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Transfers of Pollution and the Marine Environment Conventions

ABSTRACT

The sea is a universal refuse dump for wastes from many sources. Measures to protect the marine environment often result in these wastes being moved from place to place or transformed into another type of pollution, creating new and different hazards. Of the many marine conventions, only a few contain a provision to guard against such transfers and transformation of pollutants. This paper describes some of the dilemmas posed by the conflicting requirements of international and national rules for waste disposal, and discusses how the existing marine environment conventions could be employed in an integrated regional waste disposal program.

The Law of the Sea Convention (1982)¹ contains, in Articles 192 to 196 of Part XII, five "umbrella" provisions broadly outlining the duty of states to protect and preserve the marine environment.² Of the five, the one which appears to have received the least attention is Article 195, which says:

In taking measures to prevent, reduce and control pollution of the marine environment, States shall act so as not to transfer, directly or indirectly, damage or hazards from one area to another or transform one type of pollution into another.³

Unlike many of the 46 provisions in Part XII which have been extensively discussed in conference and in the literature,⁴ this provision seems to

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1. The Law of the Sea: Official Text of the United Nations Convention on the Law of the Sea with Annexes and Index: Final Act of the Third United Nations Conference on the Law of the Sea, U.N. Sales No. E.83.V.S. (1983) [hereinafter Law of the Sea Convention].

2. *Id.* at 70-85.

3. Law of the Sea Convention, *supra* note 1, at 71.

4. The literature on the development of the marine environment provisions by the Third United Nations Conference on the Law of the Sea, since it began work in 1973, is voluminous. *See, e.g.*, Kindt, *The Effect of Claims by Developing Countries on the Law of the Sea International Marine Pollution Negotiations*, 20 Va. J. Int'l L. 313 (1979); Schneider, *Codification and Progressive Development of International Environmental Law at the Third United Nations Conference on the Law of the Sea: The Environmental Aspects of the Treaty Review*, 20 Colum. J. Transnat'l L. 243 (1981); Reports of the United States Delegation to the Third United Nations Conference on the Law of the Sea 47-51 (M. Nordquist & C. Park eds. 1983); Boyle, *Marine Pollution Under the Law of the Sea Convention*, 79 Am. J. Int'l L. 347 (1985).

have been taken for granted; yet it could have profound implications for the environment as a whole and for the way in which states manage the production, use, and disposal of environmentally harmful substances.

Article 195 refers to an increasingly worrisome problem—that pollutants do not stay where they arise or are put. They move from one place to another and from one medium of the environment to another, degrading and contaminating whatever they come in contact with, be it air, land, or water.⁵ Transfers and transformation of pollutants can even happen, and are happening more and more often, as an unexpected and unwanted byproduct of action taken to *protect* a part of the environment. They show how complex the interrelationships within the physical environment are and how difficult it is to regulate waste management so as to prevent such unpleasant surprises.

This article will: (1) describe some of the dilemmas posed by the conflicting requirements of international and national rules for the disposal of wastes in various media; and (2) outline an integrated regional land and water program that could mitigate adverse effects from the balancing of waste disposal options inherent in measures such as Article 195 of the Law of the Sea Convention.

Effects of Regulation on Pollution Transfers Into and Out of the Marine Environment

The sea has long been used (or abused) as the ultimate repository of wastes of many kinds and from many sources. "There is only one pollution," oceanographer Jacques Cousteau pointed out, "because every single thing, every chemical whether in the air or on land will end up in the ocean."⁶ That reference to the complex workings of the hydrologic cycle was echoed in a Council of Europe resolution which declared land-based pollution to be "the main factor in marine pollution, yet one of the least controlled at international and national levels, owing to the ease of using the sea as a universal refuse dump."⁷

To redress this sorry state of affairs, more multilateral conventions have been promulgated within the past two decades for protection of the oceans than for any other single element of the global environment. They govern pollution of the sea by oil and chemicals, the dumping of wastes by ships,

5. On cross-media pollution generally, see, *Controlling Cross-Media Pollutants: An Issue Report* (Conservation Foundation, 1984); *State of the Environment, An Assessment at Mid-Decade 319-64* (The Conservation Foundation, 1984); Teclaff & Teclaff, *International Control of Cross-Media Pollution—An Ecosystem Approach*, 27 *Nat. Res. J.* 21 (1987).

6. Cousteau, *Our Oceans are Dying*, *N.Y. Times*, Nov. 14, 1971, sec. 4 (News of the Week in Review), at 13, col. 3.

7. Council of Europe Resolution 161 (1985) on Land-Based Marine Pollution, para. 5 (adopted at the 20th Session of the Standing Conference of Local and Regional Authorities of Europe, Strasbourg) 15-17 October, 1985, *reprinted in* 16 *Env'tl. Pol'y & L.* 35 (1986).

and pollution from land-based sources.⁸ For the most part, they were developed independently of each other, by type of pollution or source of generation, without reference to their effect on areas or media not specifically defined. The oil pollution instruments are concerned only with oil pollution from vessels, chiefly tankers.⁹ They are very detailed, setting forth elaborate construction and equipment regulations, plus specific discharge standards for vessels while in operation. The dumping conventions deal primarily with dumping at sea from ships and aircraft.¹⁰ Their annexes contain lists of substances, divided into those which may not be dumped at all, those which may be dumped only under special permit, and those which may be dumped under general permit. The land-based pollution conventions are restricted to wastes that reach the marine environment via watercourses or from the coast (for example, through pipelines)—not from ships.¹¹

All of these conventions are very comprehensive instruments and collectively cover enormous ocean areas, but not one contains a provision like that in Article 195 of the Law of the Sea Convention. Their compartmentalization of pollution control, combined with quite detailed instructions as to what may be disposed of, where and how, has produced some bizarre results. An example was the *Zuid-Chemie* case in the Netherlands, concerning the discharge of gypsum waste into the Scheldt estuary.¹² The activity was acknowledged to be environmentally harmful, yet it was found to be not in conflict with three marine conventions¹³ (plus a European Economic Community directive),¹⁴ all designed to prevent such harm. The gypsum waste was discharged from a ship into internal waters (the Scheldt estuary). So, the court found the discharge

8. See *infra* notes 9, 10, and 11.

9. E.g., International Convention for the Prevention of Pollution from Ships, Nov. 2, 1973, 12 I.L.M. 1319, with protocol, Feb. 17, 1978, 17 I.L.M. 546.

10. Convention for the Prevention of Marine Pollution by Dumping from Ships and Aircraft, Feb. 15, 1972, 11 I.L.M. 262 [hereinafter Oslo Dumping Convention]; International Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, Dec. 29, 1972, 26 U.S.T. 2403, T.I.A.S. No. 8165, 11 I.L.M. 1291 [hereinafter London Dumping Convention].

11. E.g., Paris Convention for the Prevention of Marine Pollution from Land-Based Sources, Feb. 21, 1974, 13 I.L.M. 352 [hereinafter Paris Convention].

12. *Werkgroep Water van de Vereniging Milieu Defensie, v. Hoofdingenieur-Directeur van de Rijkswaterstaat in de Directie Zeeland*, Royal Decree (administrative decision of the Crown), 26 June 1984, No. 23, Institute's Collection No. 2311, as reported in part in Netherlands Judicial Decisions, 16 Netherlands Y.B. Int'l L. 519-21 (1985) [hereinafter *Zuid-Chemie Case*]. The Chief Engineer Director of the Department for the Maintenance of Dikes, Roads, Bridges and the Navigability of Canals in the Province of Zeeland had granted *Zuid-Chemie* permission to discharge gypsum wastes into the Western Scheldt estuary for an indefinite period. The appellants, environmental groups, appealed against this decision to the Crown—unsuccessfully. *Id.*

13. The conventions were the Oslo and London Dumping Conventions and the Paris Convention. See *supra* notes 10 and 11.

14. Council Directive on Pollution Caused by Certain Dangerous Substances Discharged into the Aquatic Environment (May 4, 1976), 19 O.J. Eur. Comm. (No. L 129) 23 (1976).

to be outside the scope of the Oslo and London dumping conventions, because it did not take place *at sea*, and outside the scope of the Paris convention on pollution from land-based sources, because it took place from a *ship*.¹⁵ Indeed, there was a question as to what part of the aquatic environment had been polluted, fresh or salt water. *Zuid-Chemie* simply took advantage of a gap in the meshes of regulation and, moreover, did so quite legally, with a license from the appropriate provincial authority. It was an instance of hazards posed because the applicable measures had: (a) failed to take into account the possibility of pollutants being transferred from one place to another and from one medium to another; and (b) failed to provide a means of reconciling possible conflicts in the law.

Environmental problems created by loopholes in the law are matched by those caused when stringent regulation of individual media leaves few, if any, options for legitimate disposal—as in the case of titanium dioxide waste. For every ton of titanium dioxide (TiO_2) manufactured, an estimated seven tons of waste are produced, much of which is dumped offshore.¹⁶ In semi-enclosed seas, such as the North Sea, dumping on such a scale rapidly becomes unacceptable, but finding disposal sites elsewhere is fraught with regulatory obstacles. The North Sea States, as members of the European Economic Community, are already in this predicament because an EEC directive governs above-ground and underground storage of the waste, injection into the ground, and discharge into inland waters, as well as dumping at sea.¹⁷ The directive obligates EEC member states to dispose of the waste without harming the environment¹⁸ and may require the suspension of disposal operations altogether if monitoring reveals adverse effects.¹⁹ Obviously, states which ban marine dumping (the easiest and cheapest of available options) are going to find it difficult to fulfill these requirements unless the amount of TiO_2 waste can be drastically reduced at source. Not surprisingly, the directive has been honored in the breach rather than in the observance.²⁰ Here, again, we have a situation in which measures specifically devised for environmental protection result in a transfer of damage or hazard from place to place and medium to medium. In the end, the TiO_2 waste, like the gypsum waste discussed above, is allowed to accumulate in one of

15. *Zuid-Chemie Case*, *supra* note 12, at 520.

16. Greenpeace Examiner, Sept. 1985, at 18-19.

17. *Council Directive on Waste from the Titanium Dioxide Industry* (Feb. 20, 1978), 21 O.J. Eur. Comm. (No. L 54) 19 (1978).

18. *Id.* art. 2.

19. *Id.* art. 8.

20. The Directive requires states to take measures to encourage recycling and at-source reduction. *Id.* art. 3. However, governments have dragged their feet on compliance, and chemical companies involved in the marine dumping have shown a reluctance to install recycling equipment unless forced to do so by government. See 9 Int'l Env'tl. Rep. (BNA), Curr. Rep. 445 (1986); and Greenpeace Examiner, *supra* note 16, at 18-19.

the most sensitive parts of the aquatic environment—estuaries and inshore waters.²¹

The number of hazardous substances that could be transferred to and from the marine environment or transformed into another type of pollution is probably legion. Only long and painstaking research can reveal how many hazardous substances there are and what happens to them. However, some very obvious and everyday wastes, such as sewage sludge and trash, already pose urgent problems and acutely difficult choices.

The disposal of sewage sludge and dredge spoil faces every coastal state which has urban industrial centers and harbors of any magnitude. These substances can be a potential resource, if rendered harmless.²² Unfortunately, they very often contain toxic heavy metals flushed into municipal sewage systems from, for example, metal-finishing plants, street runoff, plumbing, and polychlorinated biphenyl (PCB) transformers. Such toxins are persistent, bioaccumulative and almost impossible to render innocuous.²³

There are a number of land disposal alternatives for sewage sludge and dredge spoil, but all of them cause pollution.²⁴ Direct application to the land (sludge farming) has impacts from metals, pathogens and excessive nutrients.²⁵ Composting produces odors, dust, leachate and pathogens in the composting operation itself, and may cause groundwater contamination from nitrogen, pathogens, and heavy metals.²⁶ Incineration on land, or thermal reduction, may result in air pollution, water pollution, problems of ash disposal, or a combination of the three.²⁷ The sludge and its residuals (from composting or incineration) often end up in a landfill.²⁸ Most communities find landfills very undesirable neighbors, adversely affecting water resources, air quality, aesthetics and human health. So disposal of sludge and dredge spoil becomes a tug of war between land-based and marine-based interests.²⁹

The urge to push the smelly and poisonous problem of disposal as far

21. Greenpeace Examiner, *supra* note 16, at 18.

22. The organic matter in these waste materials can be recycled and applied to impoverished soils, for example. See *Ocean Dumping, Hearing Before the Subcomm. on Environmental Pollution of the Senate Committee on Environment and Public Works, 99th Cong., 1st Sess. 128, 223 (1985)* [hereinafter *Ocean Dumping, Senate Hearing*].

23. See P. Ehrlich, A. Ehrlich & J. Holdren, *Ecoscience* 562-63, 660-61 (1977).

24. On the various alternatives to ocean dumping and their polluting impacts, see *Ocean Dumping, Senate Hearing, supra* note 22, at 192-204.

25. *Id.* at 193-94.

26. *Id.* at 195-97.

27. *Id.* at 198-99.

28. *Id.* at 200-01.

29. New York City has been in this unenviable situation for years and has even gone to court to seek at least a temporary solution. See *id.* at 150-51, 163-66; see also Spierer, *The Ocean Dumping Deadline: Easing the Mandate Millstone*, 11 *Fordham Urb. L.J.* 1 (1982), and *City of New York v. Environmental Protection Agency*, 543 F. Supp. 1084 (S.D. N.Y. 1981).

away from their own doors as possible has caused cities to employ strange and ethically dubious solutions, including the attempted export of sludge, garbage, incinerator ash, and industrial waste to Third World countries.³⁰ In recent years the number of international incidents and the tales of outcast vessels wandering the seas, unable to land their rejected cargoes anywhere,³¹ have so multiplied as to prompt the drafting of a global convention to control these shipments.³² The agreement may provide some defense for countries which do not have adequate laws to protect themselves from such unwanted environmental hazards, but it does not resolve the cities' dilemma.³³

Another means of disposal, incineration at sea by ships, was once considered an attractive alternative to on-land burning, but has since failed of its early promise.³⁴ When marine incineration technology was first developed in Europe in the 1960s, it was regarded as a useful way of

30. For example, the Massachusetts Water Resources Authority unsuccessfully sought an EPA permit to dump sewage sludge from Boston harbor off the New York-New Jersey coast. 16 Int'l Env'tl. Rep. (BNA), Curr. Rep. 1032 (1985). Los Angeles reportedly tried to export sludge to Guatemala for use as fertilizer. 10 Int'l Env'tl. Rep. (BNA), Curr. Rep. 515 (1987). Philadelphia proposed to send sewage sludge contaminated with heavy metals to the Caribbean island of West Caicos, which has no laws to protect itself from such hazards and is peculiarly vulnerable to environmental damage because of its porous limestone geology. 28 Env't 21-22 (No. 7, Sept. 1986).

31. The saga of the trash barge *Mobro 4000* occupied much newspaper space in 1987 as the vessel wandered the seas from Long Island to the Caribbean and returned after its cargo was rejected by several southern states, the Bahamas, Belize and Mexico. See Hogan, *All Baled Up and No Place to Go*, 42 *Conservationist* 37 (No. 4, Jan.-Feb. 1988); see N.Y. Times, Apr. 24, 1987, at B1, col. 6, N.Y. Times, Apr. 25, 1987, at 33, col. 1; N.Y. Times, May 16, 1987, at 33, col. 3. Similarly, the *Khian Sea* spent 17 months attempting unsuccessfully to unload a cargo of Philadelphia's incinerator ash in Bermuda, the Bahamas, Honduras, the Dominican Republic, and Guinea Bissau. 11 Int'l Env'tl. Rep. (BNA), Curr. Rep. 286-87 (1988). From Europe come reports of the *Zanoobia*, loaded with Italian toxic waste that had been refused by Djibouti and Venezuela, and the *Karin B*, turned away by four European countries after picking up a cargo of toxic waste dumped in Nigeria. 11 Int'l Env'tl. Rep. (BNA), Curr. Rep. 324, and 469-71 (1988).

32. Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, done at Basel, Switzerland, Mar. 21, 1989 [hereinafter 1989 Basel Convention]. *Text reproduced in* Int'l Env'tl. Rep. (BNA), Ref. File 21:3701. Thirty-four countries signed immediately, but the ratification process (20 ratifications are needed for the convention to come into force) is expected to take several years. See 12 Int'l Env'tl. Rep. (BNA), Curr. Rep. 159-61 (1989).

33. In the United States, the problems of waste disposal reached crisis proportions in the late 1980s, not merely because of the growing volume of waste but also for a number of regulatory, administrative and technological reasons. Among them were: absence of an overall strategy on waste management; imposition of strict deadlines to cease various dumping practices in inshore waters; lack of federal grants to local governments for sludge handling; and failure to develop environmentally safe alternative technologies. See, e.g., Spiner, *supra* note 29, at 13; Shabecoff, *Tons of Sludge: A Clean Chesapeake's Cost*, N.Y. Times, May 11, 1986, at E5; and Herz & Denison, *Municipal Waste Incineration: Dollars and Sense*, 18 EDF Letter: A Report to Members of the Environmental Defense Fund, July 1987, at 4.

34. See generally Watson, *Ocean Incineration: Science or Politics*, 9 *Marine Pol'y Rep.* 124 (1986) (University of Delaware, College of Marine Studies, Center for the Study of Marine Policy); Asmus & Johnston, *A Sea of Troubles: Where Will Ocean Incineration Turn Up Next?*, 13 *Greenpeace* 6 (1988); Forster, *London Dumping Convention: In the Ranks of Tuscany*, 16 *Env'tl. Pol'y & L.* 7 (1986).

disposing of liquid industrial wastes which could not be dumped at sea because of their extremely hazardous nature. It had advantages over incineration on land, because the acid vapor produced as a by-product, which in land-based incinerators required removal by expensive gas-scrubbing equipment, might be simply neutralized by sea water in ocean burning. Following several years of apparently successful operation in the North Sea,³⁵ the technique was taken up in the United States and some experimental burns were carried out in the Gulf of Mexico and the Pacific Ocean under Environmental Protection Agency research permit.³⁶ The major marine pollution conventions were silent upon the subject, not regarding incineration at sea as important in waste management, and there was no guidance from that source, either for the United States or for European countries.

Bit by bit, however, the drawbacks of the technology became evident. Ocean burning requires specially equipped vessels and specific types of waste mixture, capable of supporting combustion at a sufficiently high temperature to obtain efficient performance from the incinerators.³⁷ At best, it pollutes the atmosphere at sea and may cause air pollution over land as well. Without adequate controls over the composition of the waste and the method of incineration, other problems arise from, for example, inefficient combustion, leaking cargo tanks, excess toxic emissions, formation of hazardous by-products, and the cleaning and repair of the incinerator ships, not to mention the risk of collision at sea.³⁸ Moreover, the residues still have to be disposed of somewhere, either at sea or on land.³⁹

By the 1980s, the experience of European states with ocean incineration had demonstrated a need for much closer supervision and monitoring. Sensing this, the Council of the European Community, in a proposed directive on the dumping of waste at sea, devoted two entire annexes to very detailed instructions concerning operational requirements, selection of sites, and permit procedures for incineration.⁴⁰ In the United States, ocean burning had also come under closer supervision, but was still not a commercial reality because of vehement public opposition.⁴¹ This caused the Environmental Protection Agency to delay so long in issuing final

35. Ocean incineration was introduced in West Germany in 1969. Since then there have been more than 300 "successful" North Sea burns. Asmus & Johnston, *supra* note 34, at 7, 9.

36. Watson, *supra* note 34, at 1 and 3; Asmus & Johnston, *supra* note 34, at 8.

37. Watson, *supra* note 34, at 2.

38. Forster, *supra* note 34, at 10; Asmus & Johnston, *supra* note 34, at 8-9.

39. See Forster, *supra* note 34, at 9-10; Asmus & Johnston, *supra* note 34, at 9 (*The Greenpeace environmental group has been in the forefront of activist efforts to halt ocean burning*).

40. *Proposal for a Council Directive on the Dumping of Waste at Sea*, 28 O.J. Eur. Comm. (No. C 245), annexes IV and V (1985), text reprinted in 8 Int'l Envtl. Rep. (BNA), Curr. Rep. 286, at 291-93 (1985) [hereinafter EEC Proposed Dumping Directive].

41. See Watson, *supra* note 34, at 3; Asmus & Johnston, *supra* note 34, at 8.

regulations⁴² that an American waste incineration company abandoned its plans for burning off the U.S. coasts in favor of operations in Europe.⁴³ In Europe, however, events have been moving steadily toward the termination of marine burning within less than a decade. The demise of marine burning was already foreseen in the EEC proposed dumping directive of 1985.⁴⁴ In November 1987, eight North Sea countries agreed to a 65 percent reduction in ocean burning activities by 1991, leading to a total ban by 1994.⁴⁵ A year later, the member nations of the London Dumping Convention, of which the United States is a party, voted to phase out ocean incineration according to a similar 1991-1994 timetable, if acceptable alternatives can be developed.⁴⁶ Furthermore, they agreed to forbid the export of liquid toxic wastes for incineration or other disposal "harmful to the environment."⁴⁷

So the wheel comes full circle. If these provisions are fully implemented, states that are parties to the major marine dumping agreements will be prevented both from incinerating at sea and from exporting their wastes to each other or to Third World countries. They will have to dispose of these wastes within their own territories. Technologically feasible alternatives to ocean burning exist, but may take decades to develop commercially with appropriate safety regulations.⁴⁸ Meanwhile, the stringency of measures to protect the marine environment could bring about the very result that provisions such as Article 195 attempt to prevent—for example, the transfer of pollution by illegal discharge into rivers and coastal waters.

Awareness of and Response to Pollution Transfers

From experience with landfills, incineration, and marine dumping, national and international agencies have become aware that the approach to pollution control which has predominated for the past quarter of a century in itself causes problems and requires rethinking. The Organization for Economic Co-Operation and Development (OECD) has concerned itself for several years, both in reports to the environment ministers

42. The EPA was to have issued final regulations in 1986. 11 Int'l Env'tl. Rep. (BNA), Curr. Rep. 10-11 (1988).

43. *Id.*

44. EEC Proposed Dumping Directive, *supra* note 40, art. 9 (2). (Member states were required to send to the Commission by Jan. 1, 1990, information to fix a date for the termination of incineration at sea).

45. 11 Int'l Env'tl. Rep. 585 (BNA), Curr. Rep. 9 (1988).

46. *Id.* at 586.

47. *Id.* This provision is badly needed and may not be adequate, despite the fact that the London Dumping Convention is a global agreement. As the options close out in waters adjacent to the industrialized countries, waste-burning companies are reportedly seeking to pursue their enormously profitable activities elsewhere, such as in the Caribbean or the South Pacific. See Asmus & Johnston, *supra* note 34, at 7-8.

48. For example, on-land incineration at present is not as efficient as incineration at sea and leaves toxic chemical residues. See Herz & Denison, *supra* note 33, at 4.

of member states⁴⁹ and in formal recommendations, with how the law encourages transfer and transformation of pollutants. In a recommendation on water management,⁵⁰ alluding to the tendency of polluters to discharge waste where the operation is cheapest and the controls least stringent, the OECD proposed that:

Authorities should ensure that the water pollution control measures they implement do not lead to uncontrolled pollution transfers to other water resources or to soil or air systems.⁵¹

Almost identical language, but in mandatory "shall" form was used in a Council directive of the European Economic Community, establishing limit values and quality objectives for the discharge of certain dangerous and blacklisted substances into the aquatic environment:⁵²

Member States shall seek to ensure that the measures taken pursuant to this Directive do not result in an increase in the pollution of other media, notably soil and air, by these substances.⁵³

Article 195 of the Law of the Sea Convention obviously does not stand alone, but has counterparts in other areas of environmental regulation. Indeed, it may be regarded as the forerunner of pollution transfer provisions, deriving in direct line from principles prepared by the Inter-Governmental Working Group on Marine Pollution for the U.N. Conference on the Human Environment, held at Stockholm in 1972.⁵⁴ The Group's Principle 13 proclaimed that:

49. See, e.g., *Second Report on the State of the Environment*, submitted to the environment ministers of OECD member states at their meeting in June 1985. Organization for Economic Co-Operation and Development (OECD), *The State of the Environment 1985*, 65-66, 246-47, 264-65 (1985).

50. *Water Management Policies and Instruments*, Recommendation adopted on 5th April, 1978, C (78) 4 (Final), text reproduced in *Organization for Economic Co-Operation and Development, OECD and the Environment 46* (1986).

51. *Id.*, para. 7.

52. *Council Directive on Limit Values and Quality Objectives for Discharges of Certain Dangerous Substances Included in List I of the Annex to Directive*, 76/464/EEC, June 12, 1986, 29 O.J. Eur. Comm. (No. L 181) 11 (1986).

53. The substances referred to are carbon tetrachloride, DDT, and pentachlorophenol. *Id.* art. 3 (6). This policy is reflected in other EEC documents. See, e.g., *Council of European Communities: Third Action Program on the Environment*, Feb. 7, 1983, 26 O.J. Eur. Comm. (No. C 46) 9 (1983), reprinted in *Int'l Env'tl. Rep. (BNA)*, Ref. File 131:0401. The Preamble declares it important for Community actions to be carried out in the context of an approach to prevent the transfer of pollution from one part of the environment to another, in combating freshwater and marine pollution. *Id.* at :0402. See also *Resolution of the Council of European Communities*, Oct. 19, 1987 (on the continuation and implementation of a European Community policy and action program on the environment) (1987-1992), 30 O.J. Eur. Comm. (No. C 289) 03 (1987). On pollution prevention, this resolution stresses that Community action shall take particular account of the need to prevent the transfer of pollution from one part of the environment to another. *Id.* at 683, para. (a).

54. *General Guidelines and Principles for the Preservation of the Marine Environment*, prepared by the Inter-Governmental Working Group on Marine Pollution, Ottawa, Nov. 8-12, 1971, U.N. Doc. A/CONF. 48/IWGMP.II/5, reprinted in S. Oda, *The International Law of the Ocean Development*, I Basic Documents 502-05 (1972).

Action to prevent and control marine pollution (particularly direct prohibitions and specific release limits) must guard against the effect of simply transferring damage or hazard from one part of the environment to another.⁵⁵

This guideline explicitly recognized that regulatory measures *per se* (such as "black" lists and standards) can cause pollutants to be shifted around in the manner of the industrial and municipal wastes described above.

The principles drawn up by the Inter-Governmental Working Group were endorsed *in toto* by the Stockholm Conference⁵⁶ and the transfer provision next turns up at the U.N. Conference on the Law of the Sea in 1974, slightly modified and minus the explicit reference to prohibitions and release limits.⁵⁷ At succeeding sessions of the Law of the Sea Conference the transfer provision went through some relatively minor draft changes, emerging by 1979 as Article 195⁵⁸ in the wording that was to be retained in the final Convention of 1982.⁵⁹

The United Nations Environment Programme (UNEP) had meanwhile incorporated language similar to Article 195 in some of its regional seas conventions,⁶⁰ and it also endeavored to make up for the absence of an anti-transfer provision in earlier marine conventions by including one in the so-called Montreal Guidelines on pollution of the marine environment

55. *Id.* at 504.

56. *Decisions of the United Nations Conference on the Human Environment, Action Plan for the Human Environment, Recommendation 92 (a)*, reprinted in II Oda, *International Law of the Ocean Development*, I Basic Documents 167, at 170 (1973).

57. See 10 Third United Nations Conference on the Law of the Sea, Documents 129 (R. Platzoder, comp. 1986) [hereinafter UNCLoS III Documents].

58. UNCLoS III, *Informal Composite Negotiating Text*, Revision, 28 Apr. 1979, U.N. Doc. No. A/CONF.62/WP.10/Rev.1, reprinted in 10 *New Directions in the Law of the Sea*, Collected Papers 203.

59. See *supra* note 1, at 3.

60. On UNEP's Regional Seas Programme, see Johnston & Enomoto, *Regional Approaches to the Protection and Conservation of the Marine Environment*, in *The Environmental Law of the Sea* 285, 324-37 (D. Johnston ed. 1981). UNEP itself was established on Dec. 15, 1972, by U.N. General Assembly Resolution 2997 (XXVII), 26 UN GAOR, Supp. (No. 30), at 43-45 (1972).

Earliest among the regional seas conventions containing a transfer or transformation provision was the Kuwait Convention of 1978, relating to the Persian Gulf, which states that:

The contracting States shall use their best endeavor to ensure that the implementation of the . . . Convention shall not cause transformation of one type of pollution to another which could be more detrimental to the environment.

Kuwait Regional Convention for Cooperation on the Protection of the Marine Environment from Pollution, Apr. 4, 1978, art. III (e), 17 I.L.M. 511. The West and Central African Convention has a somewhat more elaborate provision, referring specifically to pollution which might be caused while promoting environmental management:

In taking measures to prevent, reduce, combat and control pollution of the Convention area or to promote environmental management, the Contracting Parties shall act so as not to transfer, directly or indirectly, damage or hazards from one area to another or transform one type of pollution into another.

Convention for Co-Operation in the Protection and Development of the Marine and Coastal Environment of the West and Central African Region, Mar. 21, 1981, art. 4 (5), 20 I.L.M. 746.

from land-based sources.⁶¹ The Guidelines were intended less as a model agreement, or protocol to an agreement, than as a comprehensive checklist of basic recommendations for governments to follow when drafting legislation and regulations. The anti-transfer provision (Guideline 6) is not an outright prohibition; a footnote says that the guideline does not prevent the transfer or transformation of pollution in order to prevent, reduce and control pollution of the environment as a whole.⁶²

Problems and Perils of the Anti-transfer Provisions

It could be argued that Article 195 of the Law of the Sea Convention, exhorting states not to transfer pollutants around the environment, and its counterparts in the regional conventions and the Montreal Guidelines are at variance with a duty imposed on states by other marine environment conventions—to search diligently for alternatives to waste disposal at sea. Many of these alternatives (such as landfills, incineration, or injection wells) are just as damaging to the environment, but in other media. Nevertheless, the duty to explore them first before permitting ocean disposal is spelled out in virtually identical language in the Oslo and London dumping conventions,⁶³ the Barcelona and Athens protocols to the Mediterranean Sea Convention,⁶⁴ the Helsinki Convention,⁶⁵ and the proposed EEC directive on the dumping of waste at sea.⁶⁶ So the anti-transfer provisions might be regarded as a step backward—as weakening an entire spectrum of regulation aimed at preventing the oceans from becoming the final repository of hazardous, persistent, and bioaccumulative pollutants.

There is also considerable danger that the anti-transfer provisions might be used to justify ocean disposal as the least environmentally harmful option, simply because the seas are wide and deep and often considered

61. United Nations Environment Programme, Ad Hoc Working Group of Experts, Montreal, Apr. 11-19, 1985, Guidelines on Protection of the Marine Environment Against Pollution from Land-Based Sources, UNEP/WG.120/3 (Part IV), reprinted in 14 *Env'tl. Pol'y & L.* 77 (1985) [hereinafter Montreal Guidelines].

62. *Id.* at 78. This is very similar to the wording in Guideline 6 of UNEP's Cairo Guidelines, also of 1985, on hazardous waste management. United Nations Environment Programme, Ad Hoc Working Group of Experts on the Environmentally Sound Management of Hazardous Wastes, Third Session, Cairo, 4-10 December 1985, reprinted in 16 *Env'tl. Pol'y & L.* 31, 32 (1986).

63. Oslo Dumping Convention, *supra* note 10, Annex III.3.b; London Dumping Convention, *supra* note 10, Annex III.C.4.

64. Protocol for the Prevention of Pollution of the Mediterranean Sea by Dumping from Ships and Aircraft, Feb. 16, 1976, Annex III.C.4, 15 I.L.M. 300 [hereinafter Barcelona Protocol]; Protocol for the Protection of the Mediterranean Sea Against Pollution from Land-Based Sources, May 17, 1980, Art. 6.3 and Annex III D, 19 I.L.M. 869 [hereinafter Athens Protocol]. The parent convention is: Convention for the Protection of the Mediterranean Sea Against Pollution, Feb. 16, 1976, 15 I.L.M. 290 [hereinafter Barcelona Convention].

65. Convention on the Protection of the Marine Environment of the Baltic Sea Area, Mar. 22, 1974, art. 16.2, 13 I.L.M. 546 [hereinafter Helsinki Convention].

66. EEC Proposed Dumping Directive, *supra* note 40, Annex III.C.4.

as less productive (that is, less valuable) than the land or even the atmosphere.⁶⁷ Instead of being polluted by default, through ignorance, venality, or loopholes in the law, the marine environment would then bear the brunt of toxic waste pollution through deliberate choice. It is argued, for instance, that if coastal and shallow waters were protected for the sake of fisheries, recreation, and amenity, the deeper waters could be used for selective waste disposal.⁶⁸ However, recent research has shown that dumping on the seabed of the continental shelf is an undesirable solution, no matter how carefully superintended, because a large number of marine mammals, fish, and other organisms are bottom feeders.⁶⁹ Moreover, experience with the dumping conventions gives no ground for confidence that regulations on disposal farther offshore would be respected. Enormous quantities of waste containing substances *prohibited* under these conventions have been dumped yearly into the Atlantic Ocean by ships operating under license.⁷⁰

Dumping farther from land compounds surveillance and enforcement problems and may merely encourage authorities to seek this solution as part of the assessment process, instead of looking diligently for other options. As the chairman of the U.S. Senate Subcommittee on Environmental Pollution foresaw, "if we continue with the kind of balancing analysis that is now required, we may find the oceans at the short end of the stick."⁷¹

Elements of Areal Integration in the Marine Conventions

These perils to the marine environment could be mitigated and perhaps altogether removed under an integrated approach to pollution transfers. In optimal form, this would put interconnected areas of the sea and of fresh water under one multi-media regulatory umbrella. Elements of such a program can already be found scattered in the environmental law of the sea, and examination of the marine environment conventions reveals which are deficient in these respects and which have potential.

67. See, e.g., arguments cited by C. Osterberg, *Old Submarines and Ocean Dumping Policy*, U. Delaware College of Marine Studies, Center for the Study of Marine Policy, 8 Marine Pol'y Rep. 1 (No. 5, Mar. 1986).

68. *Id.* at 6. It has even been proposed to inject wastes *into* the seabed itself. 9 Int'l Envtl. Rep. (BNA), Curr. Rep. 414-15 (1986).

69. See, e.g., Nelson & Johnson, *Whales and Walrus as Tillers of the Sea Floor*, 256 Sci. Am. 112 (1987). The churning up of the sea floor by whales and walrus is apparently an important part of the ecosystem, and its beneficial effect on the recycling of nutrients is disrupted by human activity. *Id.*

70. 7 Int'l Envtl. Rep. (BNA), Curr. Rep. 106 (1984), citing the estimate of the European Parliament's Environment Committee.

71. Ocean Dumping, Senate Hearing, *supra* note 22, at 2 (statement of Sen. John H. Chafee) (The kind of balancing analysis referred to is that mandated in *Calvert Cliffs Coordinating Committee v. AEC*, 449 F.2d 1109 (D.C. Cir., 1971), when the Court of Appeals interpreted the National Environmental Policy Act (42 U.S.C. § 4321 *et seq.*, 1969) to require economic and technical benefits to be weighed against environmental costs).

Estuaries, Internal Waters, and the Coastal Zone

Most of the marine conventions are quite explicit about the ocean areas to which they apply: it is close to shore that their definition of what constitutes the marine environment and, therefore, their area of application, becomes blurred.

The Athens Protocol, on protection of the Mediterranean from land-based source pollution, defines the Protocol Area as the Mediterranean Sea, together with saltwater marshes communicating with the sea, and waters on the landward side of the baselines from which the breadth of the territorial sea is measured, extending, in the case of watercourses, up to the freshwater limit.⁷² Thus, it may include internal waters that are not estuarine. For a body of water as large as the Mediterranean, with many coastal states, and deeply indented, islanded or embayed coastlines, the extent of internal waters to which the Protocol applies could vary considerably from state to state.⁷³

The Paris Convention defines its area of application by coordinates and then elaborates on that definition by stating that the maritime area comprises the high seas, the territorial seas of contracting parties, and waters on the landward side of the baselines of the territorial sea.⁷⁴ It embraces the coastal waters of all of Europe, except those of the Mediterranean and Baltic seas.⁷⁵ Like the Athens Protocol, it also comprises estuaries up to the freshwater limit, with one reservation—that, on the proposal of the contracting party or parties bordering on a watercourse, it is the duty of the convention commission to fix the limit to which the maritime area shall extend in that watercourse (rather than use the salinity of the water as a measure).⁷⁶ Furthermore, the Paris Convention refers to the marine environment as including estuaries, leaving no doubt that the maritime area, the convention area, and the marine environment are all one.⁷⁷

72. Athens Protocol, *supra* note 64, art.3.

73. The parent Barcelona Convention expressly states that, except as may be otherwise provided in any protocol, the Mediterranean Sea Area shall not include internal waters of the contracting parties. Barcelona Convention, *supra* note 64, art. 1 (2). It may be noted that, whereas the Athens Protocol makes that provision, the Barcelona Protocol on dumping does not. Barcelona Protocol, *supra* note 64, art. 2. Hence, it is possible for internal waters to be protected from waterborne and even airborne pollution, but not from dumping by ships.

74. Paris Convention, *supra* note 11, arts. 2 and 3 (a).

75. *Id.* art. 3 (a).

76. *Id.* art. 16 (e).

77. *Id.* art. 1 (1). The Convention Commission (PARCOM) has already adopted measures for control of mercury and cadmium discharges into the maritime area or into watercourses affecting the maritime area. Both the mercury and cadmium programs set detailed limit values for effluent, plus quality objectives for receiving waters (estuaries, non-estuarine waters landward of the baseline of the territorial sea, and territorial waters). No quality objective was fixed for the high seas in either program, on the understanding that the objectives set for the other waters would protect the high seas. See Council Decision on Marine Pollution, 20 Dec. 1985. Concerning the Adoption, on Behalf of the Community of Programmes and Measures Relating to Mercury and Cadmium Discharges under the Convention for the Prevention of Marine Pollution from Land-Based Sources, PARCOM Decision 85/1 (Mercury) and 85/2 (Cadmium), with Annexes I and II, 85/613/EEC, 28 O.J. Eur. Comm. (No. L 375) 23 (1985), reprinted in Int'l Env'tl. Rep. (BNA), Ref. File 151:1401.

The Kuwait Convention proclaims that the convention area (delineated by coordinates) shall not include internal waters of the contracting states, unless otherwise stated in the Convention or any of its protocols.⁷⁸ Even so, the contracting parties are required to take all appropriate measures to prevent, abate, and combat pollution of the Sea Area resulting from land reclamation and associated dredging activities, which take place precisely at the land-sea interface.⁷⁹ Furthermore, the Kuwait Action Plan pertains not only to the marine area defined in the convention, but also to coastal areas.⁸⁰ For inclusion in the Action Plan region, coastal areas are to be identified on an ad hoc basis, depending on the type of activities to be carried out within the framework of the Plan, but even areas not included in the region should not be a source of marine pollution.⁸¹ One of the activities to be carried out within the framework of the Plan is environmental assessment, and this includes ecological studies of important natural habitats in the intertidal and subtidal zones, including creeks (*khores*).⁸² So, in one way or another the reach of the Kuwait program is supposed to extend to at least some internal waters for certain projects.

The same cannot be said of another regional agreement, the Wider Caribbean Convention.⁸³ The convention area in that instrument is held to mean the marine environment of the Gulf of Mexico, the Caribbean, and adjacent areas of the Atlantic Ocean, and explicitly does not embrace any internal waters.⁸⁴ Estuaries are considered as sources of pollution which it is up to the contracting parties to prevent from reaching the convention area.⁸⁵ This view of estuaries as sources of marine pollution, not as part of the land-sea interface falling within the purview of marine environment agreements, is to be found also in the preambles to the London and Oslo dumping conventions.⁸⁶ Such provisions are at variance with a definition—that the marine environment includes estuaries—which

78. Kuwait Convention, *supra* note 60, art. II (b).

79. *Id.* art. VIII.

80. Action Plan for the Protection and Development of the Marine Environment and the Coastal Areas of Bahrain, Iran, Iraq, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates, Apr. 23, 1978, *reprinted in Int'l Env'tl. Rep. (BNA), Ref. File 21:2701* [hereinafter *Kuwait Action Plan*].

81. *Id.* Introduction, para. 5.

82. *Id.* para. 13.4 (c).

83. Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region, Mar. 24, 1983, *Int'l Env'tl. Rep. (BNA), Ref. File 21:3201*; 4 *International Environmental Law—Multilateral Agreements* (W. Burhenne, ed.) 983:23/1.

84. *Id.* arts. 1 and 2.

85. *Id.* art. 7.

86. London Dumping Convention, *supra* note 10, para. 5 of the Preamble; Oslo Convention, *supra* note 10, para. 4 of the Preamble.

has long been accepted in United Nations pronouncements⁸⁷ and has been incorporated in the Law of the Sea Convention.⁸⁸ It is not surprising, therefore, that when estuaries are excluded, a lot of polluting activity takes place in the crucial zone where land and freshwater meet the sea, and so falls in the gaps between the conventions, as in the *Zuid-Chemie* case.⁸⁹

The River Basin

Only a few river treaties make specific provision for estuarine and adjacent waters. One is the Rhine Chemical Convention of 1976,⁹⁰ which states that the need "to preserve an acceptable quality of sea water"⁹¹ must be taken into account. Another, the Finnish-Swedish Agreement of 1971, is expressly declared applicable to the mouth of the River Torne and part of the Gulf of Bothnia.⁹² Perhaps the 1973 treaty between Argentina and Uruguay for the maritime front of the Plata River could be included, for there is administrative machinery in place, although the treaty is not primarily concerned with pollution.⁹³

The Draft European Convention for the Protection of International Watercourses Against Pollution (1974)⁹⁴ defined "estuary" as the part of a watercourse between the freshwater limit and the baseline of the territorial sea, and "freshwater limit" as the place in the watercourse where, at low tide in a period of low freshwater flow, there is an appreciable increase in salinity due to the presence of sea water.⁹⁵

Conceptually, then, the estuary of a river was regarded both as part of the watercourse and part of the marine environment. There was recognition of the need for an integrated approach to estuarine pollution. How-

87. The Intergovernmental Oceanographic Commission of UNESCO used the expression "marine pollution (including estuaries)" in its proposed definition of marine pollution in 1969. UNESCO, Intergovernmental Oceanographic Commission, *Report on Long-term and Expanded Programme of Oceanographic Research*, Note by the Secretary-General, U.N. Doc. A/7750 (1969). See also UNESCO, Report of the Secretary-General, *The Sea: Prevention and Control of Marine Pollution*, U.N. Doc. No. E/5003 (1971).

88. Law of the Sea Convention, *supra* note 1, art. 1 (4).

89. See *supra*, at note 12.

90. Convention on the Protection of the Rhine Against Chemical Pollution, Dec. 3, 1976, 16 I.L.M. 242, at 244.

91. *Id.* art. 1 (2)(g).

92. Agreement Concerning Frontier Rivers, Sept. 16, 1971, Finland-Sweden, 825 U.N.T.S. 191, art. 1.

93. Treaty Concerning the River Plate and its Maritime Limits, Nov. 19, 1973, Argentina-Uruguay, 13 I.L.M. 251. The two states formed a mixed technical commission for the maritime front. The primary concern is maritime boundary delimitation. *Id.*

94. Council of Europe, Draft European Convention for the Protection of International Watercourses Against Pollution, Feb. 1974, *text in* [1974] 2 Y.B. Int'l L. Comm'n, Pt. 2, 346-49.

95. *Id.* art. 1 (b) and (c).

ever, that did not translate into subsuming the estuary to the administrative regime of the river basin, for the Draft European Convention remained a draft.

Overall, it seems that the lack of effective jurisdiction by river entities over the land-sea interface is just one more illustration of the single-medium approach—that agencies tend to be concerned with pollution of the medium for which they are responsible, not for the pollution transmitted through it to other parts of the environment.⁹⁶

The gaps in regulatory coverage of the land-sea interface indicate that neither the river administrations nor the marine conventions adequately protect this zone from transfers of pollution. But recognition of the problem already exists, and some authorities consider that the river basin should be included, wholly or partly, within the purview of some of the marine conventions for the control of land-based pollution.⁹⁷ When linked to river administration, this approach points in the right direction for integrated development, even though the results as yet are not very promising. For instance, the Montreal Guidelines emphasize drainage basin planning as follows:

This strategy acknowledges that a large proportion of pollution enters the marine environment via watercourses....Through consideration of socio-economic and environmental factors utilizing a drainage system as the boundary limit, the desired uses and level of quality that can be attained for any given marine water body are determined.⁹⁸

The Council of Europe echoed that thought in a 1985 resolution on land-based marine pollution, when it asked UNEP to draw up "an ecological assessment of the various marine basins and the main European river basins so as to enable a precise assessment to be made of the seriousness of the problem and enable appropriate measures to be envisaged. . . ."⁹⁹

96. The Special Rapporteur to the International Law Commission tried in 1981 to introduce a rule concerning the freshwater-marine interface and spoke of "the gap that appeared as the result of inattention by many of the jurists specialized in the law of international watercourses and many of the jurists specialized in the law of the sea." See International Law Commission, *Third Report on the Law of the Non-Navigational Uses of International Watercourses*, U.N. Doc. A/CN.4/348 (1981), at 233, No. 327. The Rapporteur, in this report, acknowledged his indebtedness to the work of Prof. Robert D. Hayton, an expert on the law of the non-navigational uses of international watercourses and author of numerous publications in this field. *Id.*

Although the jurists failed to close the gap, others have had less difficulty in linking the estuarine zone to the drainage basin. For instance, in a study of the river basin as a functional ecosystem, using a systems approach, V.R. Pantulu of the Mekong Secretariat considered the estuarine area and coastal zone as one of six physical sub-systems of the river system, linked to all the others by flow of water, sedimentation, nutrients, and water pollutants. Pantulu, *River Basin as Ecosystem*, in *River Basin Strategy*, University of Linköping, Department of Water in Environment and Society, Tema V Report 228, at 231-33 (U. Lohm, ed. 1984).

97. For example, the experts who devised the Montreal Guidelines and the Council of Europe Resolution. See *supra* notes 7 and 61.

98. Montreal Guidelines, *supra* note 61, annex 1, para. 1.3.2.2.

99. Council of Europe Resolution 161, *supra* note 7, at para. 13 (i).

So far, however, the need to link drainage basins with the marine environment in planning and policy-making is reflected only to a limited extent in the marine environment conventions. The Helsinki Convention, for example, appears to imply the inclusion of the drainage basins of all the rivers flowing into the Baltic, at least for demographic purposes, because it refers to the population living within the "catchment area" of that sea.¹⁰⁰ The Paris Convention calls for an integrated planning policy in implementing control of pollution from land-based sources.¹⁰¹ Such integration of planning could extend to a very large land area, for this is one of the conventions to which the European Economic Community is a contracting party, and, therefore, states party to the Convention which are members of the Community are subject also to the Community's pollutant discharge directives.¹⁰²

The Rhine is one major international river on which the Paris Convention has a bearing, for three of that Convention's contracting parties (Federal Republic of Germany, France, and the Netherlands) are riparian states and contribute heavily to the pollution carried by that watercourse to the North Sea. They are also party to the Rhine chemical and chlorides pollution conventions of 1976,¹⁰³ and, as members of the European Community, are subject to the EEC directive, likewise of 1976, on dangerous substances discharged into the aquatic environment.¹⁰⁴ The Rhine River itself has a commission on pollution. In fact, it has two, the International Commission for Protection of the Rhine Against Pollution,¹⁰⁵ which is responsible for administering the chemical and chlorides conventions, and the Central Commission for Navigation of the Rhine,¹⁰⁶ which has regulatory power over vessel pollution.

And yet the system does not work. The Rhine is still one of the dirtiest rivers in the world¹⁰⁷ and helps to make the North Sea one of the dirtiest

100. Helsinki Convention, *supra* note 65, Preamble, para. 3.

101. Paris Convention, *supra* note 11, Introduction, para. 6, and part II, paras. 18-22.

102. The Community approved the Convention in 1975. 18 O.J. Eur. Comm. (No. L 194) 5 (1975). It has adopted the Paris Commission's programs and measures on mercury and cadmium discharges. See *supra* note 77.

103. Convention on the Protection of the Rhine Against Chemical Pollution, *supra* note 90; Convention on the Protection of the Rhine Against Pollution by Chlorides, Dec. 3, 1976, 16 I.L.M. 265.

104. EEC Council Directive on Pollution Caused by Certain Dangerous Substances, *supra* note 14.

105. The International Commission for the Protection of the Rhine Against Pollution was established by the multilateral convention of Apr. 29, 1963, known as the Berne Agreement, *English translation of text in A. Peaslee, International Government Organizations, Part Five, 430 (rev. 3d ed., 1976)*.

106. The Central Commission for Rhine Navigation can prohibit the dumping of substances in the river, limit the kind of materials transported, and set conditions for their transport, loading and unloading. The Commission's authority to regulate is based on arts. XLIII-XLVII of the Mannheim Convention of 1868. Convention . . . Respecting Navigation of the Rhine, Oct. 17, 1868, 20 Martens Nouveau Recueil 355 (ser. 12), 138 Pary's T.S. Consolidated Treaty Series 167.

107. On the long struggle to implement the chlorides convention, see, e.g. Teclaff & Teclaff, *Transboundary Toxic Pollution and the Drainage Basin Concept*, 25 Nat. Res. J. 589 (1985).

seas.¹⁰⁸ Partly, this is because the network of regulation extends to only a portion of the river basin. Switzerland, an upper basin state, does not belong to the European Community and is not, therefore, subject to its directives. The possible consequences of such a gap in the areal coverage of pollution control measures were dramatically underscored by the Sandoz chemical warehouse fire in 1986, when firefighting equipment washed huge quantities of toxic chemicals into the Rhine at Basel, Switzerland, killing fish and polluting the river and its sediments for hundreds of miles downstream as far as the North Sea.¹⁰⁹

The Sandoz fire and its aftermath demonstrated that even states far removed from the sea, in the upper basins of great rivers, contribute to marine pollution and may, in turn, be affected by attempts to regulate and prevent it. Although coordination of drainage basin regulation and marine environment regulation is still limited, the potential scope of some of the marine environment instruments is extended by the admission of states which do not border the sea. The Paris Convention, for instance, proclaims that it is open to any state not at the original conference, located *upstream* on watercourses crossing the territory of one or more parties and reaching the maritime area of the Convention.¹¹⁰ The Barcelona Convention and its Athens Protocol on pollution from land-based sources do not have any such explicit wording.¹¹¹ However, they were both held open for signature by the European Economic Community and by any similar regional economic grouping of which at least one member is a coastal state of the Mediterranean Sea area and which exercises competence in fields covered by the Convention and Protocol.¹¹² Moreover, after the entry into force of the Convention and any of its protocols, other states may join, subject to approval by three-fourths of the contracting parties to the protocol concerned.¹¹³ This provision, thus, allows some flexibility in admitting to the program inland states that belong to a regional group which borders the Mediterranean.

According to the Montreal Guidelines, the question is no longer whether upper basin states should be invited to participate in a conference or

108. The Rhine is not the only river contributing to the sad state of the North Sea, nor is riverborne pollution the only source of the Sea's contamination (other sources include the atmosphere and offshore oil industries). However, the polychlorinated biphenyl pollution of the Dutch coastal zone is regarded as indicative of the Rhine's input, because the river's own level of PCB contamination is so high that eel may not be eaten. 10 Int'l Env'tl. Rep. (BNA), Curr. Rep. 124 (1987), citing a spokesman for the Seas at Risk Federation, which represents environmental groups from coastal states of the North Sea. *Id.*

109. See N.Y. Times, Nov. 11, 1986, at A1, col. 3; *id.*, Nov. 12, 1986, at A8, col. 3; *id.*, Nov. 13, 1986, at A3, col. 1; and *id.*, Nov. 15, 1986, at 3, col. 1; see also *The Rhine: Sandoz Incident*, 9 Int'l Env'tl. Rep. (BNA), Curr. Rep. 429-41 (1986).

110. Paris Convention, *supra* note 11, art. 24.3.

111. See *supra* note 64, Barcelona Convention and Athens Protocol.

112. Barcelona Convention, *supra* note 64, art. 24; Athens Protocol, *supra* note 64, art. 16.3.

113. Barcelona Convention, *supra* note 64, art. 26.

become, by majority approval, contracting parties to a marine environment convention. The Guidelines declare that such states now have an obligation with respect to the sea independently of whether they are party to a marine agreement.¹¹⁴

INSTITUTIONAL ARRANGEMENTS

In developing a multi-media perspective, much will depend on the kind of institutions adopted and their coordinating capacities. In its Montreal Guidelines, the United Nations Environment Programme recommended that institutional arrangements made at the regional or global level should include formulation and adoption of a comprehensive environmental management approach.¹¹⁵ High on the list of functions that would form part of such an approach are: environmental assessment; research and monitoring; and data management and information exchange.

Environmental Assessment

The need for multi-media assessment of pollution transfers to and from the marine environment was put forward as long ago as 1976, in an OECD recommendation on coastal management:

In order to arrive at a comprehensive approach to environmental pollution, ecological, technical and economic studies should be undertaken of the possible transfer of pollution between land, sea and air as a result of policies to deal with only one of these media.¹¹⁶

The Council of Europe's request to UNEP in 1985 to draw up an ecological assessment of marine basins and the main European river basins reiterated that need,¹¹⁷ and so did a resolution drafted for the European Economic Community's Fourth Environmental Action Programme (1987-1992), urging the development of multi-media analyses of environmental problems.¹¹⁸

Such analyses are not mandated in the marine environment conventions and guidelines, although the obligation to conduct some form of environmental assessment is quite generally recognized. The Paris Conven-

114. Montreal Guidelines, *supra* note 61, Guideline No. 5.2. This Guideline proclaims that: States not bordering on the marine environment should co-operate in preventing, reducing and controlling pollution of the marine environment originating or partially originating from releases within their territory into or reaching water basins or watercourses flowing into the marine environment or via the atmosphere. *Id.*

115. *Id.*, Guideline No. 19.2 (b).

116. *Principles Concerning Coastal Management, Recommendations adopted on 12th October, 1976*, annex, 19 O.J. Eur. Comm. (No. C 76) 161 (1976), reprinted in OECD and the Environment, *supra* note 50, at 173.

117. Council of Europe, Land-Based Marine Pollution, Resolution 161, *supra* note 7.

118. *Policy and Action Programme on the Environment (1987-1992)*, European Economic Community Publication Draft Resolution, reprinted in 17 *Envtl. Pol'y & L.* 42 (1987). See paras. (e) and (f) of the recommendations for Community action.

tion's emphasis, for instance, is on input from land to sea and it is chiefly concerned with assessment of marine pollution.¹¹⁹ The Montreal Guidelines, building on experience with the Paris Convention, require consideration not only of activities significantly affecting the marine environment, but also of the impact of any reasonable alternative to an activity.¹²⁰ This is a step toward the simultaneous assessment of risks posed to different media by a particular pollutant or means of disposal. Similarly, the EEC's proposed dumping directive is not confined to marine impacts: its annex on incineration at sea requires that, in selecting an incineration site, particular attention be given to atmospheric transport of pollutants in coastal areas.¹²¹ The Wider Caribbean and Kuwait conventions have almost identically worded brief articles on environmental assessment, again limited to marine pollution,¹²² but the Kuwait Action Plan is broader in scope, consistent with the inclusion of coastal areas in what is termed the "ecoregion."¹²³ Environmental assessment forms the first of the Plan's four main components and is intended to comprise impacts of coastal activities on human health, as well as on marine ecosystems.¹²⁴

It may be noted that none of the marine environment instruments contain any reference to assessment of the impact of regulation or lack of regulation (as opposed to the impact of activities).¹²⁵ They are not alone in this failure, but it must be regarded as a major deficiency. Authorities cannot be expected to implement an integrated approach if they are unaware of the extent to which laws and regulations contribute to the transfer and transformation of pollutants.

Research and Monitoring

Because they deal with highly technical matters, most of the marine conventions, guidelines, and directives contain provisions on research and monitoring, some of which are quite detailed and comprehensive. For example, the Montreal Guidelines devote an entire annex to monitoring and data management.¹²⁶ The purpose of such provisions is threefold: to establish a basis for environmental assessment; for the development

119. The Contracting Parties agree to set up a monitoring system allowing assessment of the existing level of marine pollution and of the effectiveness of measures for the reduction of marine pollution from land-based sources. Paris Convention, *supra* note 10, art. 11.

120. Montreal Guidelines, *supra* note 61, at annex I, No. 1.3.1.2.

121. EEC proposed Dumping Directive, *supra* note 40, at annex IV.I.1 (a).

122. Wider Caribbean Convention, *supra* note 83, at art. 12; Kuwait Convention, *supra* note 60, at art. XI.

123. Kuwait Action Plan, *supra* note 80, Introduction, para. 6.

124. *Id.*, paras. 13.3 and 13.5.

125. However, the Kuwait Action Plan does provide for surveys of national capabilities of the region covering, *inter alia*, existing environmental laws and regulations. *Id.*, para. 13.1 (e).

126. Montreal Guidelines, *supra* note 61, at annex III.

of standards; and for evaluating the effectiveness of pollution control measures.

Monitoring may measure levels of the pollutant itself or its effects on living organisms. In a lot of the research and monitoring carried out for other media, control has been effected either by effluent limitations (emission standards) or ambient limitations (receiving standards), without much reference to quantifiable impacts on human and other forms of life. In the marine environment, researchers increasingly turn to living organisms as an index of contamination, because the sensitivity of fish and other marine creatures to pollution permits more rapid and accurate measurement.¹²⁷

Some of the conventions and programs reflect this trend. For example, the Kuwait Action Plan calls for studies on the impact of dredging on marine species, communities and ecosystems, and for monitoring the levels of heavy metals in marine organisms.¹²⁸ In other instruments, there has been a shift of emphasis from a more traditional approach in the original framework agreement to newer methods in subsequent protocols or regulations. The Paris Convention, for instance, merely requires the parties to "take account" of the quality and absorptive capacity of the receiving waters of the maritime area.¹²⁹ However, certain of the regulations promulgated under that convention have very explicit provisions on monitoring, detailing even the species of fish to be adopted as indicators for analysis.¹³⁰

The dumping conventions do not even specify research and monitoring, apart from some very generally worded provisions governing the issue of permits. These require studies of the characteristics of the dumping site and consideration of the possible effects of dumping on marine life, chiefly effects which would reduce the commercial value of the resource.¹³¹ It would be helpful to an integrated approach if such studies were carried out systematically with a view to determining the levels of individual toxic pollutants in marine organisms.

No research and monitoring program, however elaborate and comprehensive, can succeed if the individual contracting parties to a marine

127. On the use of marine organisms in research, see, e.g., *Hearings Before the Subcommittee on Oceanography . . . of the Committee on Merchant Marine and Fisheries*, House of Representatives, 99th Cong., 1st Sess., 78-79 (1985).

128. Kuwait Action Plan, *supra* note 80, at para. 13.3 (c) and (d).

129. Paris Convention, *supra* note 10, at art. 6.2 (c). But one reason for the inclusion of substances in Part I of annex A is that they may endanger the welfare of living organisms, causing undesirable changes in marine ecosystems. *Id.*, annex A, part I (ii)(b).

130. See PARCOM Decision 85/1, *supra* note 77, at annex IV.4.

131. Oslo Convention, *supra* note 10, at annex III.1 (i) and 3 (a); proposed EEC Dumping Directive, *supra* note 40, at annex III.A (8) and C (2); London Dumping Convention, *supra* note 10, at art. IV.2 and annex III. A (8) and C (2). They refer to the production of taints which would reduce the marketability of fish and shellfish. *Id.*

environment convention fail to cooperate. The Mediterranean Action Plan¹³² seems to have fallen victim to such failure. The basis of the Plan is the Pollution Research and Monitoring Program, known as MEDPOL, set up in the 1970s to assess and monitor pollution levels in the Mediterranean.¹³³ It comprises some 80 national research institutions, as well as the European Community, the United Nations Environment Programme as supervising agency, and other global organizations.¹³⁴ The very magnitude of the project seems to have been an obstacle to its implementation. Recently, the Executive Director of UNEP complained that the Action Plan was in danger of becoming a mere facade, because governments were not acting upon the findings of MEDPOL's research.¹³⁵ However, the research itself was by no means comprehensive, due chiefly to problems of funding and technical expertise. A decade after its inception, the monitoring network reportedly encompassed only half of the coastal countries, a quarter of the Mediterranean coastline, and about a quarter of the total pollutants.¹³⁶

Data Management and Information Exchange

Provisions on data collection and exchange of information among the parties are virtually standard nowadays in environmental conventions, and the marine environment instruments are no exception. The Montreal Guidelines devote considerable attention to the details of data organization.¹³⁷ Under the Paris Convention the parties agree to establish complementary or joint programs of scientific and technical research,¹³⁸ and under the Helsinki (Baltic) Convention they undertake to develop inter-comparable observation methods.¹³⁹ The dumping agreements do not specify intercomparability, but their annexes indicate what characteristics of the waste and of the dumping site are to be considered in issuing permits, and this gives a degree of uniformity.¹⁴⁰

The UNEP regional seas agreements (for example, Kuwait, Wider Caribbean, and Barcelona conventions) contain a broader mandate. The

132. Mediterranean Action Plan, adopted by the Intergovernmental Meeting on the Protection of the Mediterranean, held at Barcelona in Feb. 1975, *reprinted in* 14 I.L.M. 475.

133. MEDPOL was established in 1975 as one of the first elements of the Action Plan. See Johnston & Enomoto, *supra* note 60, at 371, n. 1988.

134. *Id.*

135. 8 Int'l Envtl. Rep. (BNA), Curr. Rep. 347-48 (1985).

136. 9 Int'l Envtl. Rep. (BNA), Curr. Rep. 287 (1986).

137. Montreal Guidelines, *supra* note 61, annex III.2.0.

138. Paris Convention, *supra* note 11, art. 10.

139. Helsinki Convention, *supra* note 65, art. 16.3.

140. *E.g.*, London Dumping Convention, *supra* note 10, annex III; Barcelona Protocol, *supra* note 64, annex 3; and EEC Proposed Dumping Directive, *supra* note 14, annex III. The Oslo Convention, however, does have provisions obligating the parties to establish complementary or joint programs of research and monitoring. Oslo Convention, *supra* note 10, arts. 13 and 14.

contracting parties undertake to cooperate in research, monitoring, and exchange of data; to coordinate their research and monitoring programs; and to interlink their research centers to ensure comparable results.¹⁴¹ The Kuwait Action Plan takes this a stage further. It emphasizes that the programs of research to be undertaken (oceanographical, meteorological, biological, geological, medical, socio-economic, and institutional) are interdisciplinary and interrelated, and it stresses the need for their close coordination and for comparable data.¹⁴²

In most of the agreements, the parties agree to exchange data, but in some cases they are required to submit information to an institution established by the convention.¹⁴³ They may also be required to cooperate with, or at least have regard to work carried out by, existing international organizations or agencies.¹⁴⁴ In one instance, the convention commission is empowered to request such agencies to collaborate in research; to disseminate relevant information from available sources; and to outline the organization and scope of work connected with scientific and technological cooperation undertaken by the parties.¹⁴⁵ Sometimes, however, there are quite severe restrictions on when and to whom information is to be divulged.¹⁴⁶

A relatively new feature in a few of the agreements is that the parties undertake to provide technical and other assistance in research and monitoring to developing countries in the convention area.¹⁴⁷ The Montreal Guidelines make a particular point of this type of assistance and go into considerable detail on what it should include.¹⁴⁸ Also implicit in the land-based pollution conventions also (but nowhere precisely spelled out) is

141. E.g. Kuwait Convention, *supra* note 60, art. 10; Wider Caribbean Convention, *supra* note 83, art. 13; Barcelona Convention, *supra* note 64, art. 11.

142. Kuwait Action Plan, *supra* note 80, at paras. 14 and 15.

143. E.g., Oslo Convention, *supra* note 10, at art. 11; Paris Convention, *supra* note 11, at art. 17.

144. Oslo Convention, *supra* note 10, at art. 12; Paris Convention, *supra* note 11, at art. 10; Barcelona Convention, *supra* note 64, at art. 11; Wider Caribbean Convention, *supra* note 83, at art. 13.2.

145. Helsinki Convention, *supra* note 65, at art. 13 (e)(i) and (f), and art. 16.

146. According to the proposed EEC Dumping Directive, information on substances dumped and dumping sites is to be made available to the Commission, at its request, but only on a case-by-case basis. The Commission and national authorities are obligated not to divulge this information. EEC proposed Dumping Directive, *supra* note 40, art. 11, paras. 2 and 4.

147. See Wider Caribbean Convention, *supra* note 83, art. 13 ("taking into account the special needs of the smaller island developing countries and territories"); Barcelona Convention, *supra* note 64, art. 11.3 ("priority to be given to the special needs of developing countries in the Mediterranean region"). Such provisions are important, given the tendency for hazardous pollutants to be transferred from industrialized to less-developed countries. The principle itself dates back to the guidelines developed by the Inter-Governmental Working Group on Marine Pollution in 1971. See *supra*, note 54, Principle 6.

148. Montreal Guidelines, *supra* note 61, para. 9. These recommendations go beyond scientific and technical assistance in research and monitoring to include training of personnel, technology transfer, and help in the establishment of appropriate infrastructure.

the notion of data on airborne and waterborne pollutants being transmitted from land-based scientific and environmental agencies to the agencies, national and international, responsible for the marine environment.¹⁴⁹

CONCLUSIONS AND RECOMMENDATIONS

Transfers of pollution from one part of the environment to another are increasingly common, both within and across national boundaries. In numerous documented instances, these transfers have been brought about by the very measures that are supposed to protect the environment. Many municipal laws and international conventions were drafted to protect a single medium—air, land, or water—without regard to impacts elsewhere. When stringent regulation of landfills, for example, comes into conflict with stringent regulation of dumping at sea, polluters resort to illegal disposal, wastes are shifted around the environment, and administrations at all levels face seemingly insoluble dilemmas. More and more often, policy-making and legislation reflect an awareness of the problem and are now attempting to cope with it.

The environmental law of the sea has shown a pioneering recognition of cross-media effects. Provisions concerning these effects have appeared since the early 1970s in principles, guidelines and conventions, including the global Law of the Sea Convention of 1982. In that period, the oceans have become the ultimate repository of hazardous wastes to an extent that warrants the more careful and comprehensive regulation. Even so, states are warned in these guidelines and conventions to take care that the measures they adopt to protect the marine environment do not cause transfer or transformation of pollution. This is a very tall order, the more so because it involves a delicate balancing of options and the conventions do not spell out how that balancing is to be achieved. It could be argued that the anti-transfer provisions weaken other convention obligations to diligently seek alternatives to disposal at sea, that they may leave too wide a loophole justifying ocean disposal as the least harmful of a range of evils, and that, anyhow, they are mostly exhortatory.

Viewed another way, however, the anti-transfer provisions in the marine environment conventions can be seen as a potentially vital part of the multi-media perspective on pollution control that is beginning to develop and to embrace the entire hydrologic cycle. One of the biggest gaps in the regulation of waste disposal occurs between the law of the land and the law of the sea. Its worst impacts are felt at the land/sea interface, in the delicate, yet environmentally rich estuarine and coastal zone. To the injury of being at the receiving end of rivers that are often little better

149. This type of inter-agency coordination is recommended in the Kuwait Action Plan. Attached to the Plan is a request from the conference of plenipotentiaries for coordination and continuous consultation between those responsible for the regional marine meteorological program and the interim secretariat for the marine environment program. Kuwait Action Plan, *supra* note 80.

than waste pipelines hundreds of miles long is added the insult of intolerable loads of sewage sludge, dredge spoil, and toxic chemicals that here find a dubiously sanctioned resting place. At present, neither the river basin legislation and treaties nor the marine conventions adequately protect this zone. An integrated approach would link the two, both areally and functionally, and provide a context within which the anti-transfer provisions could be implemented effectively.

The foregoing analysis of marine conventions, guidelines, and directives indicates that elements of such an integrated approach already exist in the environmental law of the sea, waiting to be built upon. Institutional arrangements and government response to the conventions are the weakest points. There are enormous areas involved, a great diversity of political systems, and a number of institutions which already have piecemeal jurisdiction over some aspects of the problem. The most that can realistically be hoped for is a central institution with coordinating and advisory powers, such as the marine environment conventions already possess. Of political necessity, the implementation of measures has to be left to the coastal states.

Nevertheless, the existing marine environment commissions and secretariats could be oriented in the direction of an integrated approach to pollution control. Our hypothetical revamped agency should have adequate powers and sufficient technical staff and funds to conduct research on the marine environment directly on its own and to verify independently the data it receives from other marine sources. Its jurisdiction (that is, its "action plan" or program) should comprise areas of land and sea large enough to avoid the loopholes in the present regulatory schemes for control of marine pollution. On the seaward side, the jurisdiction should extend out to the high seas, overlapping, if necessary, with that of other commissions. Smaller, semi-enclosed seas might be, as several now are, under a single entity.

On the landward side, the jurisdiction of the commission should extend at a minimum to the freshwater limit in rivers, so as to include the vital estuarine zone. Ideally, the area of concern ought to overlap with that of river basin commissions, reaching to the upper limits of the basins of rivers flowing into a particular sea, so as to permit a more meaningful balancing of options for waste disposal. If it proved impracticable to include river basins, our hypothetical commission should at least be empowered to request information from basin or river entities, as well as from other national and international bodies dealing with pollution. It would use this information to work out an effective balancing of waste disposal options and to formulate proposals either directly to these other bodies or to periodic meetings at the ministerial level of states and international organizations that are parties to a multi-media program.