winds, and little precipitation. The mean temperature on the high interior polar plateau of East Antarctica approximates -60°C, although temperatures in coastal areas are less severe. See CENTRAL INTELLIGENCE AGENCY, POLAR REGIONS ATLAS 37 (1979). The coldest temperature ever recorded on earth was at the Soviet Union's station Vostock, where on August 24, 1960, the temperature fell to -88°C

years ago may have been part of a supercontinent known as Gondwanaland.<sup>74</sup> If this situation actually occurred, rich deposits of minerals<sup>75</sup> discovered in present day South America, Africa, India, and Australia conceivably could exist in similar quantities in Antarctica as well.<sup>76</sup> While these speculations thus far have proved to be unfounded,<sup>77</sup> and while Antarctica seems unlikely to make any noteworthy contribution to world supplies of hard minerals in the near or foreseeable future,<sup>78</sup> the com-

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(-127°F). INTERNATIONAL INSTITUTE FOR ENVIRONMENT AND DEVELOPMENT, THE FUTURE OF ANTARCTICA (Earthscan Press Briefing Doc. No. 5 1978), reprinted in *Exploitation of Antarctic Resources: Hearing before the Subcomm. on Arms Control, Oceans, and the International Environment of the Senate Comm. on Foreign Relations*, 95th Cong. 2d Sess. 34 (1978) [hereinafter cited as *Antarctic Resources Hearing*]. Steady katabatic wind blasts averaging 100 km per hour are not infrequent during the winter (i.e., in July). Bertrand, *Antarctica*, 43 FRONTIERS 9 (1978). Annual snow precipitation of less than 5 cm of water equivalent qualifies Antarctica as a frozen-desert. Bull, *Snow Accumulation in Antarctica*, in RESEARCH IN THE ANTARCTIC 367 (L. Quam ed. 1971).

72. Nearly 98 percent of Antarctica's 5,700,000 square miles is covered by a sheet of ice with an average thickness of one mile, and a maximum of three miles. *Antarctic Resources Hearing*, supra note 71, at 198. In addition, Antarctica not only is the most isolated of the continents, it also has the highest average elevation, approximately 6000 feet above sea level. P. JESSUP & H. TAUBENFELD, CONTROLS FOR OUTER SPACE AND THE ANTARCTIC ANALOGY 138 (1959).

73. The Antarctic continent contains no land vertebrates and is the only continent without shrubs or trees. Only two plant species are indigenous, making mosses and lichens the principle plant life. Lamb, *Antarctic Terrestrial Plants and Their Ecology*, in 2 ANTARCTIC ECOLOGY 737 (M. Holdgate ed. 1970). Only a single river, the Onyx in the Ross Dependency, flows in the summer—over a course of less than 50 miles. *Warm Weather Aids Onyx River Flow*, 9 ANTARCTIC 49 (1980). Finally, in ice-free locations, soils are generally underlain by permafrost. Moreover, given their low-temperature, low moisture, and non-microbial content, they assume the quality of cold desert soil formations. J. TEDROW, SOILS OF THE POLAR LANDSCAPES 518 (1977).

74. See Elliot, *Tectonics of Antarctica: A Review*, 275 AM. J. SCI. 45-106 (1976); Craddock, *Antarctic Geology and Gondwanaland* in FROZEN FUTURE 101 (R. Lewis & P. Smith eds. 1973); and *Antarctic Resources Hearing*, supra note 71, at 205.

75. Accepting the Gondwanaland thesis, four primary areas in Antarctica potentially could contain mineral-bearing deposits: 1) the Antarctic peninsula (copper and molybdenum); 2) the Dufek Massif (chromium, platinum, copper, and nickel); 3) the Transantarctic Mountains (copper, lead, zinc, silver, tin, and gold); and the Prince Charles Mountains (iron). Zumberge, *Potential Mineral Resource Availability and Possible Environmental Problems in Antarctica*, in Charney, supra note 2, at 127.

76. Other trace minerals conceivably also recoverable in Antarctica include vanadium, cobalt, uranium, manganese, and coal. MINERAL RESOURCES OF ANTARCTICA 39 (U.S. Geological Survey Circular 705, N. Wright and P. Williams eds. 1974). But see text and note 78 infra.

77. See G. Schatz, *Antarctic Myths and the Quality of Policy Discourse* (Sept. 28, 1977)(unpublished paper).

78. Professor James Zumberge expressed well the current scientific appraisal of Antarctica's hard mineral potential when he asserted:

Minerals . . . have already been discovered, but no ore deposit of economic grade or volume has been identified. Moreover, even if a significant deposit were discovered, the costs of extraction, concentration, and shipment to market are likely to prohibit any serious mining venture for one or two generations. There is a good possibility that no mineral resources on land will be mined in the foreseeable future, if ever.

Zumberge, supra note 75, at 127. This assessment has been echoed by Dr. Giulio Pontecorvo as he averred:

We conclude that, based on what is currently known about the supply of minerals elsewhere, market prices, and production costs, the probability is close to zero that



mercial opportunities for exploiting possible hydrocarbon deposits offshore may be more optimistic.<sup>79</sup> Closely related to this, the Antarctic marine ecosystem teems with living resources,<sup>80</sup> paramount among which is a shrimp-like crustacean, krill.<sup>81</sup> Recent studies suggest that these living

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under market conditions (rational decisions with no subsidies), nonliving resources in Antarctica will be exploited within a finite time horizon of twenty years, and probably for a much longer period.

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In all cases of nonliving resources, with the possible exception of petroleum in some future period, there are alternative sources of supply in more accessible, less hostile locations. (Again, it is desirable to weigh this conclusion against the low probability of some unique discovery.) Unless one is willing to deny the role of price and substitution in the markets for minerals and to assume further that the demand for and real price of minerals will behave differently than they have for the past century, there are no economic resources on the Antarctic continent.

Pontecorvo, *The Economics of the Resources of Antarctica* in Charney, *supra* note 2, at 159, 162. See also, Rowley, Williams, & Pride, *Mineral Occurrences of Antarctica*, in PETROLEUM AND MINERAL RESOURCES OF ANTARCTICA 25 (J. Behrendt ed. 1983) (U.S. Geological Survey Circular 909). As the authors conclude, "Nearly all mineral occurrences are small and isolated, and presently have no commercial importance. . . . It is doubtful . . . that any metallic or nonmetallic mineral resources in Antarctica will be exploited for many years, unless world economic or political conditions change drastically." *Id.* at 43.

79. See McIver, *Hydrocarbon Gases in Canned Core Samples from Leg 28 sites 271, 272 and 273, Ross Sea*, in 28 INITIAL REPORTS OF THE DEEP SEA DRILLING PROJECTS 815 (D. Hayes & L. Frakes eds. 1975) and Auburn, *Offshore Oil and Gas in Antarctica*, 22 GER. Y. B. INT'L L. 139 (1977). Also see Behrendt, *Are There Petroleum Resources in Antarctica?*, in PETROLEUM AND MINERAL RESOURCES OF ANTARCTICA, *supra* note 78 at 3. Professor Behrendt concludes:

Although no petroleum resources are known in Antarctica and the petroleum industry is not particularly interested at present, economic and political considerations may change the industry's interest in the next few years, and exploration and exploitation are possible within one or two decades. A number of countries [i.e., the Soviet Union, Great Britain, West Germany, Norway, Japan, and France] are actively carrying out multi-channel seismic reflection surveys of the Antarctic continental margin, . . . which are obviously focused on petroleum resource studies. Technology development will probably occur at a more rapid rate than research, exploration, and legal development.

*Id.* at 22 (footnotes omitted).

80. Found in Antarctica's circumpolar waters are significant numbers of fin fish, squid, whales, seals, penguins, and birds. For appropriate treatments of these resources, see El-Sayed, *Biology of the Southern Ocean*, in OCEANS 46-47 (Summer 1975); Llano, *Ecology of the Southern Ocean Region*, 33 U. MIAMI L. REV. 357 (1978), I. Everson, *The Living Resources of the Southern Ocean*, U.N. Doc. UNDP/FAO GLO/SO/77/1 (1977); Scully, *The Marine Living Resources of the Southern Ocean*, 33 U. MIAMI L. REV. 341 (1978); Laws, *The Significance of Vertebrates in the Antarctic Marine Ecosystem*, in ADAPTATIONS WITHIN ANTARCTIC ECOSYSTEMS 411 (G. Llano ed. 1977); and ANTARCTIC RESOURCES HEARING, *supra* note 71.

81. Krill, the principal species of which is *Euphausia superba*, range in size from 10 to 50 millimeters and form dense swarms in wide distributions throughout the Southern Ocean. Laws, *supra* note 80, at 414. Krill is believed to be the primary food for other Antarctic marine organisms, and is a vital link in the region's ecosystemic food chain. K. GREEN, *ROLE OF KRILL IN THE ANTARCTIC MARINE ECOSYSTEM* 18 (1977); U.S. DEPT. OF STATE, *FINAL ENVIRONMENTAL IMPACT STATEMENT FOR A POSSIBLE REGIME FOR CONSERVATION OF ANTARCTIC MARINE LIVING RESOURCES* (1978), at App. C.; TETRA TECH, *THE ANTARCTIC KRILL RESOURCES: PROSPECTS FOR COMMERCIAL EXPLOITATION* 121 (1978); and B. MITCHELL & R. SANDBROOK, *THE MANAGEMENT OF THE SOUTHERN OCEAN*, at Section 4, (1980).

fishery resources could furnish substantial amounts of protein to meet the world's increasing food needs.<sup>82</sup> These prospects notwithstanding, given man's baneful experience in the recent past with the oceans, serious environmental problems obviously could result from uncontrolled exploitation of either non-living or living resources in the Antarctic-Southern Ocean region. Not discounting difficulties of technological feasibility,<sup>83</sup> the critical question for consideration then becomes who has a legal right in Antarctica to exploit which resources, in what quantities, and for whose benefit?

### *The Contemporary Legal Status of Antarctica*

#### *The Antarctic Treaty Regime*

The Antarctic Treaty of 1959 created the legal regime presently overseeing the conduct of activities south of 60 degrees South latitude.<sup>84</sup> The Treaty emerged in the aftermath of the International Geophysical Year (IGY)(1957/58)<sup>85</sup> and the success achieved at scientific cooperation then among twelve participant nations. Argentina,<sup>86</sup> Australia,<sup>87</sup> Chile,<sup>88</sup> France,<sup>89</sup>

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82. Initial suggestions put the annual sustainable yields of krill at 150 million tons. TETRA TECH, *supra* note 82, at 121. However, recently, more conservative estimates suggest that 10 million tons would be a safer level to avoid serious ecological repercussions or numerous risks to krill stocks or dependent species. Bogdanov, *cited in* B. MITCHELL & R. SANDBROOK, *supra* note 81, at 106. Given that the annual fish catch is only approximately 70 million tons, krill would greatly supplement human demand for animal protein. Mitchell, *The Politics of Antarctica*, 22 ENVIRONMENT 13 (1980). Also see G. GRAHAM, THE UTILIZATION OF KRILL (1977).

83. See Zumberge, *supra* note 75, at 130-40.

84. Antarctic Treaty, Dec. 1, 1959, 12 U.S.T. 794, T.I.A.S. No. 4780, 402 U.N.T.S. 71 (*entered into force* June 23, 1961). The Treaty has received considerable scholarly attention internationally over the past twenty years. See, e.g., Rene-Jean Dupuy, *Traite sur l'antarctique*, 6 ANNUAIRE FRANCAIS DE DROIT INTERNATIONAL III (1960); Hanessian, *The Antarctic Treaty*, 9 INT'L & COMP. L. Q. 436 (1960); Hayton, *The Antarctic Settlement of 1959*, 54 AM. J. INT'L L. 349 (1960); Simmonds, *The Antarctic Treaty, 1959*, 87 JOURNAL DU DROIT INTERNATIONAL 668 (1960); van der Essen, *Le probleme politico-juridique de l'Antarctique et le Traite de Washington du 1er decembre 1959*, 80 ANNUAIRE DE DROIT ET DES SCIENCES POLITIQUE (1960); Mouton, *The International Regime of the Polar Regions*, [1962 III] 107 RECUEIL DES COURS 175; A. SCILINGO, EL TRATADO ANTARTICO (1963); G. BATTAGLINI, LA CONDIZIONE DELL' ANTARTIDE NEL DIRITTO INTERNAZIONALE (1971); C. BEEBY, THE ANTARCTIC TREATY (1972); GUYER, *The Antarctic System* [1973 III] 139 RECUEIL DES COURS 149; Barrie, *The Antarctic Treaty: Example of Law and Sociological Infrastructure*, 8 COMP. & INT'L L. J. SO. AFRICA, 212 (1975); Wassermann, *The Antarctic Treaty and Natural Resources*, 12 J. WORLD TRADE L. 174 (1978); and F. AUBURN, ANTARCTIC LAW AND POLITICS 84-204 (1982).

85. For relevant discussion of the IGY, see Jones, *The Inception and Development of the International Geophysical Year*, 1 ANNUAL OF THE IGY 393 (1959) and H. BULLIS, THE POLITICAL LEGACY OF THE INTERNATIONAL GEOPHYSICAL YEAR (1973).

86. Argentina's claim includes the pie-shaped sector between 25 degrees West and 74 degrees West, bordered on the north by the 60th parallel of South latitude. While never officially issuing a formal claims document, Argentina did publish Decree-Law No. 2191 of February 28, 1957, in its Boletin Oficial (March 19, 1957), whereby it reestablished the National Territory of Tierra del Fuego, the Antarctic and the Islands of the South Atlantic. 9 POLAR RECORDS 52-53 (1958). Significantly, similar to Chile, Argentina's claim to Antarctica is based on rights purportedly inherited from Spain

New Zealand,<sup>90</sup> Norway,<sup>91</sup> and the United Kingdom<sup>92</sup> filed wedge-shaped<sup>93</sup> claims of sovereignty<sup>94</sup> antecedent to the Treaty negotiations. Five other

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through the doctrine of *uti possidetis*. For an evaluation, see Hayton, *The "American" Antarctic*, 50 AM. J. INT'L L. 583, 603 (1956). Certainly, also not unimportant is the realization that both Argentina's and Chile's claims overlap substantially with the claim of the United Kingdom. See Moneta, *Antartica Argentina: Los problemas de 1975-1990*, 1 ESTRATEGIA 5 (1975), and J. PUIZ, *LA ANTARTIDA ARGENTINA ANTE EL DERECHO* (1960).

87. Australia claimed the area south of 60 degrees South latitude, between 45 degrees East and 160 degrees East, save for the interceding French sector running 136 degrees East to 142 degrees East. This claim was activated through a February 7, 1933, Order in Council by the United Kingdom, reprinted in 46 INT'L L. DOCS. 236 (1948-49 Compilation)(Publication of the Naval War College). Australia formalized its claim in the Australian Antarctic Territory Acceptance Act No. 8 of 1933, located in I ACTS OF THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA, 1901-50, at 227 (1951).

88. Chile proclaimed its sovereignty over a sector situated 53 degrees West and 90 degrees West in the Presidential Decree of November 6, 1940, reprinted in INT'L L. DOCS., *supra* note 87, at 224. Not insignificant is the fact that Chile traces its claim back to the 1493 papal Bull of Alexander VI which, coupled with the Treaty of Tordesillas in 1494, divided up the New World between Portugal and Spain. See Zegers, *The Antarctic System and the Utilization of Resources*, 33 U. MIAMI L. R. 427, 455-59 (1978). O. PINOCHET DE LA BARRA, *LA ANTARTICA CHILENA* (4th ed. 1976); and O. LABRA, *CHILENOS EN LA ANTARTICA* (1947).

89. The French sector, known as Adelle Land, covers the "island and territories situated south of the 60-degree parallel of south latitude and between the 136-degree and the 142-degree meridians of longitude east" and was articulated in the Presidential Decree of April 1, 1938, reprinted in INT'L L. DOCS., *supra* note 87, at 230-31. See also 1 G. HACKWORTH, 1 DIGEST OF INT'L LAW 459 (1940).

90. New Zealand's administrative claim, known as the Ross Dependency, encompasses the area from 160 degrees East to 150 degrees West and was made possible by a July 30, 1923, Order in Council by the United Kingdom to the Governor of New Zealand. Reprinted in INT'L L. DOCS *supra* note 87, at 235. For especially enlightening accounts, see generally F. AUBURN, *THE ROSS DEPENDENCY* (1972) and L. QUARTERMAIN, *SOUTH FROM NEW ZEALAND* (1964).

91. Norway claimed sovereignty over Bouvet (Bouvetoya) Island on January 23, 1928, and over Peter I Island on May 1, 1931. INT'L L. DOCS, *supra* note 87, at 238, 239. Presumably to obviate the possibility of any German annexation in Antarctica, Norway claimed "[t]hat part of the mainland coast" between 20 degrees West and 45 degrees East (Queen Maud Land) by the Royal Proclamation of January 14, 1939, reprinted in 34 AM. J. INT'L L. 83 (Supp. 1940). Interesting to note, Norway's claim does not extend seaward from *glacia firma* Antarctica, and that even though a Norwegian, Roald Amundsen, was the first explorer to reach the South Pole in 1911, Norway has made no legal claim to that interior region. P. JESSUP & H. TAUBENFELD, *supra* note 73, at 152-54.

92. The British claim, which was made in conjunction with the islands comprising the Falkland Islands Dependencies, covered the area between 20 degrees West and 80 degrees West, below 50 degrees South, and was enunciated in a Letters Patent of July 21, 1908, reprinted in INT'L L. DOCS, *supra* note 87, at 231-33. A subsequent Letters Patent of March 28, 1917, amended the earlier claim to include 20 degrees West to 50 degrees West below 50 degrees South and in addition, claimed the area from 50 degrees West to 80 degrees West below 50 degrees South. *Id.* at 233.

93. Configuration of the claims in Antarctica comport to the "sector theory," ostensibly first devised by Captain J. Bernier in 1907 for Canada's claims in the Arctic. F. AUBURN *supra* note 84, at 19. While admittedly convenient, application of the sector theory in Antarctica is seriously flawed in that: (a) geographically, Antarctica lacks appropriate baselines for drawing sectors; (b) theoretically, claims could be advanced by Guatemala, Ecuador, Nicaragua, Costa Rica, Panama, Peru, Uruguay, and Brazil; (c) applying the sectorization notion to Antarctica contradicts accepted modes of acquiring territory in international law; and (d) sectors could invite conflicts and disputes over the legal validity to future sovereign claims. *Id.* at 23-31.

94. The acquisition of territorial sovereignty in Antarctica has long presented a complex dilemma to international lawyers. In general, claims to Antarctic territory have been predicated upon three doctrines: (1) discovery; (2) the sector theory; and (3) effective occupation. Argentina and Chile

signators, Belgium, Japan, the Soviet Union, South Africa, and the United States have neither made claims nor recognize the legal validity of those which have been made.<sup>95</sup> These twelve States became the original "Consultative Parties"<sup>96</sup> to the Treaty, having demonstrated their "interest in

have also used geographical proximity (contiguity), geological affinity (i.e., the Gondwanaland thesis) and succession to prior Spanish title (*uti posseditis*) as substantiation of their claims. See notes 86-92 *supra*. "Effective occupation," which has long been recognized in international law as a legitimate principle of acquiring title to territory is difficult to define and substantiate when applied to Antarctica. For apt discussion and appropriate analyses, see Bernhardt, *Sovereignty in Antarctica*, 5 CAL. W. INT'L L. J. 297 (1975); Carl, *Claims to Sovereignty—Antarctica*, 28 S. CAL. L. REV. 386 (1955); Daniel, *Conflict of Sovereignties in the Antarctic*, 1949 Y.B. WORLD AFF. 241; Jain, *Antarctica: Geopolitics and International Law*, 17 INDIAN Y.B. INT'L AFF. 249 (1974); Wilson, *National Interests and Claims in the Antarctic*, 17 ARCTIC 15 (1964); and F. AUBURN, *supra* note 84, at 5-47.

95. For treatments of United States and Soviet interests in Antarctica, see F. AUBURN, *supra* note 88, at 61-78, and 78-73, respectively; *U.S. Antarctic Policy: U.S. Policy with Respect to Mineral Exploration and Exploitation in the Antarctic: Hearing Before the Subcomm. on Oceans and International Environment of the Senate Comm. on Foreign Relations*, 94th Cong., 1st Sess (1975); and Wolk, *The Basis of Soviet Claims in the Antarctic*, 5 BULL. INSTITUTE STUDY U.S.S.R. 43 (1958).

96. The status of being a Consultative Party is key to how the Antarctic Treaty system operates. In addition to the twelve original parties, only four states have been accorded Consultative Party status since 1961: Poland in 1977, West Germany in 1981, Brazil in 1983, and India in 1983. These sixteen nations meet periodically, approximately every two years, to approve recommendations aimed at enhancing Treaty cooperation.

Important to realize, a "Contracting Party" is not synonymous with "Consultative Party," a status which must be approved unanimously by the present Consultative Party Group. Non-Consultative parties to the Antarctic Treaty presently include Czechoslovakia (1962), Denmark (1965), The Netherlands (1967), Romania (1971), The German Democratic Republic (1974), Brazil (1975), Bulgaria (1978), Uruguay (1980), Italy (1981), Papua New Guinea (1981), Peru (1981), Spain (1982), and the Peoples Republic of China (1983). U.S. DEP'T OF STATE, TREATIES IN FORCE 252 (1981). The blatant disparities between Consultative and Contracting Parties in benefits gained versus costs paid are readily apparent. As F. Auburn cogently points out,

The Treaty itself imposes a number of obligations on Contracting Parties, but few rights. Scientific information must be provided. Article IV prevents their making new claims. Their consent is not required for amendment of the nuclear provisions. Only Consultative Parties can nominate observers to carry out inspections. Contracting Parties have to exert appropriate efforts to secure compliance with the principles and purposes under Article X. Their agreement is not needed for amendment of the Treaty at any time, although they are not bound by the amendment unless they have consented to it. A review conference can only be called by a Consultative Party, and accession by a non-member of the United Nations requires the unanimous consent of the Consultative Parties. The original signatories were given Consultative status permanently without having to pass any test. Contracting Parties have to show substantial scientific research, and may lose status if this requirement is not complied with. Benefits are not large. In theory, scientific information is received. Exchange scientists are subject to national jurisdiction only. Contracting Parties are entitled to take part in a review conference. It will be pointed out that a State which is a Contracting Party has a legal right, as against all the other parties, to enforce the general clauses, for example the prohibition of military measures and nuclear explosions; but these rights are not backed by any effective means of dispute resolution. The Treaty itself contains little incentive for accession unless the nation concerned intends to become a Consultative Party, and practice since 1961 has endorsed this conclusion.

F. AUBURN, *supra* note 84, at 170-71 (footnotes omitted). Cf. Hanerold, *The Antarctic Treaty Consultative Meetings*, 6 J. COOPERATION AND CONFLICT 183-99 (1971). Significant to note, however, is that the Consultative parties invited the Contracting Parties to attend as observers the

Antarctica by conducting substantial scientific research activity there, such as the establishment of a scientific station or the dispatch of a scientific expedition."<sup>97</sup>

The Antarctic Treaty is a multipurpose document, and embodies significant prescriptions calling for demilitarization,<sup>98</sup> denuclearization,<sup>99</sup> and only peaceful use of the continent;<sup>100</sup> freedom from scientific research and cooperation;<sup>101</sup> on site inspection (after appropriate notification);<sup>102</sup> and, the obligation to settle disputes peacefully.<sup>103</sup> Of especial legal import, moreover, Article IV mandates that nothing contained in the Treaty may be interpreted as renunciation, diminution, or support of a claim made to territorial sovereignty in Antarctica. In addition, no new claim to territorial sovereignty may be asserted by the contracting parties while the Treaty remains in force.<sup>104</sup> For all intents and purposes, Article IV legally froze the status quo ante of the seven pre-Treaty sector claims. Importantly, it did so without qualifying or clarifying the legitimacy of the claims' character under international law, or the potentially conflictual ramifications they might portend for later resource exploitation.<sup>105</sup>

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XII biannual treaty meeting in Canberra, Australia, in September 1983. This is being viewed as an attempt to foster a less furtive forum for Antarctic discussions, "a major departure from previous Antarctic Treaty practice." Kimball, *Unfreezing International Cooperation in Antarctica*, *The Christian Science Monitor*, Aug. 1, 1983, at 23, col. 1. Also see ISSUES BEFORE THE 38TH GENERAL ASSEMBLY OF THE UNITED NATIONS 1983-1984 at 107, 109 (D. Puchala ed. 1983).

97. Antarctic Treaty, *supra* note 85, art IX (2).

98. *Id.* art. I.

99. *Id.* art V.

100. *Id.* Preambular para.

101. *Id.* art. I.

102. *Id.* art. II.

103. *Id.* art. XI.

104. In full, Article IV provides that:

1. Nothing contained in the present Treaty shall be interpreted as:
  - a) a renunciation by any Contracting Party of previously asserted rights of or claims to territorial sovereignty in Antarctica;
  - b) a renunciation or diminution by any Contracting Party of any basis or claim to territorial sovereignty in Antarctica which it may have whether as a result of its activities or those of its nationals in Antarctica, or otherwise;
  - c) prejudicing the position of any Contracting Party as regards its recognition or nonrecognition of any other State's right of or claim or basis of claim to territorial sovereignty in Antarctica.
2. No acts or activities taking place while the present Treaty is in force shall constitute a basis for asserting, supporting or denying a claim, to territorial sovereignty in Antarctica, or create any rights of sovereignty in Antarctica. No new claim, or enlargement of an existing claim, to territorial sovereignty in Antarctica shall be asserted while the present Treaty is in force.

*Id.* art. IV.

105. See text at notes 200-05 *infra*. Also see Bilder, *The Present Legal and Political Situation in Antarctica* in Charney, *supra* note 2, at 167-205; Peterson, *Antarctica: The Last Great Land Rush on Earth*, 34 INT'L ORG. 377 (1980), Burton, *New Stresses on the Antarctic Treaty: Toward International Legal Institutions Governing Antarctic Resources*, 65 VA. L. REV. 421 (1979); Alexander, *A Recommended Approach to the Antarctic Resource Problem*, 33 U. MIAMI L. REV. 371 (1978); and Note, *Thaw in International Law? Rights in Antarctica Under the Law of Common Space*, 87 YALE L. J. 804 (1978).

As set within the parameters of the Treaty, the principal thrust of national activities over the past two decades has been evinced in scientific research cooperation and environmental protection. Indeed, of the 132 recommendations unanimously adopted thus far by the Consultative Parties meeting in eleven conference sessions,<sup>106</sup> the vast majority have related directly to those two basic concerns. In addition, two multilateral instruments designed to conserve and protect Antarctic living resources have grown out of the Treaty's Consultative Group process, the Agreed Measures for the Conservation of Antarctic Fauna and Flora<sup>107</sup> in 1964 and the Convention for the Conservation of Antarctic Seals in 1972.<sup>108</sup>

Nevertheless, the Antarctic Treaty neither provided a formal mechanism nor stipulated any precise regulations for exploring or exploiting living or non-living resources on the continent or offshore. Further, the Treaty designated no rights or privileges for resource exploitation, nor did it fashion pollution restrictions or create any specified husbandry standards for safeguarding the environment. Expressed succinctly, while the Antarctic Treaty established a legal framework for Antarctic affairs, it failed to deal in any substantive manner with issues regarding resource exploitation, management, or ownership.

## *Antarctic Resource Regimes and the Environment*

### *Living Resources*

Rapid improvement and advancement of marine resource harvesting technology during the 1970s,<sup>109</sup> coupled with the overt absence of any appropriate international law for adequate regulation, prompted the Consultative Parties in 1980 finally to address squarely the problem of managing marine resources in the Southern Ocean.<sup>110</sup> The composite product of these discussions was a new agreement, the Convention on the Con-

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106. Barnes, *The Emerging Convention on the Conservation of Antarctic Marine Living Resources: An Attempt to Meet the New Realities of Resource Exploitation in the Southern Ocean*, in Charney, *supra* note 2, at 242. Prior to the Eleventh Consultative Meeting (1982), 127 recommendations had been approved. For texts of the 118 recommendations adopted at the first nine consultative meetings, see U.S. DEP'T OF STATE, HANDBOOK OF MEASURES IN FURTHERANCE OF THE PRINCIPLES AND OBJECTIVES OF THE ANTARCTIC TREATY (2d ed. 1979). The nine subsequent recommendations adopted in 1981 are reprinted in U.S. DEP'T OF STATE, REPORT OF THE TENTH CONSULTATIVE MEETING OF THE ANTARCTIC TREATY (1979).

107. Reprinted in F. AUBURN, *supra* note 84, at 304-310. Also see Guyer, *supra* note 84, at 193-97.

108. June 1, 1972, T.I.A.S. No. 8826, reprinted in 11 INT'L LEGAL MATERIALS 251 (1972).

109. See generally Butler, *Owning Antarctica: Cooperation and Jurisdiction at the South Pole*, 31 J. INT'L AFF. 35 (1977).

110. Pallone, *Resource Exploitation: The Threat to the Legal Regime of Antarctica*, 10 CONN. L. REV. 401 (1978); Mitchell & Kimball, *Conflict Over the Cold Continent*, 35 FOREIGN POLICY 124 (1979); and Roberts, *International Co-operation for Antarctic Development: The Test for the Antarctic Treaty*, 19 POLAR REC. 107 (1978).

ervation of Antarctic Marine Living Resources.<sup>111</sup> This multilateral instrument marked a significant step toward living resource management for the Antarctic region, albeit one not without serious defects and deficiencies.

The ambit of the Convention's application is that region south of the Antarctic Convergence.<sup>112</sup> The substantive essence of the treaty, however, lies in Article II. It defines the primary objective to be conservation (implicitly, "rational use")<sup>113</sup> and sets out broad principles aimed at preserving the balance and interrelationships among harvested species.<sup>114</sup>

As with other fishery agreements,<sup>115</sup> the Convention establishes two chief institutions: a Commission and a Scientific Committee. The Commission<sup>116</sup> is responsible for effectuating the Convention's objectives. Accordingly, the Commission is charged with the obligations to facilitate research, compile relevant biological data, ensure acquisition of catch and effort statistics on harvested species, analyze, disseminate, and publish relevant scientific information, identify pertinent conservation needs, "formulate, adopt and revise conservation measures on the basis of the

111. May 20, 1980, *reprinted in* 19 INT'L LEGAL MATERIALS 837 (1980). As of September 1, 1982, the following States had ratified the Convention: Argentina, Chile, East Germany, West Germany, Japan, New Zealand, South Africa, the United Kingdom, the United States, and the U.S.S.R. The Convention entered into force on April 7, 1982.

112. Convention of Marine Living Resources, *supra* note 111, art. 1. The Antarctic Convergence is a zone where the cold, low-saline waters of the Southern Ocean meet the warmer, higher-saline waters of the southern parts of the Atlantic, Pacific, and Indian Oceans. Also known as the "Polar Front Zone," the Antarctic Convergence is located between latitudes 50 degrees and 60 degrees South.

113. *Id.* art. II (2), at 842.

114. The conservation principles contained in Article II obligate Parties to ensure:

a) Prevention of decrease in the size of any harvested population to levels below those which ensure its stable recruitment. For this purpose its size should not be allowed to fall below a level close to that which ensures the greatest net annual increment;

b) maintenance of the ecological relationships between harvested, dependent and related populations of Antarctic marine living resources and the restoration of depleted populations to the levels defined in subparagraph (a) above; and

c) prevention of changes or minimization of the risk of changes in the marine ecosystem which are not potentially reversible over two or three decades, taking into account the state of available knowledge of the direct and indirect impact of harvesting, the effect of the introduction of alien species, the effects of associated activities on the marine ecosystem and of the effects of environmental changes, with aim of making possible the sustained conservation of Antarctic marine living resources.

*Id.* art. II (3), at 843.

115. For example, the International Convention for the Regulation of Whaling with Schedule of Whaling Regulators, Dec. 2, 1946, 62 Stat. 1976, T.I.A.S. No. 1849, 161 U.N.T.S. 72. An excellent analysis of the IWC's efficacy is M'Gonigle, *The "Economizing" of Ecology: Why the Big, Rare Whales Still Die*, 9 ECOLOGY L. Q. 114 (1980).

116. Convention on Marine Living Resources, *supra* note 111, at arts VII-XIII.

best scientific evidence available,"<sup>117</sup> and implement the system of inspection provided for in the Convention.<sup>118</sup>

The Scientific Committee will operate as a "consultative body to the Commission."<sup>119</sup> The Scientific Committee serves primarily as a "forum for consultation and cooperation concerning the collection, study and exchange of information with respect to [Antarctic] marine living resources. . . ." <sup>120</sup> Furthermore, the Convention charged the Committee with encouraging and promoting cooperation in scientific research through a broad spectrum of activities.<sup>121</sup>

The Convention on the Conservation of Antarctic Marine Living Resources is not without flaws, however. These warrant notation. First, in

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117. *Id.* art. IX (2). As specified, "conservation" measures include the following:

- a) the designation of the quantity of any species which may be harvested in the area to which this Convention applies;
- b) the designation of regions and sub-regions based on the distribution of populations of Antarctic marine living resources;
- c) the designation of the quantity which may be harvested from the populations of regions and sub-regions;
- d) the designation of protected species;
- e) the designation of the size, age and, as appropriate, sex of species which may be harvested;
- f) the designation of open and closed seasons for harvesting;
- g) the designation of the opening and closing of areas, regions or sub-regions for purposes of scientific study or conservation, including special areas for protection and scientific study;
- h) regulation of the effort employed and methods of harvesting, including fishing gear, with a view, inter alia, to avoiding undue concentration of harvesting in any region or sub-region;
- i) the taking of such conservation measures as the Commission considers necessary for the fulfillment of the objective of this Convention, including measures concerning the effects of harvesting and associated activities on components of the marine ecosystem other than the harvested populations.

118. *Id.* See *id.* art. XXIV.

119. *Id.* art. XIV.

120. *Id.* art. XV.

121. *Id.* art. XV. As stipulated, the Scientific Committee is empowered to:

- a) establish criteria and methods to be used for determinations concerning the conservation measures referred to in Article IX of this Convention;
- b) regularly assess the status and trends of the populations of Antarctic marine living resources;
- c) analyse data concerning the direct and indirect effects of harvesting on the populations of Antarctic marine living resources;
- d) Assess the effects of proposed changes in the methods or levels of harvesting and proposed conservation methods;
- e) transmit assessments, analyses, reports and recommendations to the Commission as requested or on its own initiative regarding measures and research to implement the objective of this Convention;
- f) formulate proposals for the conduct of international and national programs of research into Antarctic living resources.

*Id.* art. XV (2).



order to activate the conservation standards set out in Article II, concerned states must provide requisite financial, technical and political commitments, most particularly the chief harvesting States, Japan and the Soviet Union.<sup>122</sup> Yet, no provision is made specifically for setting either national catch quotas or effort restrictions. Moreover, a second difficulty rests in the voting procedure. Given the "consensus" formula adopted (read to mean "unanimity"), a single government could veto a catch allocation proposed for consideration by the Commission. Inherent in consensus as a policymaking approach, not surprisingly, is the risk of deadlock and stalemate. The Commission couched a third fallacy in the binding nature of an adopted conservation-oriented measure. If some member determines that it is unable to accept such a decision, it may notify the Commission within a certain time limit of the objection, and thereby obviate being bound by that measure.<sup>123</sup>

A claims problem exists as well, perhaps the matter most difficult to reconcile during the Convention negotiations.<sup>124</sup> Article IV of the proposed agreement was the compromise product. It provides for a "bifocal" approach, i.e., one "which allows both claimants and nonclaimants to interpret the same language differently regarding a claimant's *right* to exercise coastal state jurisdiction off the continent and islands south of 60 degrees S."<sup>125</sup> Hence, though linking verbatim the Convention to the Antarctic Treaty, Article IV does nothing to clarify explicitly the legal nature or validity of the claims' status.

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122. Barnes, *supra* note 106, at 243.

123. Convention on Marine Living Resources, *supra* note 111, at art. IX (6).

124. For an insightful treatment of the Convention negotiations, see Barnes, *supra* note 106, at 242-69.

125. *Id.* at 265 (emphasis in original; footnote omitted). Article IV of the Convention provides in full

1. With respect to the Antarctic Treaty area, all Contracting Parties, whether or not they are Parties to the Antarctic Treaty, are bound by Articles IV and VI of the Antarctic Treaty in their relations with each other.

2. Nothing in this Convention and no acts or activities taking place while the present Convention is in force shall:

a) constitute a basis for asserting, supporting or denying a claim to territorial sovereignty in the Antarctic Treaty area or create any rights of sovereignty in the Antarctic Treaty area;

b) be interpreted as a renunciation or diminution by any Contracting Party of, or as prejudicing, any right or claim or basis of claim to exercise coastal state jurisdiction under international law within the area to which this Convention applies;

c) be interpreted as prejudicing the position of any Contracting Party as regards to recognition or nonrecognition of any such right, claim or basis of claim;

d) affect the provision of Article IV, paragraph 2, of the Antarctic Treaty that no new claim, or enlargement of an existing claim, to territorial sovereignty in Antarctica shall be asserted while the Antarctic Treaty is in force.

Convention on Marine Living Resources, *supra* note 111, at art IV. Cf. Article IV of the Antarctic Treaty, *supra* note 104.

The precise operation of the Scientific Committee was also left vague. Whereas headquarters for the Commission was designated in Hobart, Tasmania, Australia,<sup>126</sup> no permanent institution nor guaranteed access to technical facilities were assured. Further, consensus voting required for the Scientific Committee's budget could result in some harvesting nation blocking allocations for research that favored lower quotas, thereby precluding implementation of appropriate conservation measures.

Difficulties of enforcement emerge as well. No centralized inspection program exists for verifying compliance with conservation measures. The overt omission of boarding, inspection, and prosecution in deference to flag state enforcement conceivably could invite opportunities for miscreant activities. In a similar vein, the covenant provides little for dispute settlement. Should some dispute arise between Contracting Parties over application or interpretation of the Convention, Article XXV does obligate them to "consult among themselves with a view to having the dispute resolved by negotiation, inquiry, mediation, conciliation, arbitration, judicial settlement or other peaceful means of their own choice."<sup>127</sup> Should these efforts fail, resort should be made "with the consent in each case of all parties to the dispute" to the International Court of Justice or to arbitration.<sup>128</sup> Compulsory dispute settlement, however, is ignored, as is the possibility that a dispute could arise between a Contracting Party and some other State or non-governmental entity.

Finally, a serious limitation of the Marine Living Resources Convention lies in its rather narrow range and focus. As treated throughout the agreement, "conservation" is intended to mean "rational use," or wise harvesting practices.<sup>129</sup> Yet, neither is the associated liability of vessel-source pollution treated, nor are potential ecological problems stemming from land-based activities ostensibly covered. In sum, the Convention's thrust is to preserve the balance of Antarctica's present ecological system, not to provide comprehensive protection from man-induced environmental degradation. Consequently, while the Convention does mark a bold beginning in setting ecostandards for harvesting living marine resources in the Antarctic region, it is merely that—just a beginning.<sup>130</sup>

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126. Convention on Marine Living Resources, *supra* note 111, art. XIII (1).

127. *Id.* art. XXV. This article is practically a verbatim transcript of the dispute settlement provisions in Article XI of the Antarctic Treaty.

128. *Id.*

129. *Id.* art. II (2). See arts. IX, XI, XV, and XXIV.

130. Professor Auburn is less sanguine in his *realpolitick* assessment of the Convention. Posits he:

To date the most significant action of environmental concern under the Antarctic system has been the Living Resources Convention. Although the Conservation principles of the Convention would provide substantial protection for the marine ecosystem, . . . there will be serious obstacles to any attempt to promulgate measures binding harvesting States contrary to their wishes. There is no specific funding

### *Non-Living Resources*

As alluded to earlier, the prospects for commercially recovering worthwhile hard minerals from Antarctica, even if discovered in mineable quantities, are neither bright nor near-term. Serious obstacles of logistics, onerous investment costs, and Antarctica's ice sheet effectively obviate for the foreseeable future any on-continent operations. On the other hand, interest in hydrocarbon geology around Antarctica became stimulated in 1972 with the discovery of traces of methane, ethane and ethylene in three of four holes drilled by the *Glomar Challenger* in the Ross Sea.<sup>131</sup> Notwithstanding sensationalist press reports at that time,<sup>132</sup> massive hydrocarbon deposits on the Antarctic continental shelf still remain speculative resources. Nevertheless, should some commercial exploration proceed during the next decade, deleterious environmental consequences could result, unless some action is taken to provide adequate ecological forecasting and preventive legal measures.

Critical to appreciating the environmental liabilities associated with exploiting non-living resources, especially hydrocarbons, in the Antarctic is the physical nature of the local marine ecosystem. Offshore, Antarctica's continental shelf is relatively steep and narrow. Its seaward edge drops off to a depth of 900 meters and the composite shelf area covers approximately 4 million square kilometers.<sup>133</sup> For up to ten months of the year, sea ice overlies nearly all the shelf, albeit during the austral summer this breaks up into pack ice and flows northward.<sup>134</sup> As a result, the multi-year accumulation of ice makes ship passage in the Southern Ocean extraordinarily difficult, if not impossible.<sup>135</sup>

Petroleum prospectors on the Antarctic continental shelf encounter unique problems, to say the least. Ice coverage most of the year hampers or

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mechanism for scientific research on krill stocks, and the Convention does not prescribe catch levels or any other form of regulation. Krill trawling countries can either veto conservation measures or individually refuse to accept them. The Scientific Committee is essentially under the direction of the Commission, which represents the political interests of States. Impact assessment in the municipal law sense is not provided for under the regime, and even if the Scientific Committee were to reach specific conclusions on, say, desirable catch levels, such findings would in no way bind the Commission.

F. AUBURN, *supra* note 84, at 289.

131. See McIver, *supra* note 79.

132. E.g., Spivak, *Frozen Assets?*, Wall St. J., Feb. 21, 1974, at 1; Shapley, *Antarctica: World Hunger for Oil Spurs Security Council Review*, 184 SCIENCE 776 (1974); and Sullivan, *Russians Will Help U.S. in Drilling in Sea's Floor*, N.Y. Times, Mar. 23, 1973, at 1, col. 6. Compare Auburn, *Offshore Oil and Gas in Antarctica*, 22 GER. Y. B. INT'L L. 39 (1977).

133. Zumberge, *Mineral Resources and Geopolitics in Antarctica*, 67 AM. SCIENTIST 68, 74 (1979).

134. See generally A. MILNE, OIL, ICE AND CLIMATIC CHANGE (1978).

135. Campbell, *Oil and Ice in the Arctic Ocean: Possible Large Interactions* 181 SCIENCE 56 (1973).

precludes geological exploratory operations. Furthermore, icebergs of tremendous size and draft present another hazard to exploration, especially during the drilling stage. While smaller bergs could be pushed aside by tugboats or icebreakers,<sup>136</sup> the larger ones, some having dimensions in excess of 70 by 100 kilometers<sup>137</sup> (or 4200 square miles), would pose obvious dangers to drilling vessels or operational platforms. Additionally, these larger bergs are so substantial in volume as to be capable of scouring the ocean floor to water depths approaching 200 meters.<sup>138</sup> As a result, production wells in the Southern Ocean's iceberg-infested waters would have to be constructed such that no structures were left protruding above the seabed. Undoubtedly, too, local icebergs would loom hazardous to tankers transporting petroleum from production wells offshore Antarctica to elsewhere. In sum, James Zumberge stated it succinctly recently:

Thus, no matter how geologically attractive the continental shelves of West Antarctica might appear, the combined hazards of severe pack ice, prolonged storms of high intensity, and bottom-scouring icebergs present technical difficulties of immense proportions for anyone contemplating petroleum exploration and, ultimately, extraction in the high latitudes of the Southern Ocean.<sup>139</sup>

Implicit in these "technical difficulties" are the concomitant risks of oil spillages and well blow outs which accompany any significant petroleum production operation in the marine environment.

At present, commercial exploitation of Antarctica's petroleum potential appears little more than futuristic speculation. Even so, the chances for severe environmental damage remain real, and due consideration of these dire possibilities, as well as the legal contingencies for preventing their occurrence, seems appropriate.

As of today, no international regime formally exists legally for ensuring the protection, preservation, and conservation of Antarctica's marine environment. Nevertheless, some scenarios regarding an Antarctic mineral regime are conceivable.

*The Status Quo Scenario.* The Consultative Parties of an Antarctic Non-Living Resources Convention may promulgate an agreement as that concluded in 1980 for living marine resources.<sup>140</sup> Clearly, this type of instrument seems reasonable of anticipation, since the 1972 Seventh Ant-

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136. Bruneau, *Iceberg Towing for Oil Rig Avoidance*, in ICEBERG UTILIZATION 379 (A. Husseiny ed. 1978).

137. Swithinbank, *Giant Icebergs in the Weddell Sea 1967-1968*, 14 POLAR REC. 477-78 (1969).

138. POSSIBLE ENVIRONMENTAL EFFECT OF MINERAL EXPLORATION AND EXPLOITATION IN ANTARCTICA 12 (J. Zumberge ed. 1979).

139. Zumberge, *supra* note 133, at 74.

140. See text at notes 110-130 *supra*.

arctic Treaty Consultative Meeting adumbrated it. One direct product of that gathering, Recommendation VII-6, publicly acknowledged the likelihood that exploitable minerals might exist within the Antarctic Treaty Area. It noted the "need for further study and deliberation among the Consultative Parties," and recognized that mineral exploitation conceivably could "raise problems of an environmental nature."<sup>141</sup>

In 1977, the Consultative Parties demonstrated more concern when they espoused unanimously a policy position aimed at dissuading mining operations by their nationals or third party States within the regional ambit of the Antarctic Treaty. To this end, paragraph (8) of Recommendation IX-1 formally proposed that these governments

urge their nationals and other States to refrain from all exploration and exploitation of Antarctic mineral resources while making progress towards the timely adoption of an agreed regime concerning Antarctic mineral resource activities. They will thus endeavour to ensure that, pending the timely adoption of agreed solutions pertaining to exploration and exploitation of mineral resources, no activity shall be conducted to explore or exploit such resources. They will keep these matters under continuing examination,<sup>142</sup>

Admittedly, this recommendation *in strictu sensu* does not entail a legal moratorium among the Consultative Parties to abstain from conducting exploration or exploitation resource activities in or around Antarctica. Nor does it legally advocate or bind the Consultative Party Governments to refrain from economically exploiting mineral resources in Antarctica's maritime region. Notwithstanding this absence of legal constraints, Recommendation IX-1 still signaled a noteworthy turning point in the Consultative Parties' attitudes toward Antarctica's mineral resource development. It not only highlighted the need for expert assessment of Antarctic environmental questions,<sup>143</sup> especially damage prevention,<sup>144</sup> but also embodied four guiding principles endorsed by the Consultative Parties relating to minerals in the region:

- (i) the Consultative Parties will continue to play an active and responsible role in dealing with the question of the mineral resources of Antarctica;
- (ii) the Antarctic Treaty must be maintained in its entirety;

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141. Certain recommendations of the Seventh Antarctic Treaty Consultative Meeting, *adopted* Nov. 10, 1972, Rec. VII-6, 28 U.S.T. 1138, T.I.A.S. No. 8500, *reprinted* in HANDBOOK OF MEASURES, *supra* note 107, at 1501.

142. Certain recommendations of the Ninth Antarctic Treaty Consultative Meeting, *adopted* Oct. 7, 1977, Rec. IX-1, *reprinted* in HANDBOOK OF MEASURES, *supra* note 106, at 1503, 1504.

143. *Id.* para. 3.

144. *Id.* para. 3(ii). The deleterious impact of oil contamination was particularly singled out in Recommendation IX-6. *See* HANDBOOK OF MEASURES, *supra* note 106, at 1107.

- (iii) protection of the unique Antarctic environment and of its dependent ecosystems should be a basic consideration;
- (iv) the Consultative Parties, in dealing with the question of mineral resources in Antarctica should not prejudice the interests of all mankind in Antarctica.<sup>145</sup>

The Consultative Parties' indicated continued concern over fashioning an Antarctic mineral resources regime through Recommendation XI-1, adopted by consensus in 1981 at the Eleventh Consultative Meeting.<sup>146</sup> This proviso recognized that "A regime on Antarctic mineral resources should be concluded as a matter of urgency," reaffirmed the four guiding principles enumerated above,<sup>147</sup> and called for convention of a Special Consultative Meeting in order to elaborate such a regime and to schedule appropriate future negotiations.<sup>148</sup> Further, while Recommendation XI-1 perpetuated the nebulous claims situation,<sup>149</sup> due consideration nevertheless was leveled at requisite protection of Antarctica's areal environment from mineral exploitation-related activities,<sup>150</sup> as well as at guaranteed assessment and research means for facilitating informed resource management and decision-making.<sup>151</sup> Given these diplomatic initiatives, the Consultative Parties clearly are moving forthrightly toward negotiating a limited agreement which establishes some kind of Antarctic mineral resource regulatory mechanism. Presumably this regime at least will have hortatory provisions for minimizing those exploitation activities capable of denigrating or polluting Antarctica's circumpolar marine ecosystem.

*The Condominium Scenario.* A second foreseeable way of fostering an environmentally conscious mineral regime for managing the Southern Ocean is the evolution of a formal condominium schema on the Antarctic

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145. Recommendation IX-1, *supra* note 142, at para. 8.

146. Para. 2, Recommendation XI-1 of the Final Report of the Eleventh Antarctic Treaty Consultative Meeting, Antarctic Mineral Resources, *reproduced* as Appendix G in Charney, *supra* note 2, at 329, 330.

147. *Id.* at para. 5. In addition, the following fifth principle was appended:

(e) the provisions of Article IV of the Antarctic Treaty should not be affected by the regime. It should ensure that the principles embodied in Article IV are safeguarded in application to the area covered by the Antarctic Treaty.

*Id.* For the text of Article IV see note 104 *supra*.

148. Recommendation XI-1, *supra* note 146, at para. 3.

149. Paragraph 6 of Recommendation XI-1 stipulates that:

6. Any agreement that may be reached on a regime for mineral exploration and exploitation in Antarctica elaborated by the Consultative Parties should be acceptable and be without prejudice to those States which have previously asserted rights of or claims to territorial sovereignty in Antarctica as well as to those States which neither recognize such rights of or claims to territorial sovereignty in Antarctica nor, under the provisions of the Antarctic Treaty, assert such rights or claims.

*Id.* para. 6.

150. *Id.* para. 7.

151. *Id.* para. 7 (I, VII).

continent.<sup>152</sup> Should imposition of ecological safeguards come to supercede priority considerations of national sovereignty and territorial aggrandizement, the claimant Consultative Parties hypothetically could opt to abandon their individual sector claims in preference to a jointly administered continental regime. This scenario likely could permit closer, more effective coordination of antipollution offshore policies. Moreover, a principal attraction of this arrangement would lie in a more comprehensive regional approach for implementing policies of offshore mineral and hydrocarbon resource development, while at the same time allowing for concomitant protection of the Southern Ocean's environment. In addition, this regime of shared rights and responsibilities would resolve the claims questions. Sector claims on the continent would be dissolved, and the region could be governed cooperatively as a whole polity. Heightened commercial attention in Antarctica very likely would stem directly from unequivocal resolution of the sector claims' uncertain legal status. Private ventures correspondingly would incur less risk by investing in a politically non-contentious legal situation. Aside from all these ostensible advantages, political reality dictates that creation of an Antarctic condominium in the near term is remote at best. Whether claimant or non-claimant, Consultative Party States have been and are still reluctant to relinquish voluntarily their real or imagined sovereign interests in the region.<sup>153</sup>

*The Nationalization Scenario.* Another relevant scenario could find the Antarctic continent and its superjacent waters carved up among competing States. Should the Antarctic Treaty regime collapse in the wake of failed renegotiation proceedings,<sup>154</sup> a likely reaction is apt to be reinvigorated assertions of sovereign claims by States historically interested in the region.<sup>155</sup> In that event, Antarctica and its environs legally would become treated as *terra nullius*, i.e., territory belonging to no one and thus made subject to national appropriation, with attendant rights of indigenous resource exploitation.<sup>156</sup> The resultant national claims would gain legal

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152. For a fuller treatment of this notion, see Rose, *Antarctic Condominium: Building a New Legal Order for Commercial Interests*, MARINE TECH. SOC'Y J. 19 (Jan. 1976).

153. Reportedly, New Zealand has been the only State to posit publicly its willingness to give up its claim if the other Claimant States did also. C. BEEBY, *supra* note 84, at 8-10.

154. Article XII provides that thirty years after the Treaty's entry into force (i.e., 1991) a Conference may be called by a Consultative Party "to review the operation of the Treaty." Antarctic Treaty, *supra* note 84, at Art. XII, para. 2(a).

155. Little question seems to exist that the United States and the Soviet Union would act to bolster their respective national interests in the region. See F. AUBURN, *supra* note 84, at 61-83.

156. For the acquisition of territory to be legitimate, it must not be under the sovereignty of another State at the moment of occupation. Compare *Island of Palmas Case*, (United States v. Netherlands) 2 R. INT'L ARB. AWARDS 829 (Perm. Ct. Arb., 1928), reprinted in 22 AM. J. INT'L L. 867 (1928) with *Affaire de l'Isle de Clippertons*, 2 R. INT'L ARB. AWARDS 1105 (1931) and *Legal Status of Eastern Greenland*, (1933) P.C.I.J., Ser. A/B, No. 53, reprinted in 3 M. HUDSON, WORLD COURT REPORTS 148 (1934).

validity, and concurrently promote legal acceptance of the Claimant States' jurisdictional assertions and commercial activities in the region.

While national claims ultimately might engender the sound policies for coastal resource management and offshore environmental protection usually associated with national ownership and control of territory, they quite possibly would also breed conflict and confrontation among vested State interests. The headlong rush to grab sovereign territory in Antarctica could not help but produce overlapping claims situations, with a concomitant high probability that disputes could be touched off among respective claimants. Predictably, the regrettable upshot of these circumstances would relegate environmental preservation policies for the Southern Ocean to only secondary, if indeed any substantive priority. Therefore, a continent earmarked by manifold national territorial claims could render the integrity of Antarctica's seaward ecosystem vulnerable to contamination and refuse cast off by multi-national regional competition.<sup>157</sup>

*The "Common Heritage" Scenario.* Conception of a minerals regime for Antarctica and its coastal environs might also take a route similar to that which occurred in the United Nations for the deep seabed.<sup>158</sup> That is, the United Nations General Assembly could declare the cold continent and all circumjacent waters south of 60 degrees South latitude to be "the common heritage of mankind."<sup>159</sup> If subsequently confirmed by State conduct and accepted practice, this legal status would explicitly exclude any exercise of national sovereignty or territorial rights over the Antarctic area. Moreover, it would also preclude acquisition of all jurisdictional prerogatives usually associated with sovereignty by any State, person, or corporate entity vis-à-vis Antarctica's mineral resources.<sup>160</sup> Hence, the

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157. Professor Rainer Lagoni alluded to this possibility when he observed, To sum up, the prospects for nationalization of this continent are still dim because the possibilities of living in Antarctica are still very limited, the territorial claims are rejected by important Consultative Parties, and several claims are clouded by competing claims of other States. On the other hand, with the growing possibility of exploiting Antarctica's mineral resources, the threat of nationalization of parts of this continent is increasing because commencement of mineral exploitation would rapidly change living conditions in this continent. Antarctica would become habitable and subject to effective occupation.

Lagoni, *Antarctica's Mineral Resources in International Law*, 39 ZETSCHRIFT FUR AUSLANDISCHES OFFENTLICHES RECHT UND VOLKERRECHT 1, 19 (1979).

158. See Pinto, *The International Community and Antarctica*, 33 U. MIAMI L. REV. 475 (1978) and Bilder, *supra* note 105, at 184, ff.

159. The precise legal status of such a U.N. declaration, however, remains highly polemical. Compare e.g., J. CASTAÑEDA, LEGAL EFFECTS OF UNITED NATIONS RESOLUTIONS (1969) and O. ASAMOAH, THE LEGAL SIGNIFICANCE OF THE DECLARATIONS OF THE GENERAL ASSEMBLY OF THE UNITED NATIONS (1966) with Sloan, *The Binding of a Recommendation of the General Assembly of the United Nations*, 25 BRIT. Y.B. INT'L L. 1 (1948) and Schwebel, *The Effect of Resolutions of the U.N. General Assembly on Customary International Law*, 79 PROCEEDINGS AM. SOC'TY INT'L L. 301 (1979).

160. For general discussion on the jurisdictional nuances of the common heritage notion, see Van Dyke & Yuen, "*Common Heritage*" v. "*Freedom of the High Seas*": Which Governs the Seabed?,



Antarctic area and its coastal resources legally would become *res communis*, i.e., territory common to all and therefore immune from national appropriation.<sup>161</sup>

Within the realm of susceptibility, the U.N. General Assembly might declare the Antarctic to be a portion of "the common heritage of mankind," particularly given that body's recent pronouncements over the deep seabed<sup>162</sup> and the moon.<sup>163</sup> Nevertheless, this type of proclamation by the General Assembly would be more politically salient than legally significant. General Assembly declarations and resolutions are merely hortatory expressions, without full legally binding commitment.<sup>164</sup> Given this fact, these recommendations do however entail consensus expressions of the international community; consequently, they may at times foreshadow the course of acceptable legal conduct by States over the long term.<sup>165</sup>

Respective to Antarctic mineral resource development offshore, a "common heritage of mankind" approach indubitably would be welcomed warmly by the Group of 77 (i.e., the less developed countries)<sup>166</sup> and vehemently resisted by the Consultative Parties (comprised primarily of advanced industrialized nations).<sup>167</sup> Concerning marine environmental protection and preservation, theoretically the "common heritage" approach might appear quite desirable; in practice, however, it actually has yet to be tested. In this regard, one unmistakable reality overwhelms legalistic niceties: for the "common heritage of mankind" approach to

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19 SAN DIEGO L. REV. 493 (1982). Larschan & Brennan, *The Common Heritage of Mankind Principle in International Law*, 21 COLUM. J. TRANSNAT'L L. 305 (1983) and Wolfrum, *The Principle of the Common Heritage of Mankind*, 43 ZEITSCHRIFT FÜR AUSLANDISCHES OFFENTLICHES RECHT UND VOLKERRECHT 312 (1983).

161. See J. KISH, *THE LAW OF INTERNATIONAL SPACES* 70-80 (1973).

162. See Declaration of Principles Governing the Sea-Bed and the Ocean Floor, and the Subsoil Thereof, beyond the Limits of National Jurisdiction, 25 U.N. GAOR, Supp. (No. 28), U.N. Doc. A/8028 (1971). For appropriate commentary, see Adede, *The System of Exploitation of the "Common Heritage of Mankind" at the Caracas Conference*, 69 AM. J. INT'L L. 31 (1975); Charney, *The International Regime for the Deep Seabed: Past Conflicts and Proposals for Progress*, 17 HARVARD INT'L L. J. 1 (1976); and see generally, *INTERNATIONAL LAW OF THE SEA AND THE FUTURE OF DEEP SEABED MINING* (C. Joyner ed. 1975).

163. Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, U.N. Doc. A/AC.105/1.113/Add.4 (1979), opened for signature Dec. 18, 1979. Article XI provides in relevant part that "The moon and its natural resources are the common heritage of mankind. . . ." *Id.*, Art. XI, para. 1. See Christol, *The Common Heritage of Mankind Provision in the 1979 Agreement Governing the Activities of States on the Moon and other Celestial Bodies*, 14 INT'L LAWYER 429 (1980). For the United States' reaction to the "Common Heritage" provision, see 115 *Time*, Mar. 24, 1980, at 47.

164. Joyner, *U.N. General Assembly Resolutions and International Law: Rethinking the Contemporary Dynamics of Norm-Creation*, 11 CALIF. W. INT'L L. J. 445, 452 (1981).

165. *Id.* at 463.

166. See generally, Friedman & Williams, *The Group of 77 at the United Nations: An Emergent Force in the Law of the Sea*, 16 SAN DIEGO L. REV. 555 (1979).

167. See notes 84-109 *supra* and accompanying text.

attain political viability in the Antarctic environs, there must come wholesale participation and cooperation from the so-called developed States, i.e., the Consultative Parties. Absent this genuine political commitment, heralding Antarctica as a common legacy for all mankind will remain merely a political chimera, a proclamation containing more rhetorical sieve than legal substance.

### *Assessment*

Increasingly over the past decade international attempts to curb intentional pollution of ocean space have been undertaken, albeit largely in piecemeal fashion. Respective to the Southern Ocean's circumpolar waters, only a modicum of direct legal concern and policy attention for anti-pollution protection thus far has been evinced. Under presently prevailing politico-economic conditions this apparent neglect can be explained by at least four mitigating circumstances. First, the region's barren desolation, austere isolation, and acutely inhospitable climate create glaring logistical problems which, not surprisingly, have tempered enthusiasm by commercial concerns for resource development there. Second, the correlated lack of efficient extracting technology, coupled with exorbitant investment expenditures and the unsettling realization that only a paucity if any lucrative deposits of exploitable mineral deposits could be found in the Southern Ocean, have combined to depreciate that region's economic attractiveness. Simply stated, investment risks for resource exploitation in Antarctica currently are calculated to outweigh potential profit returns. Hence, neither economic incentives for large scale Antarctic resource exploitation nor a perceived pressing need for legally insulating the marine area from potential pollution hazards are evidenced. Third, though admittedly exclusive in design and composition, a legal regime for administering the Antarctic environment already is in place and has been accepted without legal challenge by the international community since the Antarctic Treaty's inception in 1961. Fourth, even if massive amounts of mineral resources were discovered, uncertainty over Antarctica's claims situation, exacerbated by unpredictable prospects for the continent's legal status over the next two decades, renders investment opportunities in the region at this time impractical and imprudent. In short, a wait-and-see attitude is being taken by commercial developers in preference to that of first come, first served.

## ANTARCTICA, THE SOUTHERN OCEAN AND UNCLOS III

### *General Observations*

Although Antarctica and its circumpolar Southern Ocean were neither direct nor preeminent negotiated concerns during the Third United Nations

Conference on the Law of the Sea (UNCLOS III), the resultant Draft Convention,<sup>168</sup> should it enter into force, could produce some conflictual and perhaps even legally entangling ramifications for Consultative Party Governments. No argument exists that the negotiated 1982 UNCLOS III Convention intentionally applies in scope to all ocean space, including the Southern Ocean south of 60 degrees South latitude.

Nevertheless, what if some particular Consultative Party opted not to participate formally in the UNCLOS III Convention? How would that policy preference legally square with those other Consultative Parties who adopted the UNCLOS III Treaty text? Moreover, and of greater pertinence for this study, to what degree do the provisions in the UNCLOS III Draft Convention affect, augment, supercede, or impinge upon provisions in the Antarctic Treaty and, hence, the administrative regime now overseeing activities throughout much of the Southern Ocean?

Considering the impending immediacy in time frame, comprehensive answers to these queries at present remain elusively speculative, and likely will be gleaned primarily from gradual state practice and behavior. Specifically relevant for Antarctica and its offshore marine ecosystem are at least six broad law of the sea areas contained in the UNCLOS III Draft Convention. Those sections pertain to (1) seaward territorial limits, (2) resource management and conservation, (3) oceanic environmental protection, (4) marine scientific research, (5) deep seabed mining, and (6) individual and archipelagic island regimes.

### *UNCLOS III's Relevance for Antarctica*

#### *Territorial Limits*

The inability to ascertain definitively the legal extent of territorial possession, independence, and legitimate jurisdiction accrued by States over claims in Antarctica suggests a singularly overt conclusion: Antarctica is neither a continent of sovereign coastal States nor a bona fide condominium territory possessing a uniform coastline border. Without acknowledged sovereignty or independence, Antarctica *terra firma* apparently fails to qualify under international law, whether partitioned sectorially or taken in toto, as a recognized Coastal State.<sup>169</sup> Therefore, absent these critical attributes, international legal acceptance of any territorial sea,<sup>170</sup> contiguous zone,<sup>171</sup> exclusive economic zone,<sup>172</sup> or continental

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168. UNCLOS III Convention (1982), *supra* note 25.

169. For relevant discussion, see Joyner, *The Exclusive Economic Zone and Antarctica*, 21 VA. J. INT'L L. 691 (1981).

170. UNCLOS III Convention (1982), *supra* note 25, at arts. 2-32.

171. *Id.* art. 33.

172. *Id.* arts. 55-75.

shelf<sup>173</sup> that might be declared seaward from Antarctica would be incredulous and highly suspect. Indeed, Antarctica's circumpolar waters customarily have been regarded by Claimants and non-Claimants alike as being legally the status of high seas.<sup>174</sup> Ostensibly, then, all States would possess traditional high seas freedoms in the Southern Ocean, including rights of free navigation,<sup>175</sup> overflight,<sup>176</sup> laying of cables and pipelines,<sup>177</sup> fishing,<sup>178</sup> and scientific research<sup>179</sup>—activities qualified only by the requisite duty of conserving and protecting living resources in the region.<sup>180</sup>

### *Resource Management and Conservation*

As discussed above, the Antarctic ecosystem teems with living resources and potentially may contain certain mineral resources.<sup>181</sup> Outside the Consultative Party Group, pertinent international law for resource exploitation throughout the South Ocean region will be derived in paramount part from the UNCLOS III Treaty package. All States will enjoy the high seas right to fish in the region, subject to any prior treaty obligations and a stipulated duty to conserve living resources.<sup>182</sup> Respective to the latter, the "best scientific evidence available" should be employed by States to ensure that a maximum sustainable yield level be maintained for all harvested species.<sup>183</sup> Given no recognized sovereign coastal State exists in Antarctica, continental shelf exploitation could become highly polemical. Geologically, a shelf prolongation is evident; legally, however, its status remains nebulous and somewhat of a fiction. Consequently, Antarctica's continental shelf entails a legal projection of the deep seabed under the high seas, making it subject to the regulatory aegis of the proposed International Seabed Authority.<sup>184</sup> Alternatively, Antarctica's shelf might be considered legally analogous to that shelf area beyond 200

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173. *Id.* arts. 76–85.

174. F. AUBURN, *supra* note 84, at 27.

175. The sector claims, save for Norway's, extend seaward from the continent to 60 degrees S. latitude.

176. UNCLOS III Convention (1982), *supra* note 25, at arts. 87 and 90.

177. *Id.* arts. 87 and 112.

178. *Id.* arts. 87 and 116.

179. *Id.* arts. 87 and 119.

180. *Id.* arts. 117–120.

181. See notes 109–167 and accompanying text *supra*.

182. UNCLOS III Convention (1982), *supra* note 25, at arts. 116 and 117.

183. *Id.* art. 119.

184. *Id.* arts. 133–191. For discussion of the Authority, see T. KRONMILLER, *THE LAW-FULNESS OF DEEP SEABED MINING* and the sources cited in note 162 *supra*. Compare de Soto, *The Developing Countries and Deep Seabed Mining: Problems, Prospects and Policy Implications*, in Joyner, *supra* note 162 at 45, with Dubs, *Law and Policy in Mining the Ocean Floor: The Industrial Perspective*, in Joyner, *supra* note 162, at 56.

nautical miles, hence making the exploiting State liable for certain "payments and contributions" to the Authority.<sup>185</sup>

### *Environmental Protection and Preservation*

The Antarctic marine ecosystem is both delicate and fragile. Moreover, studies suggest that it is also heavily dependent upon krill organisms for sustaining the balance of nature in the local food chain.<sup>186</sup> Successful preservation and protection of the Southern Ocean's environment, therefore, retains preeminent concern, and States would be obligated under the UNCLOS III treaty to restrain and control use of technologies in the region.<sup>187</sup> Additionally, they should refrain from pollution (whether it is land-based<sup>188</sup> [i.e., from Antarctica], seabed-based,<sup>189</sup> vessel-source,<sup>190</sup> dumping-source,<sup>191</sup> or atmospheric<sup>192</sup> in origin) in order to protect the environs' vitality. Though identified in the UNCLOS III Treaty merely as the "competent international organization," presumably primary responsibility for monitoring pollution output and assessing the condition of Antarctica's environment would be assumed by the United Nations International Maritime Organization (formerly, the Intergovernmental Maritime Consultative Organization).

### *Maritime Scientific Research*

The 1959 Antarctic Treaty is conspicuously noteworthy for promoting international (albeit in fact only limited) cooperation in free scientific investigation among the Contracting Parties.<sup>193</sup> For non-Parties, however, legal strictures for conducting marine scientific research in the Southern Ocean are provided in Part XIII of the UNCLOS III Treaty text. States and "competent international organizations"<sup>194</sup> are permitted to conduct scientific research, so long as it is carried out for peaceful purposes and does not interfere with "other legitimate uses of the sea."<sup>195</sup> All States also have the attendant legal right to conduct scientific research on the local deep seabed and "in the water column beyond the limits of the exclusive economic zone."<sup>196</sup> Once again, because exclusive economic

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185. UNCLOS III CONVENTION (1982), *supra* note 25, at art. 82.

186. See text at notes 80-83 *supra*.

187. UNCLOS III Convention (1982), *supra* note 25, at art. 196.

188. *Id.* art. 207.

189. *Id.* art. 208.

190. *Id.* art. 211. See notes 17-55 *supra*.

191. *Id.* art. 210.

192. *Id.* art. 212.

193. Antarctic Treaty, *supra* note 84, at arts. II and III.

194. UNCLOS III Convention (1982), *supra* note 25, at art. 240.

195. *Id.* art. 240.

196. *Id.* art. 257.

zones can not exist legally absent a sovereign coastal State, a logical inference would allow scientific research *sine consent*<sup>197</sup> up to the edge of Antarctica's continental land mass. Finally, while research installations and related equipment in Antarctic waters are permissible, they can not generate legitimate territorial jurisdictional limits, nor can they be construed legally as islands,<sup>198</sup> or obstruct any international shipping lanes in the proximate seas.<sup>199</sup>

### *Deep Seabed Mining*

Though the amount has yet to be determined precisely, the abyssal plains surrounding Antarctica are thought to be littered with manganese nodule deposits. Consequently, for parties to the UNCLOS III Convention, these portions of the deep seabed (i.e., "the common heritage of mankind")<sup>200</sup> would be subsumed under the jurisdictional purview of the proposed International Sea-Bed Authority.<sup>201</sup> An interesting conundrum potentially lies for the Antarctic Claimant States. Save for Norway's, all sector claims to Antarctica extend from the South Pole outward to 60 degrees South latitude. (Great Britain's claim, in fact, reaches as far north as 50 degrees South latitude.) While the Claimant States usually have denied appropriation of juxtaposed high seas,<sup>202</sup> they might attempt to assert title to the sea floor below, particularly if a superabundance of mineral wealth is proven to be there. Obviously, were this scenario to occur, an overt conflict of interests would be created between Claimant States and parties to the UNCLOS III Convention. No doubt, too, the rub could become even more exacerbated if a Claimant State were simultaneously a contracting member of the UNCLOS III agreement.

### *Island Regimes*

On both sides of the 60 degrees South latitude perimeter of the Antarctic region are several significant islands and archipelagoes, including *inter alia*, Macquarie Island (Australia); Peter I Island (Norway); the South Shetland Islands (Argentina, Chile, and Great Britain); South Georgia Island (Argentina and Great Britain); the South Orkneys (Argentina and Great Britain); the South Sandwich Group (Argentina and Great Britain); Bouvet Island (Norway); Prince Edward Island (South Africa); Crozet

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197. *Id.* arts. 245-253.

198. *Id.* art. 259.

199. *Id.* art. 261.

200. *Id.* art. 136. See text at notes 159-167 *supra*.

201. *Id.* arts. 156-191. See Goodell, *Marine Sediments of the Southern Ocean*, in ANTARCTIC MAP FOLIO SERIES (1973)(Folio 17).

202. F. AUBURN, *supra* note 84, at 27.

(France); Kerguelen (France); and Heard Island (Australia). Notwithstanding some jurisdictional disputes over title, all of the above formations do qualify as islands under the UNCLOS III draft's definition.<sup>203</sup> Accordingly, each is legally capable of generating a territorial sea, a contiguous zone, an exclusive economic zone, and a continental shelf delimitation.<sup>204</sup> Moreover, the South Shetlands, the South Orkneys, and the South Sandwich Islands geographically and legally are considered archipelagoes; hence, were they to qualify someday as independent States, ostensibly then archipelagic baselines could be assigned,<sup>205</sup> internal waters could be designated,<sup>206</sup> and the right of innocent passage through the islands' waters could be supervised<sup>207</sup> or, if deemed necessary, suspended.<sup>208</sup> Perhaps most noteworthy, proximate to these three archipelagoes, as well as to South Georgia Island and Bouvet Island, are impressive concentrations of vast krill swarms. Not surprisingly, then, were 200 mile EEZs to be declared seaward from these islands, local krill resources in effect would become "nationalized" and appropriated by the islands' respective possessor-claimant States.

### *Assessment*

The present Antarctic Treaty regime could become susceptible to criticism or collision in the wake of an UNCLOS III Convention coming into force. For Antarctic claimant states, the current system permits their sector claims to exist seaward without subjecting their validity to substantive challenge. Application of pertinent UNCLOS III Treaty provisions to the Southern Ocean and its indigenous resources, whether living or non-living, could alter that situation.

For States not party to the Antarctic Treaty or its related conventions, the 1982 UNCLOS III Convention formally would allocate certain new resource exploitation rights, as well as attendant responsibilities for regional protection of the Southern Ocean's marine environment. New legal guidelines for territorial delimitation, resource management, environmental preservation, scientific research, and island regimes would be enunciated and legally promulgated. Importantly, too, all these activities assume direct relevance for the Southern Ocean in general and for the marine area south of 60 degrees South latitude in particular. Of course,

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203. The UNCLOS III Convention defines an island as "a naturally formed area of land, surrounded by water, which is above water at high tide." UNCLOS III Convention (1982), *supra* note 25, at art. 121.

204. *Id.* art. 121(2).

205. *Id.* art. 47.

206. *Id.* art. 50.

207. *Id.* art. 52.

208. *Id.*

these novel aspects of emergent ocean law would apply just as meaningfully to all Consultative Parties and other Antarctic Treaty Contracting States who eventually ratify the UNCLOS III Convention.

The recent law of the sea negotiations additionally highlight the pervasive concern throughout the international community for the health and well being of common ocean space. In spite of its relatively desolate isolation, the Southern Ocean looms as no exception to this consideration. One might conclude therefore that this decade-long series of protracted negotiations could mark a watershed for Antarctic politics. This would be especially true if there were to surface a serious concerted effort in the United Nations aimed at having Antarctica and the Southern Oceans declared as "the common heritage of mankind," or perhaps in a politically less extreme vein, as a world park administered under the Charter's trusteeship provisions.<sup>209</sup> Doubtlessly cries of "world socialism" would be voiced by various extractive industries in technologically advanced, free-enterprise-oriented nations; yet, doubtless, too, absent unrestricted intensive commercial development and exploitation of the Antarctic, eco-

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209. An Antarctic Trusteeship arrangement could be provided through Article 81 of the U.N. Charter. See COMMISSION TO STUDY THE ORGANIZATION OF PEACE, STRENGTHENING THE UNITED NATIONS 207, 213-16 (1957) and Neider, *To All Nations: Don't Have a Pack Mentality, Keep Antarctica Pure*, N.Y. Times, Apr. 26, 1975, at 27, col. 1. Along these lines, James Barnes has recently suggested the need for a trusteeship type of approach vis-a-vis the Antarctic environs. Posits he:

. . . What would appear to be needed is a rational and equitable mechanism for managing activities on the continent and in the surrounding seas in order to protect interests and resources of importance to the entire international community. These include freedom of scientific research, continued demilitarization of the region, protection of the environment, preservation of endangered species, maintenance of the potential food production for future generations, and prevention of adverse climatic change due to human activities. Perhaps what is required is a new approach to the question of resource ownership and control of resource exploitation in the Antarctic area, one that would be consistent with the history of involvement in the region by the Antarctic Treaty Consultative Parties, the interest of the international community of nations, and with conservation and protection values.

. . . .

Such an approach would require (1) that both claimants and nonclaimants renounce any territorial claims they have asserted or might assert in the future, (2) that an increasing number of other nations be invited to participate in Antarctic decision-making along with the existing Treaty Parties, (3) that the interim trustees explicitly take into consideration the interests of the international community in all decisions, particularly those regarding access to, utilization and protection of resources, (4) that all future deliberations be conducted in the open, (5) that representatives of appropriate international and nongovernmental organizations be invited to participate as members or observers, (6) that the technology for exploiting resources of the Antarctic be made available on a fair basis to interested countries or appropriate international authorities once it is determined that such use is environmentally safe, and (7) that the Southern Ocean and the continent of Antarctica, except for 200-mile zones around islands north of 60 degrees S as to which there is no dispute over sovereignty, be declared a common heritage area.

Barnes, *supra* note 106, at 269-70 (emphasis in original).



logical protection and preservation of the region will be objectives far easier to reach and effectively sustain.

### CONCLUSION

This study has sought to examine critically the nature of maritime pollution and the threat it poses to common space resource regimes, especially that of the Southern Ocean. As a deleterious phenomenon, marine pollution continues to occur, in spite of ongoing international legal attempts to curtail such activities. Both vessel-source and land-based waste effluents persist in finding their way into the oceanic ecosystem. If left unabated by industry or unattended without restrictive international legal fiat, they surely will continue to do so.

On another tack, the Antarctic's regional environment today remains relatively pristine and unadulterated by man's toxic wastes. This pristine condition is attributable to acts of commercial omission rather than to international legal commission. In other words the harshly inhospitable quality of life in the Antarctic, aggravated by tremendous logistical obstacles and overburdening technological investment costs, have worked thus far to make the region commercially unattractive for resource development. Just how long this situation of lethargic interest and non-incentive will last, however, remains another question to be answered.

Notwithstanding legitimate doubts about natural resource availability there, in the coming decade Antarctica and the Southern Ocean are bound to receive increasing economic, strategic, geopolitical, and legal international attention. The decisive consideration turns on whether international regulatory regimes for the region can be suitably fashioned, effectively implemented, and legitimately accepted before widespread exploitation and commercial activities begin.

Encouragingly, some movement in this direction has been evidenced in recent policy initiatives by the Consultative Parties, as well as by the international community through the UNCLOS III Convention conduit. Nevertheless, the degree to which this institutional challenge is met effectually will also mirror the extent to which marine pollution in the Antarctic ecosystem is adequately deterred. This assertion must retain some priority as a preeminent, constant concern of international law, if for no other selfless reason than to preserve some part of the world's environment for succeeding generations.