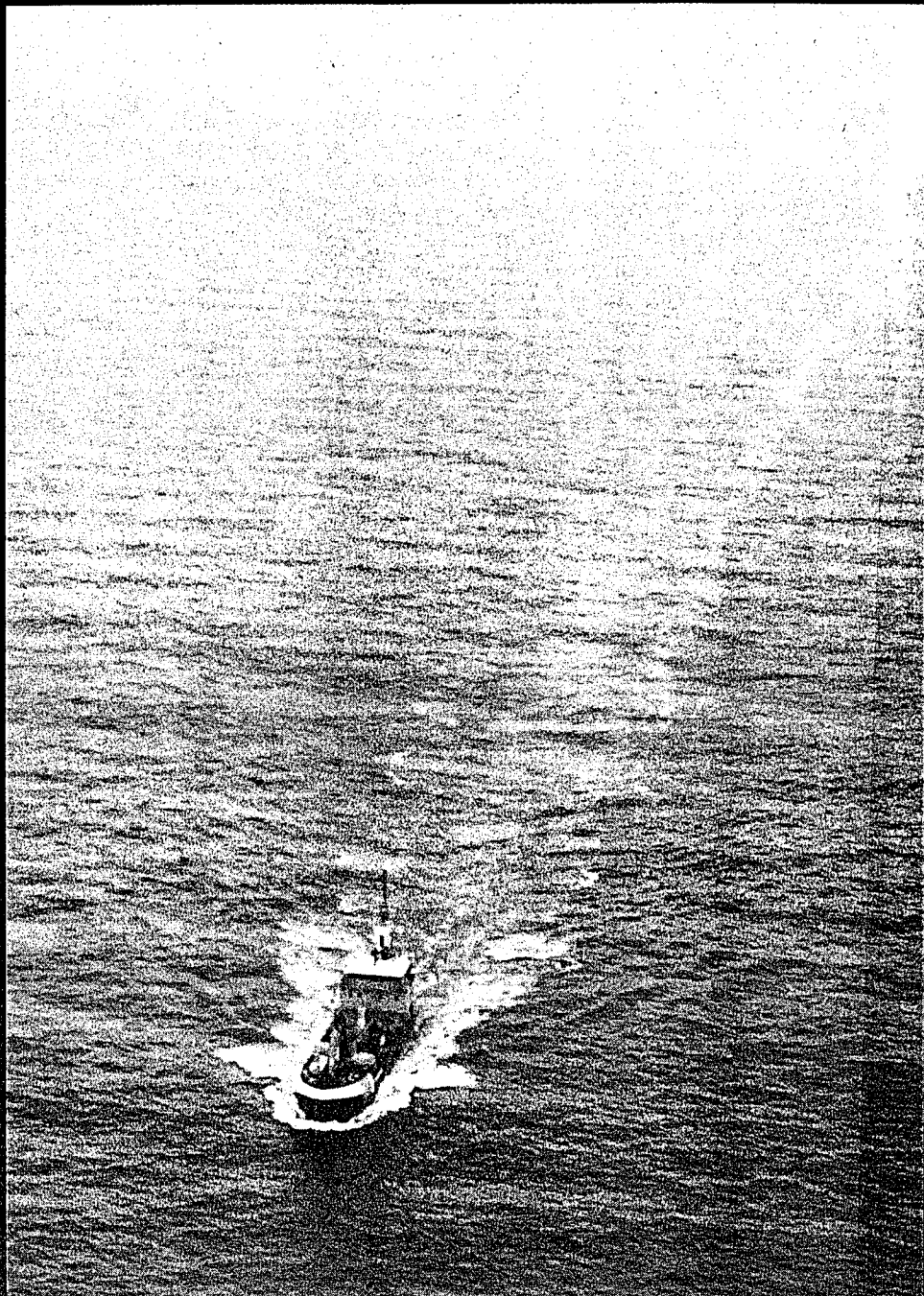


When public concern about an international environmental problem is strong enough to require action, governments often respond by negotiating a treaty. More than 120 multilateral treaties have been negotiated to address such problems, along with hundreds of regional and bilateral ones.¹ This profusion of international environmental law will prove positive if it leads to substantive changes in behavior. Yet nations regularly violate even relatively low-cost reporting requirements and ignore more substantive provisions in many environmental treaties.²

Why doesn't compliance follow automatically from a nation's signature? A recent study of compliance with international treaties regulating intentional oil pollution (discharges of waste oil at sea) by tankers may offer some insights into this discrepancy.³ (The nature and extent of this problem are discussed in the box on page 12.) By comparing the different regulatory strategies within those treaties, it was possible to identify those that have had the most success in inducing compliance and causing the intended behavioral changes. This, in turn, suggested a number of policy prescriptions regarding the types of rules that should be imposed and the ways in which new environmental accords should be drafted (or existing ones redrafted) to elicit higher compliance. As Maurice Strong, secretary-general of the United



NORTH SEA DIRECTORATE, THE NETHERLANDS

Ronald B. Mitchell, "Compliance with International Treaties: Lessons from Intentional Oil Pollution," *Environment* 37:4 (May 1995), 11-15 and 36-41.

Lessons from Intentional Oil Pollution

Nations Conference on Environment and Development, has noted, "We have to push like hell to make sure implementation takes place."⁴ These efforts will be most fruitful, however, if the correct direction in which to push is determined first.

Four decades of experience with the International Convention for Prevention of Pollution of the Sea by Oil (OILPOL) and the International Convention for Prevention of Pollution from Ships (MARPOL) show that treaties can—but do not always—lead powerful governments and corporations to behave in new ways, particularly if they opposed them initially.⁵ (The provisions of these treaties and the technical means of preventing intentional oil pollution are summarized in the box on page 13.) The study found reason to reject both the blind faith of international lawyers that international law "is a force with inherent strength of its own" and the cynical view of realist international relations scholars that "considerations of power rather than of law determine compliance."⁶ Even within this one problem area, compliance levels differed across treaty provisions. Higher compliance occurred when negotiators formulated those provisions to regulate the agents that had less power to violate them and/or greater interest in complying with them. The levels of environmental concern shown by governments and the resources they devoted to environmental protection clearly placed upper limits on compliance levels. But how policymakers chose to approach compliance, monitoring, and enforcement significantly influenced subsequent levels of compliance: Policymakers succeeded when they ensured that those responsible for complying, monitoring, or enforcing a treaty provision were placed in a "strategic

By Ronald B. Mitchell



TOM STACK & ASSOCIATES—THOMAS KITCHIN

triangle" in which they had the incentives, the ability, and the authority to perform those functions (see Figure 1 on page 14).

The Experience with Intentional Oil Pollution

International attempts to control intentional oil pollution include three cases in which those affected complied with

the rules concerning one type of behavior while at the same time failing to comply with the rules concerning another, very similar type of behavior. The most striking contrast was between the almost universal compliance with MARPOL equipment standards requiring tankers to install segregated ballast tanks (SBTs), which remove a major source of oil pollution from ships, and the frequent violations of

INTENTIONAL OIL POLLUTION

To most people, oil pollution conjures up images of massive oil spills due to tanker accidents like that of the *Exxon Valdez*.¹ Yet intentional oil discharges from tanker operations have consistently overshadowed accidents as the major source of ship-related oil pollution (see table below).² After a tanker delivers its cargo, a small amount of oil remains clinging to the tank walls like the residue visible after a glass of milk is emptied. Traditionally, tanker captains filled empty cargo tanks with sea water to provide ballast on the return voyage and then used sea water in high-pressure cleaning machines to wash down their tanks before loading more oil. The resultant mixtures of waste oil and water

were usually discharged at sea. Although clingage represents only about 0.4 percent of total cargo, this translates to 400 tons of oil discharged for each voyage of a typical tanker. Given the large volume of oil transported by sea, such discharges were a major pollution problem by the 1950s.

Discharges of crude oil do not persist indefinitely, but they can travel long distances before breaking up, thus posing environmental and aesthetic threats to coasts far from their release. Their most visible impact (and the most frequent source of public concern) has been on seabirds. Contact with oil destroys the insulating ability of the birds' feathers, and it can cause internal damage when

they ingest it in attempting to clean themselves. Beyond this, however, scientists disagree over the extent of the environmental harm caused by oil discharges. Some contend that the low-concentration but frequent oilings cause major long-term harm to fish, shellfish, and other marine life.³ Others find no evidence that even major oil spills "have unalterably changed the world's oceans or marine resources."⁴ Although less dramatic than major tanker spills, the appearance of small oil patches and tar balls on resort beaches has also prompted regular public complaints, especially in developed countries. These environmental and aesthetic concerns have provided the impetus for virtually all the international efforts to regulate oil pollution.⁵

TABLE
SOURCES OF OIL IN THE SEA

Source	1971	1980	1989
	(Thousands of metric tons)		
Transportation:			
Tanker operations	1,080	700	159
Dry docking	250	30	4
Terminal operations	3	20	30
Pumping of bilges	500	300	253
Accidents	300	420	121
Scrappings of old tankers	*	*	3
Subtotal	2,133	1,470	570
Offshore production	80	50	*
Municipal and industrial wastes	2,700	1,180	*
Natural sources	600	250	*
Atmospheric emissions	600	300	*
Total	6,113	3,250	570
Selected detail:			
Discharge from tanker operations	1,080	700	159
Crude oil transported by sea	1,100,000	1,319,000	1,097,000
Discharge as a percentage of crude oil transported by sea	0.098	0.053	0.014

*Not available

SOURCES: National Academy of Sciences, *Petroleum in the Marine Environment* (Washington, D.C., 1975); National Academy of Sciences and National Research Council, *Oil in the Sea: Inputs, Fates and Effects* (Washington, D.C.: National Academy Press, 1985); and International Maritime Organization, *Petroleum in the Marine Environment*, MEPC 30/INF.13 (London, September 1990).

1. The *Exxon Valdez* spilled 35,000 tons of oil into Prince William Sound, Alaska, on 24 March 1989.

2. See National Academy of Sciences, *Petroleum in the Marine Environment* (Washington, D.C., 1975); National Academy of Sciences and National Research Council, *Oil in the Sea: Inputs, Fates and Effects* (Washington, D.C.: National Academy Press, 1985); and International Maritime Organization, *Petroleum in the Marine Environment*, MEPC 30/Inf.13 (London, September 1990).

3. On the impact of oil pollution on birds, see C. J. Camphuysen, *Beached Bird Surveys in the Netherlands, 1915-1988: Seabird Mortality in the Southern North Sea Since the Early Days of Oil Pollution* (Amsterdam: Werkgroep Noordzee, 1989). For estimates of the harm done to other creatures, see the sources in note 2 above.

4. National Academy of Sciences and National Research Council, note 2 above, 489. See also GESAMP [IMO/FAO/UNESCO/WMO/WHO/IAEA/UN/UNEP Joint Group of Experts on the Scientific Aspects of Marine Pollution], *The State of the Marine Environment*, GESAMP Reports and Studies No. 39 (New York: United Nations, 1990), 2; Second International Conference on the Protection of the North Sea, *Quality Status of the North Sea* (London: Her Majesty's Stationery Office, 1987), 72-73; United Kingdom Royal Commission on Environmental Pollution, *Eighth Report: Oil Pollution of the Sea* (London: Her Majesty's Stationery Office, 1981), 38, 46-49, and 266; and J. M. Baker, *Impact of Oil Pollution on Living Resources* (Gland, Switzerland: International Union for Conservation of Nature and Natural Resources, 1983), 40.

5. See United Kingdom Ministry of Transport, *Report of the Committee on the Prevention of Pollution of the Sea by Oil* (London: Her Majesty's Stationery Office, 1953), 1-2.

INTERNATIONAL REGULATION OF INTENTIONAL OIL POLLUTION

Intentional oil pollution was one of the first environmental problems to receive international attention, with draft treaties being negotiated (but never signed) in both 1926 and 1935. By 1954, growth in both the amount of crude oil being transported by sea and concern about birds and beaches led to the signing of the International Convention for Prevention of Pollution of the Sea by Oil (OILPOL). OILPOL required that all tankers keep the oil content of discharges below 100 parts per million when within 50 miles of land but left discharges outside these zones unregulated. Governments were required to impose fines large enough to deter violations, to ensure that reception facilities were provided for waste oil, and to report on various treaty-related matters.

Minor amendments in 1962 were followed by amendments in 1969 that required that discharges within these 50-mile zones leave no "visible sheen," that discharges outside these zones not exceed 60 liters of oil per mile, and that total discharges not exceed 1/15,000th of total cargo capacity. Tanker captains were expected to reduce their total discharges by consolidating ballast and tank-cleaning slops in a single tank, letting gravity separate the oil from the water, discharging the clean water from beneath the oil, and then loading the next cargo on top of the oil that remained (a system known as load-on-top).

In 1993, the International Convention for Prevention of Pollution from Ships (MARPOL) made the regulation of oil pollution one part of an agreement that addressed four other forms of ship-generated marine pollution. MARPOL retained the 1969 discharge standards essentially unchanged but added requirements that all large new tankers install segregated ballast tanks (SBTs), a system that outfits tanks and other ballast spaces equal to 30 percent of the tanker's capacity with a separate piping system that never carries oil. Difficulties in obtaining ratification of the initial MARPOL agreement prompted a protocol conference in 1978. The protocol, negotiated as an integral part of the earlier agreement, required all existing tankers to install either SBT or crude oil washing (COW) systems and required all new tankers, both large and small, to install both such systems. (COW systems use crude oil itself instead of water to remove oil clinging to tank walls for delivery with the current cargo, thereby significantly reducing the amount of oil wasted due to tank cleaning and ballasting.) MARPOL authorized countries to detain foreign tankers as a sanction, set specific dates by which reception facilities were required, and strengthened reporting requirements. Since 1978, major amendments to MARPOL have required accident mitigation equipment and limits on air pollutants produced by ships.

MARPOL discharge standards limiting the amount and location of discharges. Tanker owners installed SBTs by required dates, even though this entailed significant investments with no offsetting benefits and even though decreasing oil prices were increasing the pressure to cut costs. Even tankers registered in countries that had opposed adoption of the equipment rules complied. They did so not in response to the threat of enforcement by other countries but as a direct response to a "coerced compliance" approach that sought primarily to prevent violations.⁷ The rules facilitated initial surveys and inspections by nongovernmental classification societies that made it hard for a tanker lacking the required equipment to receive the classification and insurance papers needed to trade internationally. The treaty reinforced this system by establishing the framework for more effective in-port monitoring and enforcement, the former of which has increased significantly.

Two facts confirm that the form of this compliance system, rather than some happy coincidence of economic or other factors, caused tanker owners to comply: Most tankers exempt from the requirements have not installed SBTs, and discharge limits failed to elicit high compliance levels even as equipment standards succeeded.

Indeed, noncompliance with the economically more efficient discharge rules—even after many amendments—was a major impetus for adopting the equipment requirements. Clearly, tanker captains still have incentives to discharge waste oil at sea, but successful equipment regulations have prevented their acting on those incentives.

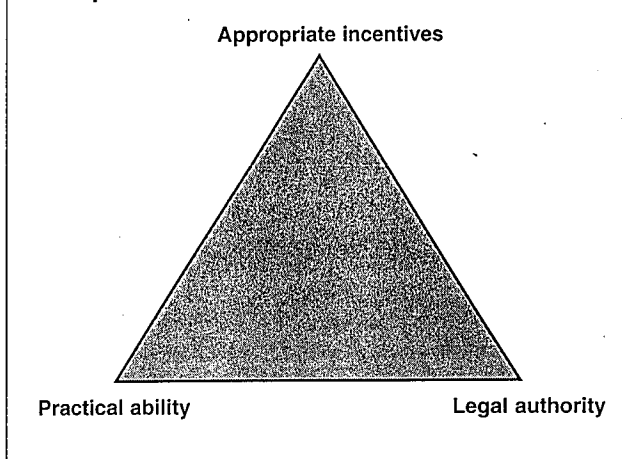
In the second case, 14 European countries signed a Memorandum of Understanding on Port State Control (MOU) in 1982 to increase regional enforcement of MARPOL and other maritime treaties.⁸ Through 1990, all of those countries reported enforcement data to the MOU secretariat, while only half of them reported the same information to the secretariat of the International Maritime Organization (IMO), a United Nations body that is responsible for the regulation of international shipping. The MOU system succeeded because it had a daily reporting requirement (as opposed to IMO's annual requirement) that readily became incorporated into the enforcing bureaucracies' standard operating procedures. Port inspectors could query the MOU

database to obtain otherwise unavailable information on which ships entering their harbors were most likely to be violating the law. In contrast, those responsible for reporting enforcement figures under the IMO system had no incentive to provide them.

Third, before MARPOL took effect in 1983, no government had ever detained a foreign-flagged tanker for violating oil pollution laws because this remedy was not available under international law. In contrast, at least seven countries have exercised their right to do this since that agreement took effect.⁹ Although MARPOL did not transform unconcerned countries into rigorous enforcers (most countries have never detained any ships and others do so only rarely), it did create an effective enforcement tool for those with the practical ability and the political incentive to use it.

These three cases provide clear evidence that treaty rules independently influence behavior when other factors are controlled for (or absent). The cases include three successes—equipment standards, MOU reporting, and enforcement

FIGURE 1. The strategic triangle of compliance.



after 1983—and three failures—discharge standards, IMO reporting, and enforcement before 1983. MARPOL presents two other examples of policy failure: The requirement that countries impose stiff penalties has been widely ignored and, despite MARPOL requirements, reception facilities for the waste oil that tankers would otherwise discharge at sea remain underprovided, especially in oil-loading ports where they are most needed.¹⁰

Lessons from the Oil Pollution Experience

These attempts to regulate intentional oil pollution offer several useful lessons regarding international efforts to protect the environment. First, despite the frequent assertions that most countries comply with most of their commitments most of the time,¹¹ significant noncompliance does occur and in some cases is quite common. The fact that treaty rules can influence behavior by no means implies that they always do. In many cases, however, noncompliance is not completely willful. Therefore, formulating treaty provisions along the proper lines can significantly increase overall compliance.

Second, although nonreporting is common, it does not always indicate noncompliance. As many studies have noted, treaties frequently fail to induce countries to report as fully as required.¹² Largely unrecognized, however, is the fact that even developed countries that comply with the substantive provisions of a treaty sometimes fail to report that fact.

Third, achieving compliance with environmental treaties requires altering the behavior of corporations and individuals as well as governments. Although centralized enforcement is not possible, other means of exacting compliance have been very effective: As the right to detain tankers demonstrates, enforcement of treaty provisions by a few countries can induce compliance far beyond their borders. Similarly, private parties can greatly assist enforcement. In

the oil pollution case, tanker classification societies, insurance companies, and tanker builders were instrumental in the success of the equipment requirements; their involvement not only prevented violations from occurring but also greatly reduced the monitoring demands on governments. Nongovernmental parties also played an important role in collecting, analyzing, and disseminating compliance and enforcement data on numerous aspects of oil pollution regulation.

Fourth, although reciprocal actions can be an effective means of inducing other countries to comply with international commitments, they are not necessarily appropriate in all cases.¹³ In arms control or trade, retaliatory noncompliance may allow countries to recoup losses imposed by others' noncompliance. In environmental affairs, however, retaliation simply inflicts further damage on the planet, so countries have avoided it.

Fifth, in the case of intentional oil pollution, secretariats have been remarkably unwilling to analyze and disseminate reported data in ways that would allow interested parties to respond to noncompliance. IMO has rarely analyzed those enforcement reports it receives to identify nonreporting or noncompliance. Although the MOU secretariat publishes excellent aggregate statistics on an annual basis, they lack the detail needed to determine which countries have not met the 25 percent inspection rate that the agreement requires. The secretariat has also decided not to release a "black list" of the tankers violating MARPOL to private oil companies and chartering organizations, even though such information would provide a strong incentive for compliance. These failures have several origins: the inadequacy of secretariat resources, diplomatic deference to member governments, and fears of legal liability regarding the release of inaccurate information about specific corporations. Secretariats are also caught in the bind that national reports often provide the only basis for identifying noncompliance, but using them for that purpose may reduce the incentive to supply those reports.

Policy Prescriptions

These empirical lessons provide the foundation for several policy prescriptions. At the most general level, treaty provisions alter behavior when they create the conditions for a strategic triangle of compliance in which agents have the political and material incentives, the practical ability, and the legal authority to undertake (or refrain from) a specified activity.¹⁴ In the case of intentional oil pollution, treaty provisions on compliance, monitoring, and enforcement only worked when they supplied all three components of this triangle. Tanker owners, for instance, always had the ability to install SBT equipment, but MARPOL gave them a new incentive to do so: Their ability to trade internationally was now contingent on compliance with MARPOL equipment requirements, as determined by classification societies and

insurance companies. Similarly, the 14 European countries had both the ability and the authority to conduct (and report) enforcement actions under the MARPOL and MOU agreements, but the MOU created greater incentives to do so because its computerized system enabled countries to deploy inspectors more effectively. Rules allowing detention also changed the enforcement tactics of those countries that already had the incentive and ability to impose stiff sanctions by giving them the legal authority.

In contrast, treaty provisions fail to improve compliance when they ignore this strategic triangle. Intentional discharges by older tankers have remained common because tanker captains, who are in the best position to prevent them, have little incentive to do so. Attempts to combat this problem by making detection of illegal discharges easier (countries may now regard any incoming tanker with an unusually low amount of waste oil as having discharged illegally at sea) have failed because oil-exporting countries have no desire to make their ports less attractive to tankers by rigorous enforcement. Similarly, attempts to increase fines for violations failed because countries already had the authority to increase fines and the rules did not create new incentives to do so. Lack of incentives also explains why many oil-loading states still lack reception facilities.

This triangle of incentives, ability, and authority is linked to the three major components of any compliance system: a primary rule system, a compliance information system, and a non-compliance response system. The primary rule system consists of the agents, rules, and procedures related to the substantive behavior targeted by the treaty. The compliance information system consists of the agents, rules, and procedures involved in the collection, analysis, and dissemination of data on compliance and enforcement. The noncompliance response system consists of those factors that determine the type, likelihood, magnitude, and appropriateness of responses to noncompliance.

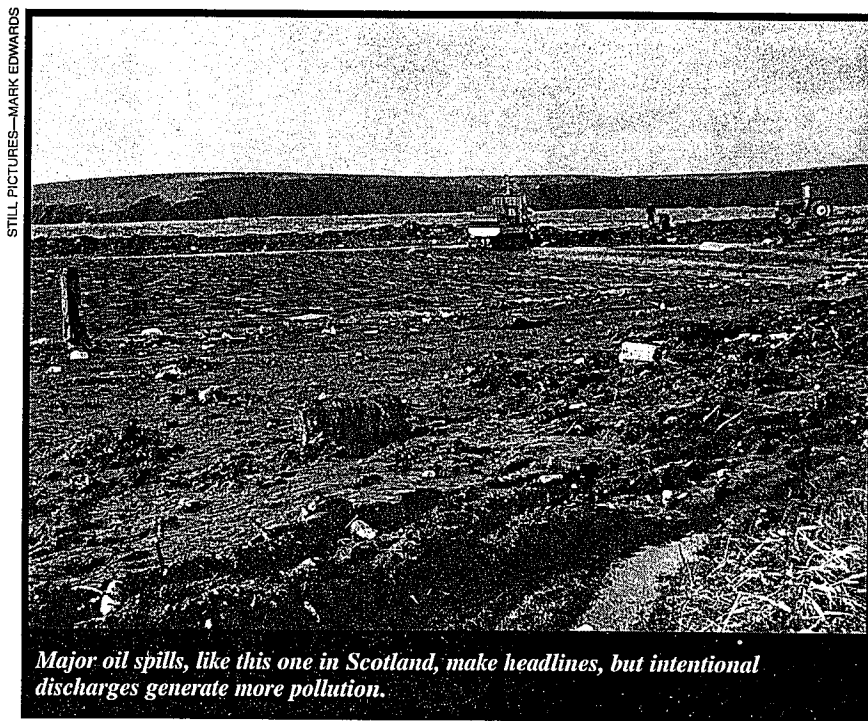
No treaty can induce perfect compliance. Even a good one requires refinement and adaptation to the particular problems and agents involved, as well as to the larger political and social context. Effective design also requires that all three components of the compliance system be closely integrated with one another: The choice of primary rules, for instance, influences the ease of monitoring and the likelihood that agents will respond to violations; similarly, a non-compliance response system that relies on funding mechanisms rather than sanctions may well induce greater

self-reporting because parties seeking funding will have the incentive to report. Three general principles regarding the design of compliance systems emerge from this analysis, along with a number of specific policy recommendations:

Devise "opportunistic" primary rule systems

In general, negotiators can achieve the same environmental goal through quite different primary rules. In choosing among them, they must consider several important factors: the likelihood of compliance by the different parties involved, the ease of monitoring compliance, and the specificity of the rules themselves. This leads to three specific recommendations:

Match the compliance burden to the expected compliance by different parties. Defining primary rules to place the burden on those most likely to comply follows the path of least resistance. For instance, both the owners and the operators of oil tankers are in a position to curb intentional oil pollution; by placing the burden on the owners, however, MAR-



POL targeted those most likely to alter their behavior and most susceptible to monitoring and enforcement.¹⁵

Parties who are already regulated are likely to comply more often because they are better informed about regulations, are subject to established monitoring and enforcement systems, and may have a "culture" or habit of compliance.¹⁶ In the oil pollution case, well-established procedures to regulate safety and load lines for ships facilitated compliance with MARPOL equipment requirements: Although both the classification societies and the tanker owners initially opposed those requirements, both readily adhered to them

(continued on page 36)

Lessons from Intentional Oil Pollution

(continued from page 15)

once “those were the rules.” International law was simply part and parcel of the specifications used to build new tankers.

Select primary rules that will ease the monitoring burden agents face. Regulatory limits defined to encourage self-monitoring and independent verification will elicit greater compliance than others.¹⁷ For instance, the initial rules limited discharges to 100 parts oil per million parts water, but onboard instruments could not measure at that accuracy; and, after a discharge was made, independent surveillance could not measure oil content at all.¹⁸ An amended criterion banning discharges that produced a “visible sheen” made detecting discharges easier but did not solve the problem of identifying the perpetrators.¹⁹ Although conscientious oil transport companies would have had a strong incentive to identify and report tankers that were gaining a competitive edge by discharging illegally at sea, they were simply incapable of identifying the occurrence of discharge violations. The primary rules themselves thereby precluded self-police-

already monitored activities; and involves transactions between parties rather than actions over which a single party has control. For instance, equipment regulations improved monitoring because tanker construction occurs less often than tanker voyages, missing equipment is easier to detect than a discharge, classification societies already monitored tanker construction, and buyers, builders, and classification societies all control a tanker’s construction. The Montreal Protocol’s focus on the few chlorofluorocarbon producers rather than the myriad consumers is another important example.

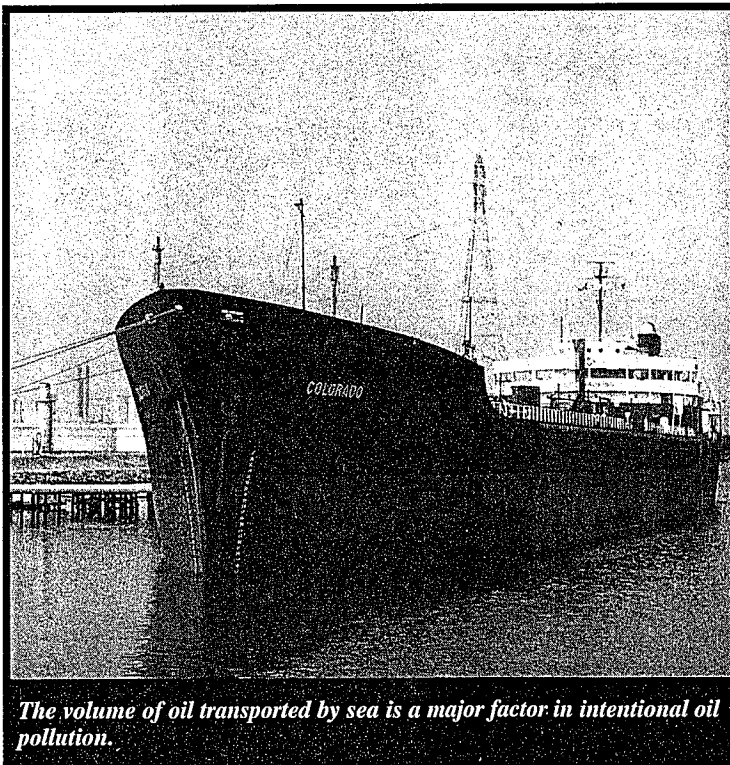
Frame primary rules in specific terms. Rules that fail to specify the required actions and responsible parties provide a rationale for noncompliance. MARPOL’s vague requirement that governments “ensure the provision” of “adequate” reception facilities at “major” ports has led to ongoing debates over whether governments or industry should provide them, what ports are “major,” and whether existing facilities are adequate—while satisfactory facilities often remain unavailable.²⁰ Such ambiguity also makes sanctioning unlikely because one cannot identify what behavior to monitor or whether observed behavior is noncompliant. To take two examples from other regulatory areas, one cannot readily tell whether governments are meeting the UN Framework Convention on Climate Change’s (FCCC) requirements to “cooperate” in implementing policies “aimed at” stabilizing carbon dioxide emissions or the Ramsar Convention’s requirements to make “wise use” of their wetlands.²¹

Devise useful compliance information systems

Once negotiators establish primary rules that facilitate monitoring, an effective compliance system needs self-reporting or independent verification systems (or both) as well as procedures to analyze and disseminate compliance information. The system must reduce the demands on those able to collect information and encourage them to report that information by facilitating their immediate goals. Three particular recommendations may be made in this regard:

Process and disseminate information to further the reporting parties’ own goals. Of the five distinct reporting systems used in the oil pollution context,²² the greatest response was to those that made the data available in readily usable ways. By incorporating daily inspection reports into a real-time database through which authorities could use

other countries’ recent inspections to identify likely violators, the MOU created incentives for each government to conscientiously report its own inspection results. Similarly, IMO’s published reports on available reception facilities promoted facility use, thereby increasing the reporting country’s interest in reducing oil discharges off its coast. In



UNICORN STOCK PHOTOS—H. SCHMEISER

The volume of oil transported by sea is a major factor in intentional oil pollution.

ing, an often valuable means of inducing compliance with industrial regulations.

Primary rules also dictate the resources needed to collect compliance information effectively. Fewer resources are needed when the rules target behavior that involves few agents or actions; is inherently transparent; coincides with

contrast, IMO has made little use of the enforcement reports it receives, creating few incentives for parties to report. Of course, self-reporting systems face the paradox that to encourage honest reporting, they must reassure reporters that the information provided will not become the basis for sanctions. Such systems seem more likely to succeed when they seek simply to evaluate treaty effectiveness or to encourage compliance through positive inducements rather than sanctions.

Obtain information on noncompliance from parties with the incentives and capability to collect it. Self-reporting systems work best when they facilitate reporting by those who bear the costs of noncompliance. IMO has received regular, accurate information only when governments or other parties perceived themselves as directly harmed by treaty violations. Environmentally concerned governments have tended to report while others have not; shipping associations have reported on ports lacking reception facilities because this forces tankers to retain waste oil on board and thus wastes cargo space; classification societies and shipping consultants routinely collect data on tanker equipment; even oil companies have collected data on discharges when oil prices were high enough to raise their concerns regarding the loss of valuable cargo.²³ Surprisingly, however, IMO has not sought access to the latter two categories of information to evaluate treaty compliance or effectiveness.

Agenda 21, adopted at the United Nations Conference on Environment and Development in Rio de Janeiro in 1992, explicitly provided for reporting by nongovernmental parties with the incentive and capacity to detect violations. For example, the United Nations Commission on Sustainable Development has been structured to provide nongovernmental organizations considerable opportunities to report on the implementation (or lack of implementation) of Agenda 21 by member countries. In many instances, the incentives and capability to identify nonimplementation are greater among nongovernmental organizations than among governments. To convince parties to report, however, such systems must promise anonymity and demonstrate that the information will be used to press violators to comply.

Make monitoring and reporting both legal and easy. After the primary rules define the behavior to be monitored, the treaty must provide the legal authority for and otherwise facilitate such monitoring. MARPOL, for instance, legalized inspections by port countries and authorized them to delegate this authority to classification societies, which greatly reduced the burdens on governments. New inspec-

PROFILES WEST—TOMAS DEL AMO



International treaties have been adopted to prevent discharges from ships, such as this one in Pearl Harbor, Hawaii.

tion rights have not led countries previously uninterested in enforcement to begin inspection programs, but they have increased the size and effectiveness of existing programs. But, just as with arms control, new verification rights need to be created and old barriers removed before verification will occur.²⁴

Both technical and political obstacles can make monitoring certain types of behavior quite difficult. All rules requiring that illegal discharges be detected at sea face the problem of “passive voice” violations, in which it is clear that a violation has occurred but it is not clear who committed it. Efforts to improve detection of violations by individual tankers have included improving radar detection capabilities along with proposals to “tag” oil cargos with traceable chemicals and to “fingerprint” oil based on the unique characteristics of each oilfield.²⁵ However, these technical improvements would still require large-scale aerial surveillance programs, as well as prompt sampling of the oil in the slick and inspection of all suspect tankers.

In addition to such practical problems, there are legal obstacles ranging from the renaming and reflagging of tankers to avoid prosecution to the variance in what courts in different countries deem sufficient legal evidence of a violation.²⁶ Even tankers caught redhanded often successfully avoid conviction.²⁷ Clearly, technological advances will only improve monitoring where the primary rules make monitoring easy.

Ease of reporting can also make a difference, however. IMO improved the number and quality of the annual reports it receives simply by clarifying and standardizing its reporting format. Although the MOU reporting system requires daily reporting, this demanding requirement has worked precisely because it has become a bureaucratic standard

operating procedure and because the reports can be submitted by telex or computer.

Devise practical noncompliance response systems

International treaties have two options with respect to enforcement: They can either try to get reluctant parties to respond to noncompliance by others or they can remove the barriers that restrain those already prepared to respond. In the oil pollution case, the latter approach has proved far more successful; those lacking independent incentives to sanction noncompliance by tankers or to fund reception facility construction have not been moved to do so by new treaty requirements. This suggests three recommendations for facilitating enforcement:

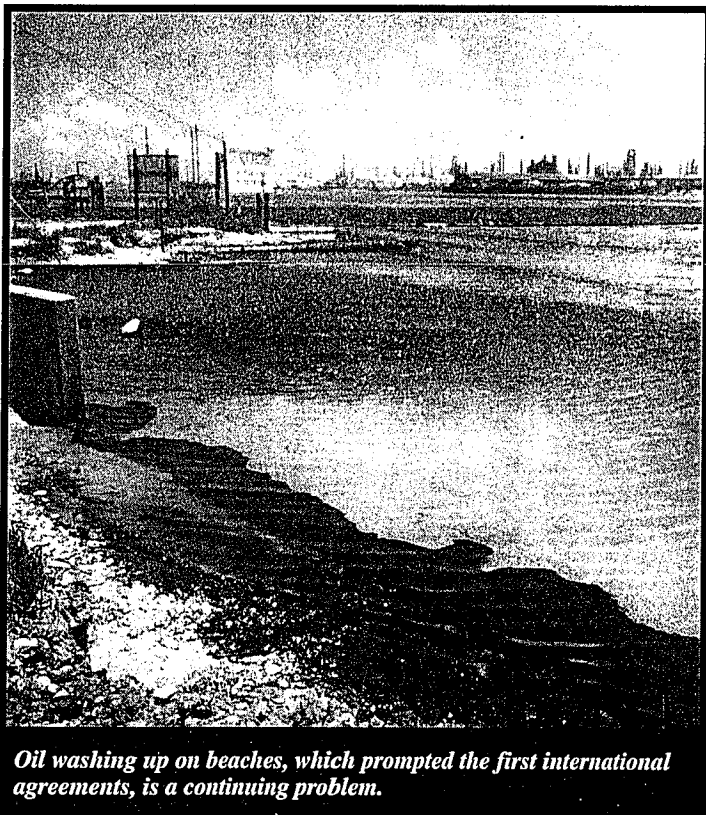
Remove the obstacles to sanctioning faced by those with enforcement incentives. Countries do not appear to take legal obligations to enforce treaties seriously: Almost all governments have failed to comply with the requirement to impose high penalties for discharge violations, and most governments have not complied with the requirement to detain ships for equipment violations. In contrast, countries do tend to observe international prohibitions: Even activist governments refrained from detaining tankers until MARPOL entered into force. Therefore, removing legal barriers is crucial to effective governmental enforcement.

The same is true of enforcement by private parties. Tanker chartering companies have requested that the MOU secretariat release data on violations so they can use it to blackball offending tankers. The secretariat, however, has refrained from doing so because of possible legal liability related to providing data on inspections rather than convictions.²⁸ Providing such information to (and authorizing sanctions by) nongovernmental parties, could have a real effect on noncompliance, however: Violators would face the prospect of bad publicity, economic boycotts, or even stronger measures.

Reduce the number of potential violations and prevent initial violations to reduce the need for later enforcement. To succeed, a deterrence-based regulatory system must detect and respond forcefully to a large fraction of the violations that occur. Reducing the number of possible violations both decreases the resources needed for response, and increases its likelihood. Equipment violations, for instance, can occur only once per tanker and represent a large, ongoing threat to the marine environment; it is thus more sensible to focus on them rather than on the smaller and more frequent discharge violations. Equipment standards have also relied on a coerced compliance strategy that prevents rather than punishes violations.²⁹

Emphasize responses appropriate to the likely sources of compliance. An effective noncompliance response system must take into account whether noncompliance is due to

JIM MARSHAM



Oil washing up on beaches, which prompted the first international agreements, is a continuing problem.

inadvertence and incapacity or to willful violation. Those advocating positive responses to noncompliance (which strive to promote future compliance through financial assistance and technology transfers rather than to sanction previous violations) may be correct in assuming that much of it arises from the inability to comply.³⁰ Although such programs may be effective, disputes over the causes of noncompliance and the reluctance of developed countries to provide funding make their full implementation unlikely; both the lack of such programs in the oil pollution case and the difficulty of negotiating relatively small financial mechanisms for the Montreal Protocol testify to this.

Sanctioning, too, is used only rarely, even though it seems to be an appropriate response to intentional noncompliance. Governments have tended to use sanctions only when they fit the crime and cost little to impose. Furthermore, the imposition of fines proportionate to the relatively small environmental harm of a discharge violation has had little effect as a deterrent. In contrast, tanker detentions are simultaneously appropriate to the violation, have the effect of deterring others, and replace a cumbersome legal process with a far less costly administrative one.

Generalizing the Results

The findings and recommendations stemming from this analysis of intentional oil pollution are directly applicable to other environmental issues as well. First, this was a "hard

case," in which it was highly unlikely that an international treaty would succeed: Well-organized and powerful industries would have to incur large costs to provide small, uncertain, and widely dispersed benefits to an unmobilized public.³¹ Furthermore, enforcement would require collaboration among governments, each of which had an incentive to free-ride, enjoying the benefits of enforcement by others without incurring the cost of it themselves. Second, all the major environmental treaties—on acid precipitation, ozone depletion, climate change, river pollution, and hazardous wastes—have faced the same choice as to whether to regulate operations directly or indirectly through equipment standards. Third, most environmental treaties have experienced problems with their reporting systems similar to those encountered in the area of oil pollution. Fourth, new enforcement obligations seem no more likely to get reluctant governments to enforce other agreements than they have with oil pollution. Fifth, the reluctance of developed countries to provide funds for waste oil reception facilities does not bode well for such treaties as the Montreal Protocol and the FCCC, which require far more costly transfers. Finally, and more positively, the increasingly international economy could give governments greater leverage against private offenders in many areas, including endangered species, hazardous wastes, tropical timber, and ozone depleting substances as well as intentional oil pollution.

At the same time, the recommendations made here have limits. For instance, they are probably more applicable to pollution problems than to wildlife and habitat preservation: Changes in production processes can often solve pollution problems without threatening the industry responsible, but preserving wildlife usually requires at least temporary bans on certain activities and involves direct conflict between opposing value systems. Then, too, compliance levels will always depend on compliance costs, which can vary considerably across problem areas.

Another important limit to these recommendations arises from the fact that strong pressure from the United Kingdom and the United States has been necessary both for the adoption of rules to increase compliance and for their enforcement. This pressure has not been sufficient to ensure implementation, however. In areas where concern is low, no efforts are likely to produce successful compliance systems; only where there is such concern can the recommendations made here contribute to a more effective approach.

Why have these suggestions not been implemented already? First,

most environmental agreements have arrived on the international scene only in the last 20 years or so, and negotiators have been more interested in getting agreement on some rules than in ensuring that those rules would be implemented and complied with. Second, the implicit decision to approach different environmental problems through separate agreements and secretariats (rather than in a comprehensive, coordinated fashion) has made it more difficult for those in one area to learn from those in other areas. This problem is compounded by the fact that secretariats are notoriously understaffed, rarely having time to analyze data on their own treaties, let alone to take a more general perspective on compliance. Third, the nature of the treaty negotiation and amendment process makes it difficult to implement significant changes quickly (although this problem has recently been remedied in some treaties through framework-protocol arrangements and tacit acceptance procedures for amendments).³² Fourth, compliance with environmental treaties has only recently garnered scholarly attention because until recently there were few empirical data with which to evaluate success or failure.³³ Thus, the major obstacles to improving compliance with environmental treaties have lain not in the failure to implement previously identified solutions or in implementing "solutions" that do not work, but in the absence of solid evidence on what works and what does not.

So far, little has been said about the relationship of compliance to effectiveness and whether MARPOL has actually solved the oil pollution problem. Much current research has addressed the problem of evaluating the effectiveness of a treaty, and in the process several theoretical and empirical difficulties have been identified.³⁴ A high level of compliance is neither necessary nor sufficient for effectiveness:

INTENTIONAL OIL POLLUTION AT SEA

Environmental Policy and Treaty Compliance

Ronald B. Mitchell

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Positive behavioral change that falls short of full compliance may significantly mitigate some environmental problems, while strong compliance with inappropriate rules will leave environmental problems unresolved. Nevertheless, more compliance is usually better than less, and (other things being equal) will lead to greater effectiveness.

MARPOL's rules appear to have made significant—though not complete—progress toward eliminating intentional oil pollution, as most estimates show that discharges from tankers have declined during the last several decades.³⁵ Unfortunately, spill sightings and bird oilings have remained relatively constant, suggesting that there are still problems with other sources of marine oil pollution, including land-based sources.³⁶ As with most environmental problems, the necessary data are either unavailable for a long enough period of time or of sufficiently poor quality that reliable inferences as to increases or decreases in intentional oil discharges cannot be made. Available evidence does suggest, however, that intentional discharges would have continued to increase without MARPOL's equipment regulations.

Finally, it should be noted that rules that achieve high levels of compliance may not be the most cost-effective ones. If, for instance, it turns out that the benefits of reduced oil discharges are outweighed by the high cost of installing the required SBT equipment, then MARPOL's approach will have been a poor social choice. However, such options should not be ruled out simply because more efficient ones can conceivably achieve the desired environmental end. Negotiators must evaluate treaty provisions in terms of actual compliance, as well as in terms of efficiency, cost, and equity; the experience with discharge and equipment standards demonstrates that a nominally cheaper, more "efficient" policy simply could not achieve the desired level of compliance.

Conclusions

In international treaties to protect the environment, both the rules that are adopted and the degree of compliance they achieve will be strongly influenced by the distribution of power, economic interests, and environmental concern across countries. By acknowledging these limits, however, and recognizing that the same goal can often be achieved in quite different ways, policymakers can greatly improve compliance and benefit the environment. In concert with the

proper primary rules, well-crafted compliance information and noncompliance response systems can increase detection and response through creating the right incentives for the right parties. All three elements of the compliance system must place agents in the strategic triangle of incentives, ability, and legal authority for undertaking the compliance, monitoring, and enforcement activities so essential to treaty effectiveness.

Whether the nations of the world avert the many environmental threats that loom on the horizon will depend not only



A worker cleans up oil near Corpus Christi, Texas. Proper ship design and reception facilities in oil loading ports are lessening the problem of intentional pollution.

on negotiating agreements to protect the air, land, and water but also on ensuring that those agreements get governments, industry, and individuals to change their behavior. The day may come when all nations are sufficiently concerned about the environment that there will be no need for international law to dictate proper behavior. Until then, however, careful crafting and recrafting of international treaties provides a valuable means of improving protection of the global environment.

NOTES

1. For the most extensive collection of environmental treaty texts, see B. Ruster and B. Simma, eds., *International Protection of the Environment: Treaties and Related Documents* (Dobbs Ferry, N.Y.: Oceana Publications, 1975), (hereafter cited as *IPE*).
2. On reporting, see U.S. General Accounting Office, *International Environment: International Agreements Are Not Well Monitored*, GAO/RCED-92-43 (Washington, D.C., 1992); and on effectiveness, see P. H. Sand, ed., *The Effectiveness of International Environmental Agreements: A Survey of Existing Legal Instruments* (Cambridge, U.K.: Grotius Publications Limited, 1992).
3. R. B. Mitchell, *Intentional Oil Pollution at Sea: Environmental Policy and Treaty*

Compliance (Cambridge, Mass.: MIT Press, 1994), 9. Another excellent work on this issue is R. M. M'Gonigle and M. W. Zacher, *Pollution, Politics, and International Law: Tankers at Sea* (Berkeley, Calif.: University of California Press, 1979). Preliminary findings of several project teams working on the issues of treaty compliance and effectiveness are contained in A. Chayes and A. H. Chayes, *The New Sovereignty: Compliance with International Regulatory Agreements* (Cambridge, Mass.: Harvard University Press, forthcoming); K. Hanf and A. Underdal (Erasmus University, Rotterdam, the Netherlands), "Domesticating International Commitments: Linking National and International Decisionmaking" (paper presented to the Helsinki meeting on Managing Foreign Policy Issues Under Conditions of Change, 1991); H. K. Jacobson and E. Brown Weiss, "Improving Compliance with International Environmental Accords," *Global Governance* 1, no. 2 (forthcoming); M. A. Levy, O. R. Young, and M. Zürn, *The Study of International Regimes*, IIASA Working Paper WP-94-113 (Laxenburg, Austria, 1994); J. Cameron, *Compliance and International Environmental Treaties* (London: Foundation for International Environmental Law and EarthScan, forthcoming); J. Wettestad and S. Andresen (Fridtjof Nansen Institute, Lysaker, Norway), "The Effectiveness of International Resource Cooperation: Some Preliminary Findings" (paper presented to the 32nd annual meeting of the International Studies Association, Vancouver, Canada, 1991); and O. Young (Dartmouth College, Hanover, New Hampshire), "On the Effectiveness of International Regimes: Defining Concepts and Identifying Variables" (working paper prepared for the Research Team Studying the Effectiveness of International Regimes, 1991).

4. Quoted in J. Brooke, "U.N. Chief Closes Summit with an Appeal for Action," *New York Times*, 15 June 1992, A8.

5. These agreements and their amendments are as follows: "International Convention for the Prevention of Pollution of the Sea by Oil," 12 May 1954, *IPE*, vol. 1, 332; "1962 Amendments to the International Convention for the Prevention of Pollution of the Sea by Oil," 11 April 1962, *IPE*, vol. 1, 346; "1969 Amendments to the International Convention for the Prevention of Pollution of the Sea by Oil," 21 October 1969, *IPE*, vol. 1, 366; "International Convention for the Prevention of Pollution from Ships," 2 November 1973, *International Legal Materials* 12 (1973): 1319; and "Protocol of 1978 Relating to the International Convention for the Prevention of Pollution from Ships," 17 February 1978, *International Legal Materials* 17 (1978): 1546.

6. J. L. Briery, *The Outlook for International Law* (Oxford, U.K.: The Clarendon Press, 1944), 1; and H. Morgenthau, *Politics Among Nations: The Struggle for Power and Peace* (New York: Alfred A. Knopf, 1978), 299.

7. Coerced compliance systems seek to reduce the opportunities for violations (by regulating easily observed and readily prevented activities) instead of deterring violations through the threat of detection and punishment. Domestic examples include banning handgun sales and requiring automobile manufacturers to install catalytic converters; in each case the potential violator has less opportunity to commit the violation.

8. G. Kasoulides, "Paris Memorandum of Understanding: A Regional Regime of Enforcement," *International Journal of Estuarine and Coastal Law* 5, no. 1-3 (1990): 180-92.

9. Mitchell, note 3 above, table 5.5 on page 181.

10. P. G. Sadler and J. King, "Study on Mechanisms for the Financing of Facilities in Ports for the Reception of Wastes from Ships" (discussion paper, College of Wales, Cardiff, Wales, March 1990).

11. See L. Henkin, *How Nations Behave: Law and Foreign Policy* (New York: Columbia University Press, 1979), 47; Morgenthau, note 6 above, 299; and O. Young, *International Cooperation: Building Regimes for Natural Resources and the Environment* (Ithaca, N.Y.: Cornell University Press, 1989), 62.

12. See A. Chayes and A. H. Chayes, note 3 above, chapter 8; and General Accounting Office, note 2 above.

13. See, for example, R. O. Keohane, "Reciprocity in International Relations," *International Organization* 40, no. 1 (1986): 1-27; and R. Axelrod, *The Evolution of Cooperation* (New York: Basic Books, 1984).

14. I am indebted to Robert Keohane for this notion.

15. A familiar domestic example of matching burdens to likely compliance is the policy of requiring employers to withhold income taxes throughout the year rather than requiring employees to pay them in a lump sum at the end of the year.

16. Young, note 11 above, pages 78-79.

17. J. Ausubel and D. Victor, "Verification of International Environmental Agreements," *Annual Review of Energy and the Environment* 17, no. 1 (1992): 21.

18. E. Somers, "The Role of the Courts in the Enforcement of Environmental Rules," *International Journal of Estuarine and Coastal Law* 5, no. 1-3 (1990), 196; and W. G. Waters, T. D. Heaver, and T. Verrier, *Oil Pollution from Tanker Operations: Causes, Costs, Controls* (Vancouver, Canada: Center for Transportation Studies, 1980), 121.

19. T. IJlstra, "Enforcement of MARPOL: Deficient or Impossible?" *Marine Pollution Bulletin* 20, no. 12 (1989): 596-97.

20. Sadler and King, note 10 above.

21. See "United Nations Framework Convention on Climate Change," 15 May 1992, *International Legal Materials* 31 (1992): 849, article IV; and "Convention on Wetlands of International Importance Especially as Waterfowl Habitat," 2 February 1971, *International Legal Materials* 11 (1972): 969, article 3(1).

22. Reporting systems under the International Maritime Organization have included

an irregular, nonstandardized system for enforcement and compliance reporting (before 1985); a regular, standardized system for such reporting (from 1985); a periodic survey of countries regarding reception facilities in their own ports; and an ongoing requirement to report the lack of reception facilities in other countries. The MOU requires daily reporting on the results of harbor inspections of all ships. For a detailed analysis of these systems, see Mitchell, note 3 above, pages 123-46.

23. See, for example, Clarkson Research Studies, Ltd., *The Tanker Register* (London, 1990); Drewry Shipping Consultants, Ltd., *Tanker Regulations: Implications for the Market* (London, 1991); and Lloyd's Register of Shipping, *Register of Ships* (London, 1991).

24. W. Fischer, "The Verification of a Greenhouse Gas Convention: A New Task for International Politics?" in J. B. Pooler, ed., *Verification Report: 1991* (London: VERTIC, 1991), 197-206.

25. See International Maritime Organization, *Planned Operational Procedures for a Swedish Oil Tagging System*, MEPC I/Inf.5/Add.1 (London, March 1974); International Maritime Organization, *Review of Outstanding Items Undertaken by the Subcommittee on Marine Pollution*, MEPC I/6 (London, January 1974); International Maritime Organization, *Report of the MEPC on its 3rd Session*, MEPC III/18 (London, July 1975); International Maritime Organization, *Identification of the Sources of Discharged Oil*, MEPC 23/14/2 (London, June 1986); and J. A. Butt, D. F. Duckworth, and S. G. Perry, eds., *Characterization of Spilled Oil Samples: Purpose, Sampling, Analysis and Interpretation* (London: John Wiley and Sons, 1985).

26. "Shipowner Opposes Further Introduction of Pollution Rules Unless Clearly Justified," *International Environment Reporter*, 9 December 1987, 67; International Maritime Organization, *Visibility Limits of Oil Discharges*, MEPC 33/4/6 (London, July 1992); and T. IJlstra, note 19 above.

27. See A. J. O'Sullivan, "In Flagrante Delicto," *Marine Pollution Bulletin* 2, no. 10 (1971): 180-81.

28. H. E. Huibers, "Statement to the Seminar on Port State Control," *Report on the Joint IMF/MOU Seminar on Port State Control* (London: International Maritime Industries Forum, 1991).

29. On coerced compliance strategies for enforcement, see A. J. Reiss, Jr., "Consequences of Compliance and Deterrence Models of Law Enforcement for the Exercise of Police Discretion," *Law and Contemporary Problems* 47, no. 4 (1984): 83-122.

30. A. Chayes and A. H. Chayes, "On Compliance," *International Organization* 47, no. 2 (1993): 193-95.

31. For more on the theory underlying this argument, see M. Olson, *The Logic of Collective Action: Public Goods and the Theory of Groups* (Cambridge, Mass.: Harvard University Press, 1965).

32. Framework-protocol arrangements entail initial framework agreements that contain few behavioral prescriptions themselves but establish negotiating processes so that subsequent protocols can adopt such prescriptions when the political and scientific conditions arise. See T. Gehring, *Dynamic International Regimes: Institutions for International Environmental Governance* (Frankfurt, Germany: Peter Lang, GmbH, 1994). Tacit acceptance procedures provide for entry into force of treaty amendments unless some fraction of the member countries have objected before a designated date. R. Churchill, "Why Do Marine Pollution Conventions Take So Long to Enter into Force?" *Maritime Policy and Management* 4, no. 1 (1976): 41-49; and R. B. Mitchell, "The Impact of the Tacit Amendment Procedure under MARPOL" (unpublished paper, Eugene, Ore., November 1993).

33. See note 3 above.

34. See, for example, P. M. Haas, R. O. Keohane, and M. A. Levy, eds., *Institutions for the Earth: Sources of Effective International Environmental Protection* (Cambridge, Mass.: MIT Press, 1993); A. Underdal, "The Concept of Regime 'Effectiveness,'" *Cooperation and Conflict* 27, no. 3 (1992): 227-40; O. Young, "The Effectiveness of International Institutions: Hard Cases and Critical Variables," in J. N. Rosenau and E.-O. Czempiel, eds., *Governance Without Government: Change and Order in World Politics* (New York: Cambridge University Press, 1991); and A. Nollkaemper, "On the Effectiveness of International Rules," *Acta Politica* 27, no. 1 (1992): 49-70.

35. For a longer discussion of these problems and an evaluation of environmental improvement, see R. B. Mitchell, "Intentional Oil Pollution of the Oceans," in P. M. Haas, R. O. Keohane, and M. A. Levy, note 34 above, especially figure 5.1 on page 187.

36. C. J. Camphuysen, *Beached Bird Surveys in the Netherlands, 1915-1988: Seabird Mortality in the Southern North Sea Since the Early Days of Oil Pollution* (Amsterdam: Werkgroep Noordzee, 1989), 39-42.

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