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Strengthening Compliance with International Environmental Accords: Preliminary Observations from a Collaborative Project



Harold K. Jacobson & Edith Brown Weiss

In June 1992, heads of government gathered in Rio de Janeiro at the United Nations Conference on Environment and Development (UNCED) to launch a major international effort to achieve environmentally sustainable development. International environmental accords or binding legal instruments are an important part of this strategy. Twenty years earlier, when the United Nations Conference on the Human Environment was held in Stockholm, there were only a few dozen multilateral treaties dealing with environmental issues. By 1992, there were more than nine hundred international legal instruments (mostly binding) that either were fully directed to environmental protection or had more than one important provision addressing the issue.¹ In the early 1990s, about a dozen important multilateral negotiations on new international legal instruments were occurring at more or less the same time, and several of those were concluded prior to or at the Rio conference. The United Nations Framework Convention on Climate Change and the Convention on Biological Diversity were signed at Rio, as was Agenda 21—an approximately 850-page text that sets forth strategies for the many complex issues involved in integrating environmental protection and economic development. Yet we know very little about national implementation and compliance with the treaties and other international legal instruments that have been negotiated, despite their importance and growing number.

In 1990, working within the framework of the Social Science Research Council's Committee on Research on the Human Dimensions of Global Environmental Change, we launched a research consortium to explore how and the extent to which countries implement and comply with international environmental treaties.² The project was funded and was under way in 1992. This article presents preliminary observations derived from a project that is very much in midstream. Nevertheless, the quantitative data and written material that are now available through the project

and the discussions in the project workshops provide a basis for some tentative generalizations and conclusions.

Why Study Implementation of and Compliance with International Environmental Accords?

International environmental accords—treaties and other international legally binding instruments—have the potential to transform the ways in which humanity uses the planet, the quality of lives all over the world, relations among states, the global economic system, the development paths of advanced and industrializing countries alike, and the differences between North and South. Some speculate that these accords could create international authorities with unprecedented scope and power, predicated on the economic leverage of only a few countries. These accords might impose stringent sanctions on violators or use rewards to induce countries to conform. Conforming could, moreover, reshape a country's energy production, transportation, industrial processes, agriculture, animal husbandry, settlement patterns and migration, and population-growth patterns.

Countries have already negotiated many international treaties and other agreements to protect the environment and to conserve natural resources. While some of these accords existed before the 1972 Stockholm conference, most have been negotiated since then. The rate at which important accords have been proposed and concluded is increasing. The substantive and procedural duties contained in the accords have become more stringent and comprehensive, and the range of issues subject to such accords has expanded. Calls for international treaties and other international legal instruments to protect the global environment will continue and likely accelerate. Indeed, several efforts are in progress. But even if no more accords were negotiated, it would be essential to make those that are in force work effectively.

International accords are only as effective as the respective parties make them. Effectiveness is the result not only of how governments implement accords (the formal legislation or regulations that countries adopt to comply with the accord) but also of how they comply with them (the observance of those regulations and the commitments contained in the international accord). Weak legislation can produce weak compliance, but unenforced strong legislation can have the same effect. One cannot simply read domestic legislation to determine whether countries are complying. While some claim that most states comply with most international treaties most of the time, there are reasons to believe that national implementation of and compliance with international accords are not only imperfect, but often inadequate, and that such implementation as takes place varies

significantly among countries. It is not known to what extent environmental accords have or have not evoked compliance or whether the same factors that presumably motivate compliance with arms control, trade, or human rights agreements will motivate compliance with environmental accords.

There is a literature regarding compliance with international accords concerning arms control, trade, and human rights, and some of the findings in this literature may be applicable to environmental accords. In addition, a general literature exists on enforcement of international treaties and on enforcement of national environmental laws and regulations.³ There is also a broad literature on the impact of international institutions.⁴ Studies of the management of common resources offer additional valuable insights.⁵

Yet there are very few studies of the implementation of and compliance with international environmental accords. The limited studies that do exist include a notable one by the U.S. General Accounting Office that looks broadly at compliance of governments with eight international environmental accords and concludes that compliance has been low;⁶ a survey of international environmental treaties and instruments prepared by the secretary-general of UNCED, which includes a brief description of accord implementation;⁷ a monograph by Peter Sand on global environmental governance that focuses on the institutional design of international accords to encourage compliance;⁸ and an article by Jesse H. Ausubel and David G. Victor⁹ and a study by David Feldman on the characteristics of international environmental accords that facilitate implementation.¹⁰ None of these studies focuses on factors at the national level that affect compliance, which is the focus of our study.

There has never been a systematic study of factors affecting compliance at the national level of the international environmental accords into which countries have *already* entered. Our study takes a first—but we hope large—step toward drawing from the experience of existing international environmental law those lessons that might instruct us how better to proceed in the future.

Without better knowledge about the implementation of and compliance with international accords, it is impossible to assess their effectiveness in protecting the global environment or to evaluate the merits of proposed accords. Formally binding international treaties or agreements are only one of the available instruments for dealing with global environmental issues. One cannot appropriately weigh the advantages of negotiating a treaty to obtain global environmental goals as opposed to relying on market forces or education without knowing more about what states tend to do to give effect to the provisions of treaties. Nor is it possible to make sensible suggestions about measures that might be taken to improve the implementation of and compliance with existing and proposed accords. If

we understood these processes better, we should be able to design better international accords that would enhance the chances of national compliance.

The Stylized View of Compliance and Reality

A traditional, stylized view of international law might maintain that (1) countries accept treaties only when their governments have concluded that they are in their interest; (2) because of that, countries generally comply with treaties; and (3) when countries do not comply with treaties, sanctions are employed both to punish offenders and to serve as deterrents designed to encourage first-order compliance. Reality with respect to many types of treaties, particularly environmental accords, is quite different. While countries might join only treaties that they regard as in their self-interest, there are a variety of reasons countries find them in their interest, and those reasons affect their willingness and ability to comply with them. Governments may choose to accept a treaty because of a desire to jump on an international bandwagon or because of pressures from other governments with leverage over them. Or there may be domestic interests that force the issue. In some cases, countries may enter treaties without intending to modify their behavior significantly so as to comply fully. Even if they intend to comply, some countries may find it difficult or impossible, because they lack the local capacity to do so. Scattered evidence suggests that implementation of and compliance with international environmental accords are often haphazard and ragged. Parties rarely resort to adjudication of violations or employ significant sanctions against noncomplying parties. While blandishments may be used to encourage compliance, these are rarely of major proportions.

Nevertheless, as the experience with human rights treaties so vividly illustrates, over time many countries have gradually begun to do more to implement treaties and improve compliance. The force of environmental accords probably comes not from the possibility of sanctions but from the felt need to coordinate activities affecting the environment and to ensure stable and predictive patterns of behavior that will sustain the commonly held environment.

This less elegant reality of imperfect, varied, and changing implementation and compliance is the starting point for this study. The purpose of the analysis is to discover factors that lead to improved implementation and compliance with treaties that cover environmental issues. We assume that cost-benefit calculations are murky, military sanctions are out of the question, and economic sanctions are exceptional and may violate international trading arrangements. Because of those assumptions, the applicability

of the literature with respect to arms control and trade is limited. That with respect to human rights is more relevant. Public goods theory may be more appropriate than game theory for the type of treaties that concerns us. We assume that the propensity of various countries to comply with different treaties will vary and change over time. Our task is to understand the factors that shape that variation and propel the change.

Assessing Implementation, Compliance, and Effectiveness

An essential first step is to have clear definitions of implementation and compliance. *Implementation* refers to measures that states take to make international accords effective in their domestic law. Some accords are self-executing; that is, they do not require national legislation to become effective. But many international accords require national legislation or regulations to become effective. Countries adopt different approaches, ranging from accounting procedures, to incentives to induce compliance, to taxation, to sanctions for noncompliance. This study seeks to identify systematically the various methods that are employed for implementing international accords and to analyze which are used with what effectiveness. In examining steps that have been taken to implement treaties, several questions arise. How comprehensive is the legislation that has been adopted? How much time elapsed before implementing legislation and regulations were adopted? Has the stringency of the legislation changed over time? What factors have affected this change? In many countries, complicated issues of federalism are raised by the implementation of international accords. In those cases, provincial and local-level legislation is also essential.

Compliance goes beyond implementation. *Compliance* refers to whether countries in fact adhere to the provisions of the accord and to the implementing measures that they have instituted. The answer cannot be taken as given, even if laws and regulations are in place. Measuring compliance is more difficult than measuring implementation. It involves assessing the extent to which governments follow through on the steps they have taken to implement international accords. Some measurable factors, such as the staffing and budget of bureaucracies charged with ensuring compliance, the quantity and quality of data that are kept, and the extent to which incentives and sanctions are actually used and imposed, give indications of efforts toward compliance. In the end, however, assessing the extent of compliance is a matter of judgment.

Compliance has several dimensions. Treaties contain specific obligations, some of which are procedural, such as the requirement to report, and

others of which are substantive, such as the obligation to cease or control an activity. In addition, preambles or initial articles in treaties place those specific obligations in a broad normative framework, which we refer to as the spirit of the treaty.

Compliance is probably never perfect; substantial compliance is what is sought by those who advocate treaties and agreements. We seek to assess the extent to which substantial compliance is achieved with the procedural and substantive obligations contained in treaties and also with the spirit, or broad norm, involved in the treaty, and to compare the extent of success within and among political units and over time.

Compliance is related but not identical to effectiveness. Countries may be in compliance with a treaty, but the treaty may nevertheless be ineffective in attaining its objectives. And even treaties that are effective in attaining their stated objectives may not be effective in addressing the problems they were intended to address. To illustrate the latter point, compliance with a treaty may result in the cessation of an activity that contributed to pollution, but it might lead to an overall increase of pollution by encouraging other activities as substitutes whose consequences are even worse; or a treaty prohibiting international trade in elephant tusks could effectively stop the trade but have little impact on the decimation of the elephant population.

Table 1 shows the several dimensions of implementation, compliance, and effectiveness. Our project is particularly concerned with assessing implementation and compliance. Effectiveness is very important, but until implementation and compliance are better understood, the contribution of treaties to solving international environmental problems cannot be known. Learning about implementation and compliance is an essential first step to learning about effectiveness.

Factors that Affect Implementation and Compliance

Many factors may affect a country's implementation of and compliance with international accords. We are interested in how several interrelated factors affect the extent to which and the way in which countries have met their commitments. These factors include the character of the activity, the character of the accord, country characteristics, policy history, leadership, information, the role of nongovernmental organizations (NGOs), actions of other states, and the role of international governmental organizations (IGOs).

Character of the activity. Environmental accords are about human activities—activities that extract resources, produce pollutants or other emissions,

Table 1. International Environmental Accords: Implementation, Compliance, and Effectiveness

I. Implementation
II. Compliance
A. Compliance with the specific obligations of the treaty
1. Procedural obligations
2. Substantive obligations
B. Compliance with the spirit of the treaty
III. Effectiveness
A. In achieving the stated objectives of the treaty
B. In addressing the problems that led to the treaty

change ecosystems, or reduce biodiversity. Some substances or activities have little economic importance, whereas controlling others has consequences for entire economies. Some also have little intrinsic economic value, but the process of compliance can disrupt economic activities in lots of other areas. Some are easy to monitor, while others can be detected only through very intrusive measures. The costs and benefits of regulating substances and activities and their distribution among various social classes and geographical regions can also be important.

The accord itself. The characteristics of the treaty or agreement itself are an important factor. Some issues relate to the process by which the accord was negotiated. By whom and how was the process initiated? What form did the negotiations take? Were issues settled consensually or by majority vote? What was the extent and depth of agreement? The substantive characteristics of the accord also raise important issues. What is the nature of the obligations contained in the accord? Are the duties general or precise? Are they binding or hortatory? What compliance mechanisms are contained in the accords? How does the agreement treat countries that do not join? The Montreal Protocol on Substances That Deplete the Ozone Layer and the Convention on International Trade in Endangered Species obligate parties not to trade controlled substances with countries that are not parties to the agreement. How effective is this provision in inducing compliance? What benefits accrue to signatory countries? What special dilemmas does the accord produce, such as the problem of how an item once placed on the World Heritage Convention's list of protected things ever gets taken off that list?

Country characteristics. The social, cultural, political, and economic characteristics of the countries clearly influence implementation and compliance. We assess the relative importance in shaping a country's actions of its broad political culture, the level of its economic development, and the trajectory and pace of its economic growth. Are there cultural traditions that influence how a country complies? What difference does it make whether the country has a market or a planned economy, or if it is mixed? Does it make a difference in which sector the substance or activity is included? What are the effects of the characteristics of the political system? How strong and effective is the bureaucracy, and what difference does that make? What is the strength of nongovernmental groups, including those engaged in lobbying and domestic and international agenda setting? What is the nature of the legal system? What procedures are required to adopt the regulations or other strategies necessary to implement the agreement?

Policy history. A country's policy history regarding the substance or activity being regulated is another basic factor. What was the country doing about the substance or activity before adhering to the international accord? Had the country already recognized the existence of an environmental problem? What role did the country play in the negotiation of the accord?

Leaders. People make a difference. Some leaders are more committed to and effective in promoting compliance with international environmental accords than others. Some countries have drawn leadership on an issue from the scientific community, while others have not had such communities from which to draw. What are the consequences of changes in and differences among leaders?

Information. It is broadly assumed that the more information there is about an environmental issue and the clearer the understanding of the issue, the more effective implementation and compliance will be. That assumption impels much of the work of international organizations. We want to assess how the availability of information about and the extent of understanding of the environmental issues covered in the treaties affect national implementation and compliance with them.

NGOs. What role do local, national, and international nongovernmental organizations have in determining the compliance of states with international accords? What role, in particular, do international nongovernmental organizations (INGOs) such as Greenpeace or the International Institute for Environment and Development play? What is the role of multinational corporations?

Actions of other states. The actions of other states in implementing and complying with the accord can also affect a state's compliance with an agreement. To what extent have other countries' noncompliance or compliance with the accords affected the willingness of countries to abide by these accords? How does the answer to that question vary with the subject and obligations of the international accord? To what extent can a state be a freeloader under the accord?

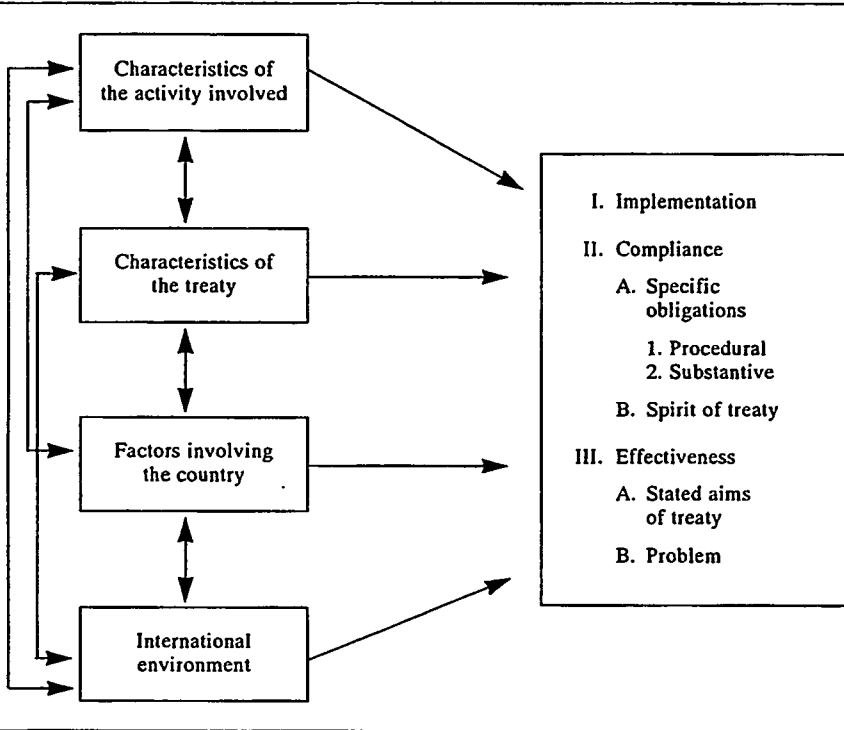
IGOs. Finally, international governmental organizations have important roles in promoting the implementation of and compliance with international accords. We investigate how countries relate to the IGOs that have responsibilities for these accords. What importance, if any, was attached to involvement by international organizations such as the United Nations?

These factors can be grouped into four broad headings: (1) characteristics of the activity that the accord deals with; (2) characteristics of the accord; (3) characteristics of the country, or political unit, that is a party to the accord; and (4) factors in the international environment. Figure 1 presents a graphic representation of the interaction of those factors with a state's implementation of and compliance with an accord and the effectiveness of the accord.

In examining these factors, we want to test certain hypotheses that are nested within the questions posed in the preceding paragraphs. Some of these hypotheses have been deduced from rational choice assumptions, others have been derived from the existing literature, and still others have been derived from preliminary analyses of empirical data that we have gathered. Some relationships seem obvious. Some have been identified in the assessments by the U.S. General Accounting Office and the secretary-general of UNCED.¹¹

Given the realist and rational choice assumptions that undergird game theory, one would expect that the smaller the costs and the greater the benefits associated with the accord, however difficult they may be to calculate, the greater the probability of implementation and compliance. The likelihood of significant sanctions would be included in the prospective cost element of this hypothesis. Since implementation and compliance require monetary and bureaucratic resources, it would seem logical that the larger a country's gross national product and the higher its per capita GNP, the greater the probability of implementation and compliance. Because costly measures can be accommodated with minimal or no redistribution in a period of rapid economic growth, the higher the rate of a country's economic growth, the greater the probability of implementation and compliance. Since domestic group and mass public pressure comprises important

Figure 1. International Environmental Accords: Model of Factors That Affect Implementation, Compliance, and Effectiveness



mechanisms for promoting implementation and compliance with treaty obligations, several scholars and policymakers have assumed that the more a country adheres to democratic norms concerning political and civil rights and political participation, the greater the probability of implementation and compliance. Many have also assumed that decentralization would promote more-effective compliance.

We expected those hypotheses to be confirmed. We expected them to bound other findings. We expected that the variables involved in those hypotheses would explain the largest share of the variance among countries and treaties, but we also were very conscious that it would not be surprising or particularly helpful to those interested in improving compliance for us to discover that rich countries were more likely to comply with treaties than poor countries, or that countries were more likely to comply with those treaties that impose few burdens. Countries cannot be made rich overnight, nor can the burdens that compliance might entail always be eliminated.

Since administrative and bureaucratic capacity is obviously essential for implementing accords, we explore the extent to which such capacity has been and could be increased in ways independent from broader economic, political, and social development. Clearly, the greater the capacity of the political unit to implement the accord, the more likely it is that it will comply. Administrative and bureaucratic capacity depends on economic resources, but it also involves education, technical training and skills, and attitudes.

The relationships that hold greatest fascination for us are those involving international and domestic processes. Many of these have been identified by Abram Chayes and Antonia Handler Chayes, Roger Fisher, Peter M. Haas, Robert O. Keohane, and Elinor Ostrom.¹² Game theory and public goods theory provide the foundation for many of the suggestions of these scholars. Factors that one or more of them have stressed are: (1) international momentum toward compliance, which increases the benefits of compliance and the costs and consequences of noncompliance for any signatory state; (2) the amount, quality, and availability of information about the issues involved so that they can be understood; (3) the involvement and/or engagement of domestic officials and bureaucracies so that their personal interests and reputations become issues at stake; and (4) the creation and engagement of communities of interested parties, especially scientists and specialists in the topic, or what Haas has termed "epistemic communities."¹³ The first factor involves international processes; the second, international and domestic processes; and the third and fourth, predominantly domestic processes. We are primarily interested in the consequences for implementation and compliance of processes that occur within the lower two boxes on the left-hand side of the diagram in Figure 1, those involving the characteristics of the country or political unit that is a party to the accord and those involving the international environment.

Hypotheses concerning those factors are straightforward. With respect to international momentum, the most direct hypothesis is: The greater the number of countries that have ratified an accord and the greater the extent of their implementation and compliance, the greater the probability of implementation and compliance by any individual signatory. Countries have a deep and abiding interest in creating and maintaining a relatively stable and predictable international environment. The more stable and predictable an environment, the higher the costs of disrupting it and, thus, the greater the probability of implementation and compliance. International momentum also has broader aspects, such as the extent to which international public opinion is committed to the issue. International nongovernmental organizations capture and articulate important sections of international public opinion; hence, the stronger and more active the INGOS are in the issue area of the treaty, the greater the probability of implementation and compliance.

With respect to information, the hypothesis is: The greater the flow of scientific and technical information about targeted activities in a form that is understood by governments and public pressure groups, the higher the likelihood of implementation and compliance. Particularly with environmental accords, these actors must rely on scientific and technical information flows to identify and assess risks, address targeted activities, and identify available technical options to enhance compliance.

Hypotheses concerning domestic processes are equally uncomplicated. Two are very important. Because repeated encounters and associations with counterparts as well as concern for reputations have a powerful impact on behavior, the more involved a country's domestic officials and bureaucracies are in the preparation, implementation, and oversight of an accord, the greater the probability of implementation and compliance. Since epistemic communities are deeply committed to the goals of particular accords because of their knowledge and professional interests, the greater the size, strength, and activism of epistemic communities, the greater the probability of implementation and compliance.

Our research efforts focus on these process factors because previous research indicates that they are important. The evidence for them, however, is largely anecdotal. We examine them empirically on a multicountry basis. Since the factors are subject to directed and purposeful modification, policies could be adopted that target them in order to increase implementation and compliance with international environmental accords.

We are also interested in other process factors, such as leadership and the extent of transparency surrounding the activity covered by the accord. Obviously, the more committed a country's leader is to the goals of an accord, the greater the probability of implementation and compliance. Leaders are chosen for many reasons. To some extent, in terms of the focus of this research, a country's choice of leaders is a stochastic process. We study how leaders, whatever their initial inclinations, become more engaged in ensuring compliance with the accord.

Transparency may promote compliance because it makes noncompliance more apparent and makes it easier for international and domestic actors to take actions to encourage and enforce accountability. Transparency is closely linked with the character of the issue covered by the treaty and democratic norms. Cultural factors may affect the acceptability of transparency internally and hence its effectiveness in inducing compliance. We test the hypothesis that transparency promotes implementation and compliance and seek to identify the conditions that bound the hypothesis. We also analyze the extent to which transparency can be promoted.

Stating the hypotheses that have guided our research in such a bald manner may make the project appear overly mechanistic. The project could not have been conducted in a mechanical and simplistic way. Context

and institutions are terribly important. The hypotheses are important because they provide a framework that guides and directs the project, useful both as a way of structuring our analyses and guiding comparisons and as a way to link our study with others at a basic, practical level as well as at a theoretical one.

In varying degrees, the factors involved in the hypotheses that are of most concern to us are subject to deliberate manipulation by those who prepare accords and who are responsible for overseeing their implementation and compliance with them. The research seeks to develop a basis for reasoned speculation about how manipulation of these factors might improve implementation and compliance. For example, a broad issue to be investigated is whether the more a country has been involved in the negotiation of a treaty, the more likely it will be to implement and comply with the treaty. Or it is possible that a key step in obtaining compliance with environmental treaties from the countries of the South is to improve their indigenous scientific capability so that they can produce independent assessments of environmental problems and evaluate their options for dealing with them. Or a key step might be to control the behavior of multinational corporations, which would then exert influence on behalf of environmental goals in the countries where they operate. Moreover, as has become evident with respect to human rights treaties, compliance with international accords can change and improve over time, even if compliance was not actually intended by all signing governments at the time of agreement. The research seeks to understand how improvement might be induced and promoted.

The Research Design: The Countries and the Treaties

To investigate these hypotheses and issues, we have chosen to focus on eight countries and the European Union (EU) and international treaties covering five broad areas of environmental concern. We have chosen the nine political units and the five areas in the hope that the study will yield knowledge that will have worldwide utility and pertain to most kinds of environmental accords that may be concluded in the future.

Political Units of Great Importance and Widely Differing Character

The eight countries selected are Brazil, Cameroon, China, Hungary, India, Japan, Russia, and the United States. We also include one group of countries, the European Union. These countries have been chosen because they are very important to the effective implementation of broad international

environmental accords. They include those that have contributed most to the anthropogenic effects that bring about global change (Japan, Russia, the United States, and the EU and its members) and others that have the potential of making major contributions to anthropogenic effects (Brazil, India, and China).

Cameroon and Hungary were included to illustrate the problems and processes of implementation and compliance in smaller countries—countries that although their total contribution to global environmental problems may be individually small, when considered as a group constitute by far the largest number of states in the global political system. This vantage point is necessary to draw inferences about collective action. The United States and other large countries can benefit directly by their actions regardless of others. But most countries, such as Hungary and Cameroon, cannot, even though collectively countries their size could be more important than the United States. So why do countries that will see the costs so much more clearly than the benefits, due to their relatively small size, become parties or comply?

The EU¹⁴ has been chosen because it increasingly behaves as a state actor through directives and regulations that are applicable in all member states. It represents a new form of governmental organization, one that conceivably could be duplicated elsewhere, such as among the states that constituted the former Soviet Union. It merits study for that reason as well as for the reason that the EU will be a major political and economic actor in forthcoming negotiations. Although the EU is a party to only two of the treaties, most of its twelve member states are parties to all of them.

In the 1990s, those countries included in this study accounted for about three-fifths of the world's population, their GNP constituted about four-fifths of the world product, and they contributed more than two-thirds of the global greenhouse emissions.¹⁵ Table 2 presents data that show the importance for environmental issues of the nine political units. They spanned the globe and encompassed a range of forms of political organization and culture. Furthermore, they included both developed and developing countries, some with mixed-market economies and others that were restructuring centrally planned economies. Finally, some of these countries could be particularly affected by global change.

Five International Environmental Treaties

The five international treaties were chosen to maximize the knowledge that could be gained about ways of managing global environmental change. We deliberately avoided the preconception that the only kind of international environmental agreement that can be entered into is one that regulates emissions; there is considerable variety among these treaties in

Table 2. Study of Adherence to International Environmental Accords: The Political Units and Their Characteristics

Country	Population (millions)	GNP per capita (U.S. dollars 1990)	GNP per capita growth rate, 1965-90	CO ₂ emissions per capita (tons of carbon)	CFC net use (thousands of metric tons)	Change in forest and woodland
Brazil	150	2,680	3.3	0.38	9	-0.4
Cameroon	12	960	3.0	0.14	0	-0.4
China	1,134	370	5.8	0.59	18	0.0
EU ^a	343	17,058	2.5	2.20	228	1.1 ^b
Hungary	11	2,780	—	1.65	1	0.6
India	850	350	1.9	0.21	0	-0.2
Japan	124	25,430	4.1	2.31	58	0.0
Russia	148.7	3,220 ^c	—	3.60	—	—
USA	250	21,790	1.7	5.37	197	-0.1
Average	—	8,293	2.8	1.8	63.88	0.08
World average	—	4,964	1.6	1.09	5.4	-0.13
Total	3,022.7	—	—	—	511	—
World total	5,222	—	—	—	659	—

Source: World Bank, *The Environment Data Book: A Guide to Statistics on the Environment and Development* (Washington, D.C.: World Bank, 1993), pp. 10-13.

^aNot including Luxembourg

^bNot including Belgium

^c1991

terms of what they concern and how they deal with it. We have selected only treaties for which there is a significant number of signatories and for which there is already some experience with implementation and compliance. A study of proposed accords that have not yet been implemented would tell us little about what makes for crafting a successful agreement. The five treaties we have chosen include three that deal with the management of natural resources and two that are aimed at controlling pollution. They are:

1. United Nations Educational, Scientific and Cultural Organization (UNESCO) *Convention for the Protection of the World Cultural and Natural Heritage*, 16 November 1972, 27 U.S.T. 37, T.I.A.S. No. 8226 (referred to as the World Heritage Convention). Secretariat, United Nations Educational, Scientific and Cultural Organization, Paris.
2. *Washington Convention on International Trade in Endangered Species of Wild Fauna and Flora*, 3 March 1973, 27 U.S.T. 1087, T.I.A.S. No. 8249 (referred to as CITES). Secretariat, United Nations Environment Programme, Geneva, Switzerland.

3. *International Tropical Timber Agreement*, 18 November 1983, U.N. Doc. TD/Timber/11/Rev. 1 (1984) (referred to as the International Tropical Timber Agreement). Secretariat, International Tropical Timber Organization, Yokohama, Japan.
4. *International Maritime Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter*, 29 December 1972, 26 U.S.T. 2403, T.I.A.S. No. 8165 (referred to as the London Convention and formerly referred to as the London Ocean Dumping Convention). Secretariat, International Maritime Organization, London.
5. *Montreal Protocol on Substances That Deplete the Ozone Layer*, 6 September 1987, 26 I.L.M. 1550 (referred to as the Montreal Protocol), together with the *Vienna Convention for the Protection of the Ozone Layer*, 22 March 1985, 26 I.L.M. 1529 (referred to as the Vienna Convention). Secretariat, United Nations Environment Programme, Nairobi, Kenya; Secretariat, Montreal Protocol Fund, Montreal, Quebec, Canada. The Vienna Convention is the framework treaty under which the Montreal Protocol was negotiated. We look at this treaty only insofar as it relates to the Montreal Protocol.

The *World Heritage Convention*, 1972, puts international constraints on the use of designated sites within a country.¹⁶ It is a useful model for studying the increasingly common international legal instruments designed to affect a country's behavior toward its own natural and cultural resources. Under the convention, parties nominate sites within their countries for inclusion on the World Heritage List. A meeting of the parties determines whether to include the nominated sites on the list. Once the sites are included, parties are obligated to protect their integrity. If they are in need of financial or technical assistance in doing so, they may receive assistance from the World Heritage Fund, financed by contributions from the parties. A secretariat, which in May 1992 consolidated the separate offices for natural and cultural heritages, administers the convention. Parties vest authority in the elected World Heritage Committee of twenty-one member states, which meets annually and until recently has been primarily devoted to considering proposals to list sites on the World Heritage List. The convention relies on voluntary compliance by the parties. There are no sanctions other than publicity about acts of noncompliance.

The *Convention on International Trade in Endangered Species* (CITES), 1973, is designed to control international trade in endangered species of plants and animals.¹⁷ It is a useful model for studying the technique of protecting the environment by controlling trade in an endangered natural resource or environmentally hazardous product. Under the CITES convention, species are classified into three categories and listed in

appendixes: internationally endangered species in which trade is prohibited, species that may become endangered unless trade is controlled, and species not in those two classes but endangered in a particular country that wants the help of others to enforce its control of exports. Under the convention, exports and imports of live specimens listed in the appendixes and of parts and derivatives are to take place only with a permit.

A conference of parties to the treaty meets every two years to review the implementation of the convention and, as appropriate, to revise the categorization of endangered species. A secretariat services the conferences of the parties to the treaty and assists countries in meeting their obligations. It also assists in monitoring trade and helps parties comply with the convention. Inquiries may be conducted into allegations that a species is being adversely affected or that the provisions of the treaty are not being effectively implemented. The conference can review the results of such inquiries and make appropriate recommendations. Publicity is the principal sanction against failures to implement or comply with the treaty, although countries have threatened to invoke trade sanctions.

The *International Tropical Timber Agreement*, 1983, was negotiated to facilitate trade in timber from tropical forests.¹⁸ It includes the major producing and consuming countries and is primarily a commodity agreement. Among its several objectives, however, is "the development of national policies aimed at sustainable utilization and conservation of tropical forests and their genetic resources, and at maintaining the ecological balance in the regions concerned."¹⁹ This goal is to be accomplished by encouraging expansion and diversification of tropical timber trade, improved forest management and wood utilization, and reforestation. To this end, the convention provides for the creation of the International Tropical Timber Organization (ITTO), which functions through the International Tropical Timber Council. The ITTO is charged with monitoring market conditions, conducting studies, and providing technical assistance. The convention is designed to attain its objectives with respect to forest management through development of knowledge, exchange and dissemination of information, and technical assistance.

The ITTO issued on 21 May 1990 the "ITTO Guidelines for the Sustainable Management of Natural Tropical Forests," which are voluntary guidelines for the parties. In the environmental context, national implementation of the convention raises important problems of how to effect substantial changes in the practices of an industry that is central to the economy of countries with tropical forests. It also provides insights into the effectiveness of using information and voluntary measures to induce changes in behavior.

The International Tropical Timber Agreement was drafted to be in force only through March 1994. It has been extended by a resolution of the parties until the new successor agreement goes into effect.

The *London Convention, 1972*, is intended to protect the marine environment from the dumping of certain kinds of pollutants.²⁰ States are obligated to regulate (or prohibit) dumping of materials that are listed in two annexes and to enforce these measures against vessels or aircraft registered in their territory, flying their flag, or otherwise under their jurisdiction. There is a regular meeting of the parties to review implementation of the agreement and to develop measures with regard to liability, and there are several advisory groups of scientific experts that meet regularly on particular issues. The convention is interesting because it requires states to control the behavior of actors operating in a globally shared resource (the oceans) and to develop measures of accountability.

The *Montreal Protocol on Substances That Deplete the Ozone Layer, 1987*, imposes the most arduous obligations on parties of any of these conventions. It was negotiated within the broad terms of the Vienna Convention, 1985—a framework convention that commits parties generally to take actions to protect both human health and the environment from the adverse effects of activities that modify the stratospheric ozone layer. The Vienna Convention provides for monitoring, the dissemination of information, and research.

The Montreal Protocol requires states that are parties to reduce their consumption of chlorofluorocarbons and to freeze consumption levels of halons.²¹ The convention provides target dates, allowing less stringent dates for the developing countries. It provides for regular meetings of the parties and for scientific assessments to be prepared in anticipation of these meetings. At the November 1992 meeting of the parties in Copenhagen, countries agreed to phase out chlorofluorocarbons completely by the year 1996, and halons (except for certain essential uses) by the year 1995, and to add new chemicals to the control list—going well beyond the initial terms of the protocol.

Countries are to report on measures they have taken to implement the protocol. The protocol obligates the parties to establish measures for determining noncompliance with its provisions and for treatment of parties that are found to be in noncompliance. It controls trade in the indicated substances with countries that are not parties to the protocol.

The protocol also recognizes the special needs of the developing countries in implementing the agreement. At the June 1990 meeting in London, the parties agreed to create a new mechanism to provide financial and technical cooperation, including the transfer of technologies, to assist these countries in complying with the control measures of the protocol; that mechanism was established as the Montreal Protocol.

The Montreal Protocol is particularly interesting because of the binding regime it has established for controlling production and consumption of ozone-depleting substances, and for the provision it has made to facilitate compliance by developing countries.

These treaties have been selected for a number of reasons. They involve several key environmental issues connected with global change. They contain a range of types of obligations, and various techniques regarding implementation and compliance. They address both pollution and natural resource problems. They involve issues that occur primarily within states' borders, those that cross borders, and those that are inherently global in nature. These treaties have been in effect a sufficient amount of time, so there is an adequate data base with which to analyze implementation and compliance. Finally, each of the selected states is a party to at least three of these accords, and a majority are parties to all of them. Table 3 shows which countries and groups of countries have acceded to which treaties.

Implementation and Compliance: Some Preliminary Observations

A secular trend toward improved implementation and compliance was visible by 1994. Not all nine political units were doing a better job of implementing and complying with all of the five treaties—indeed, several were not even parties to all of them—but the overall trend was positive. More and more actions have been taken to implement the treaties, and both procedural and substantive compliance have improved. The political units in general are increasingly acting in terms that accord with the spirit of the treaties.

Beyond this secular trend, the political units have also agreed to strengthened and improved treaties. This fact is evident both in the London and Copenhagen supplements to the Montreal Protocol and in the renegotiated International Tropical Timber Agreement.

Table 3. Adherence of the Political Units to International Environmental Treaties as of 1 January 1994 (p = party to treaty)

Political Units	World Heritage	CITES	Tropical Timber	London Convention	Vienna Convention	Montreal Protocol
Brazil	p	p	p	p	p	p
Cameroon	p	p	p		p	p
China	p	p	p	p	p	p
European Union			p		p	p
Hungary	p	p		p	p	p
India	p	p	p		p	p
Japan	p	p	p	p	p	p
Russia	p	p	p	p	p	p
USA	p	p	p	p	p	p

Those broad points having been made, there are some important qualifications. The performance of some countries with respect to CITES has sharply declined since the mid-1980s. With respect to developing countries, the substantive obligations of the Montreal Protocol are not yet severe. Thus, it would be premature to be extremely optimistic about their performance. Many signs thus far have been positive, but they provide only a weak basis for projecting a positive trend.

Among the five treaties, implementation and compliance seem to be stronger with respect to the Montreal Protocol, the London Convention, and the World Heritage Convention than they are with respect to CITES and the Tropical Timber Agreement. Among the last two, CITES imposes the most stringent obligations of the five accords, and it is the one that has encountered the most serious difficulties in the late 1980s and early 1990s. The Tropical Timber Agreement, with its nonbinding, sustainable forest guidelines, has had the least environmental impact.

No political unit does a perfect job of implementing and complying with the treaties, but the EU, Japan, the United States, and to a lesser extent Russia have done more than the other units in our study. During the past decade, Cameroon has been having the greatest difficulty of the nine political units in implementing and complying with the treaties.

As noted above, even strong implementation and compliance with treaties do not ensure their effectiveness in terms either of meeting the objectives of the treaties or of dealing with the problems that led to the treaties in the first place. In the case of the five treaties that are included in our study, the record is mixed. The Montreal Protocol and the London Convention seem, respectively, to have contributed to a decline in the production and consumption of ozone-depleting substances and in the intentional dumping of wastes in the high seas. The World Heritage Convention appears to have contributed to the preservation of cultural and natural resources. The Tropical Timber Agreement has not yet resulted in the "sustainable utilization" of forest resources, and—unfortunately, despite CITES—there appears to have been, especially since the mid-1980s, an increase in the illicit trade in endangered species. Moreover, while some endangered species have become less critically endangered, others have become more so; but, arguably, the situation could have been even worse absent the treaty.

Revisiting the Model

With these rough assessments as benchmarks, what explains what has happened? The model presented in Table 2 grouped the variables we thought might be important into four broad categories: (1) characteristics of the activity involved, (2) characteristics of the treaty, (3) factors involving the

country, and (4) the international environment. The model shows that all the factors interact to produce a combined effect on implementation, compliance, and effectiveness. In our discussion, however, for clarity and manageability, the factors must be treated individually. Thus, each of the statements in the following paragraphs requires the qualification "other things being constant."

With reference to the characteristics of the activity involved, our study confirms the conventional wisdom that the smaller the number of actors involved in the activity, the easier it is to regulate it. Because by early 1995 only a limited number of facilities have produced ozone-depleting substances, it has been relatively easy to control the production of those substances as the Montreal Protocol requires. The situation may become more difficult as more production facilities come on-line. The striking contrast between the limited number of facilities that have produced ozone-depleting substances and the millions of individuals who could engage in illicit trade in endangered species contributes to CITES being a much more difficult treaty to enforce than the Montreal Protocol.

Activities conducted by large multinational corporations are also easier to deal with than those conducted by smaller firms that are less visible internationally. Again, the production of ozone-depleting substances provides the example. The large multinational firms are much more subject to the pressure of public opinion and diverse consumers throughout the world than are the smaller, lesser-known firms that engage in much of the timber trade. Obviously, since the characteristics of activities that contribute to environmental degradation are more or less fixed, treaties must address activities whether or not their characteristics facilitate implementation and compliance. To the extent that treaties can decompose problems and define points of attack, these generalizations could be used to shape treaties.

Factors Involving the Treaties

The characteristics of treaties obviously do make a difference. The London Convention, CITES, and the Montreal Protocol impose relatively precise obligations. It is consequently relatively easy to judge whether or not states and other political units are fulfilling these obligations. The World Heritage Convention and the Tropical Timber Agreement are much vaguer; thus, assessing implementation and compliance becomes much more difficult.

Requiring the filing of regular reports is a standard feature that four of the treaties under consideration here, and most others, use to monitor implementation and compliance. Clearly, this is one of the few instruments that is available. Yet it is an instrument that is not well understood. The record of compliance with reporting requirements is spotty at best. Governments, particularly of smaller political units, are extremely overburdened;

filing reports is yet one more burden. The locus of the responsibility for preparing the report may be uncertain—is it with foreign offices or with substantive ministries? What is clear is that international secretariats can use the reporting exercise to help them clarify for government officials what the obligations of treaties are and what techniques have been and might be used to fulfill them. Thus, reporting is probably best seen as an educational process rather than a rigorous process of monitoring, and as a tool that enables secretariats, other states that are parties to the treaty, and national and international nongovernmental organizations to intervene to encourage compliance.

It is also clear that even though they have no formal standing under the treaties we have considered, NGOs and multinational corporations can play an important role in providing information about activities that are addressed in international environmental treaties. The TRAFFIC reports on illicit trade in endangered species provide information that governments might find difficult to gather or publish. Greenpeace is an important source of information about ocean dumping. The knowledge that monitoring goes on outside of formal governmental and treaty channels is probably an important restraining factor on governmental actions. The multinational firms that produce ozone-depleting substances sometimes may have had better information than governments about their production. Also, since there are proprietary aspects to this information, these firms have access that governments might not be able to achieve easily. Clearly, the private sector must be engaged if monitoring is to prove effective.

Not surprisingly, for parties to implement and comply with treaties, they must feel that the obligations imposed are equitable. India and China would not become parties to the Montreal Protocol until the agreement about compensatory financing had been reached at the London meeting in 1990. Part of the difficulty with the Tropical Timber Agreement seems to be a sense that burdens are disproportionately imposed on the producer countries; the consumer countries' activities with respect to their forests are unregulated. The new agreement attempts to address this issue by having a separate formal statement regarding temperate forests accompany it.

Factors Involving the Country

The performance of the eight countries and the EU in implementing and complying with the five treaties examined in this study varies substantially across countries and time. The record, however, must be viewed in context. One very important factor shaping how well a country does is what it has traditionally done in the past with respect to the issue in question, including what legislation and regulation it already had in place at the time it became a party to the treaty. For instance, since Japan has had a long

tradition of protecting its cultural heritage, becoming a party to the World Heritage Convention did not require vast changes in the way it treated its historical treasures. Its standards may previously have been even above those required by the treaty.

Beyond this, perhaps the most important factor contributing to the variance is administrative capacity. Countries that have stronger administrative capacities can do a better job. Administrative capacity is the result of several factors. Having educated and trained personnel is important. But such individuals usually must have financial support to be effective. For example, while the Indian administrative service is well staffed and well trained, its financial resources are extremely limited, and thus its effectiveness is restricted. Administrative capacity depends on having authority. Administrators whose mandate is narrower than their assigned responsibilities or who are subject to capricious interference cannot do as well as their training and skills would make possible.

Economic factors are important but rather indirectly. The political units in this study have widely varying GNPs per capita that have grown or declined at substantially different rates. Of course, the larger a country's GNP, the more likely it could have a strong administrative capacity; but changes in GNP or the rate of growth of GNP have had little discernible effect on implementation and compliance. Economic collapse and chaos, however, can have a profound effect. In Cameroon and Russia, compliance with CITES seems to have declined since the mid-1980s, and this phenomenon seems to be directly attributable to economic collapse and chaos. Limited government resources and rapid rates of inflation have had an impact on the incentive structure of the individuals who must enforce the provisions of CITES: the customs inspectors. In some instances they have not been paid. In others, they have seen the value of their salaries decline precipitously. Conversely, the value of illicit trade in endangered species has increased. Under the circumstances, the apparent increase in illicit trade in endangered species is perhaps understandable.

Political systems have an effect on implementation and compliance, but, again, the effect is mixed and complex. Large countries have a much more complex task of complying with the obligations of treaties than do smaller ones. There are several levels of political authority in Brazil, China, the EU, Russia, and the United States. In cases where activities that the treaty deals with are widely dispersed—as in CITES, the Tropical Timber Agreement, and the World Heritage Convention—these levels of political authority must be coordinated, which is not always an easy task. Sometimes the authority of the central government, which accepts international obligations, does not reach deeply into local areas. Moreover, these large countries contain within their borders widely different ecological regions, which require variation in the way administration is conducted.

As part of its reform, Russia has attempted to decentralize authority. In the process of decentralization, the authority of Moscow over localities has been weakened. This shift appears to have resulted in a decline in Russia's compliance with CITES. Whether this is the temporary result of an administrative restructuring or a longer-term change is yet to be determined.

Political stalemate and chaos can bring about a noticeable decline in implementation and compliance. These factors seem to have affected Brazil, Cameroon, and Russia.

There are many features of democratic governments that contribute to improved implementation and compliance. Democratic governments are normally more transparent than authoritarian governments, so interested citizens can more easily monitor what their governments are doing to implement and comply with treaties. In democratic governments, it is possible for citizens to bring pressure to bear for improved implementation and compliance. Also, NGOs generally have more freedom to operate in countries with democratic governments. At the same time, however, democratic governments are normally more responsive to public opinion than authoritarian governments. Public opinion is not always supportive of environmental concerns: indeed, the economy is usually the public's greatest concern. Democratic governments allow conflicts about environmental issues to flare. It is probably the case that because of the balance of factors mentioned in this paragraph, democratic governments are more likely to do a better job of implementing and complying with international environmental accords than nondemocratic governments; but this generalization does not always hold, and democratization does not necessarily lead automatically or quickly to improved compliance.

The importance of NGOs has already been mentioned. They play a crucial role in implementation and compliance. They mobilize public opinion and set political agendas. They make information about problems available, sometimes information that governments do not have or would prefer to keep confidential. Often the information they make available is essential to monitoring. They bring pressure on governments directly and indirectly. Because many local and national nongovernmental organizations have connections with NGOs in other countries and INGOS, they are a means of ensuring a uniformity of concern throughout the world. There are also significant transfers of funds among NGOs, so NGOs in poorer countries may have surprisingly extensive resources at their disposal. NGOs have become an instrument for universalizing concern.

Individuals make a crucial difference in the implementation and compliance with treaties. It matters who is the head of state. Brazilian president Fernando Collor took a special interest in the environment, played a major role in having Rio de Janeiro selected as the site for UNCED, and

advanced environmental causes within his country. Brazil's compliance with the five treaties improved during his presidency. Russia's prime minister insisted on revealing the Soviet Union's past violations of the London Convention and sought to bring the Russian navy's activities into compliance with the terms of the treaty. Individuals in less exalted positions can also play important roles. Russell Train, as chairman of the U.S. Council on Environmental Quality and administrator of the Environmental Protection Agency, initiated actions within the United States and extended them abroad. He played a crucial role in starting the international momentum in the 1970s. Other individuals through their knowledge, skills, and persistence have played important roles in NGOs. The designation of some heritage sites should clearly be attributed to individuals. Individuals are important also as members of epistemic communities.

The International Environment

The international environment is undoubtedly the most important factor explaining the secular trend toward improved implementation and compliance. Since the Stockholm Conference in 1972, international momentum toward concern for the environment has increased, and it increased sharply starting in the mid-1980s with the publication of the report of the World Commission on Environment and Development, *Our Common Future*, in 1987, and the preparations for the 1992 UNCED meeting in Rio de Janeiro.

The Rio conference was a massive event. It was the largest gathering of leaders of countries in history. It brought together an unprecedented number of NGOs. Significantly, thanks to a decision taken in Working Group III of the Preparatory Commission for UNCED, improving implementation and compliance with international environmental accords was specifically addressed at the conference.²²

Increased salience for environmental issues was one aspect of the international momentum that developed. The increased salience roused public opinion and mobilized both national and international nongovernmental organizations, and public opinion and NGOs put increased pressure on governments to deal with environmental issues, which enhanced implementation and compliance.

Another aspect of international momentum was that more and more treaties were signed and more and more countries became parties to these treaties. This increase had an effect on implementation and compliance. Governments did not want their countries to be seen as laggards. Moreover, there are practical economic consequences. Once it became apparent that the major countries would stop producing and consuming chlorofluorocarbons,

other countries did not want to deal with outmoded technologies. Finally, in the case of a treaty like CITES, it is easier for a government to attempt to enforce its obligations if all of the neighboring countries are also parties.

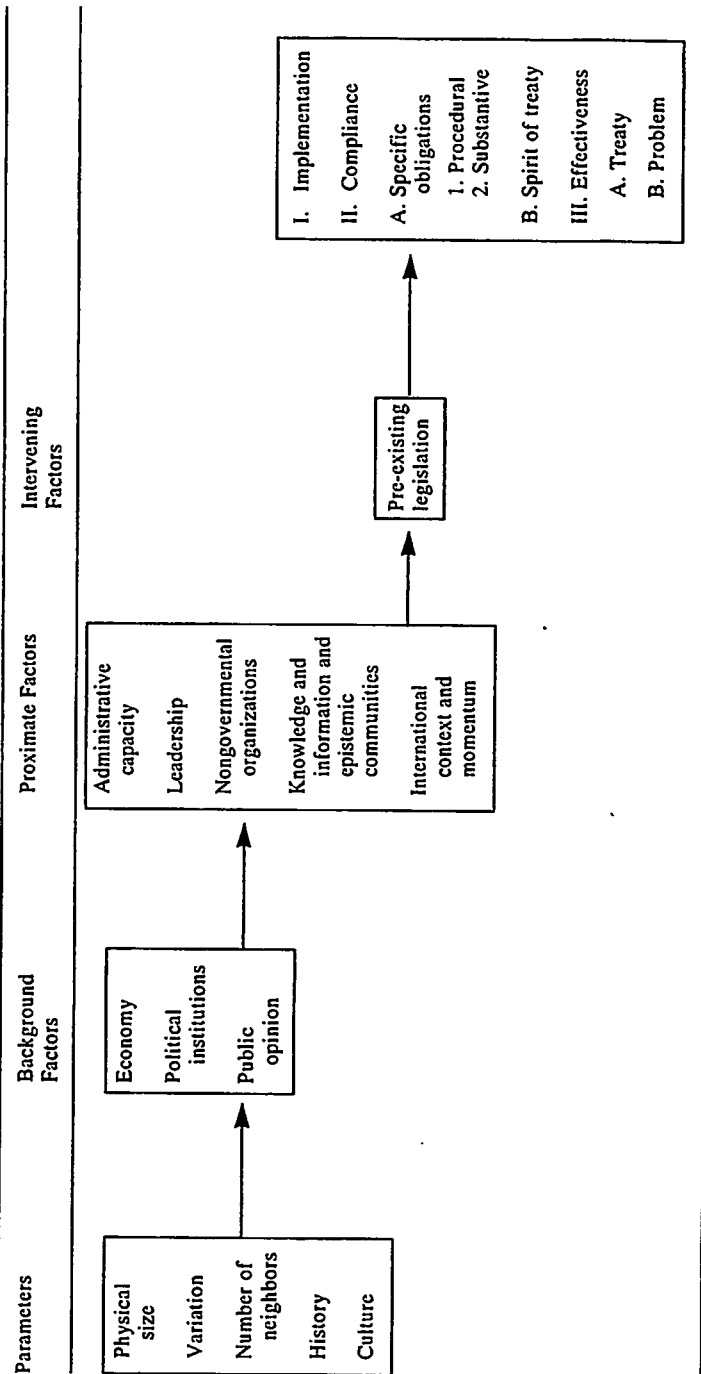
Figure 2 attempts to portray this more nuanced picture of how factors within countries and the international environment affect implementation and compliance. A country's physical conditions, its history, and its culture establish basic parameters that affect implementation and compliance. The economy, political institutions, and public opinion have an effect, but it is generally indirect. These factors operate through proximate variables. In our view, the most important proximate variables are administrative capacity, leadership, NGOs, knowledge and information, and epistemic communities. All these factors, of course, are shaped by the country's preexisting traditions, legislation, and regulations in the area involved. Finally, the international environment, especially in the form of international momentum, is also a proximate variable. And it has been exceedingly important.

What prescriptions do these findings suggest? They underscore the importance of the underlying strength and health of national political-economic systems for efforts to protect the global environment. The strength and health of national political-economic systems are the most important factors; thus, long-term strategies must squarely focus on these issues, as indeed Agenda 21 does. In the shorter run, engaging national leaders in the effort to protect and improve the global environment will make a difference. Strengthening national bureaucracies charged with responsibilities for environmental management, supporting international and national non-governmental organizations that focus on environmental issues, and building epistemic communities all will help. Maintaining and increasing the international momentum for the protection and improvement of the environment is crucial for both its own effects and the stimulus it provides for all the other factors that are important. ☹

Notes

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Figure 2. Factors That Contribute to Lessening or Improving National Compliance with International Environmental Accords



1. Edith Brown Weiss, Daniel B. Magraw, and Paul C. Szasz, *International Environmental Law: Basic Instruments and References* (New York: Transnational Publishers, 1992).

2. Although Harold K. Jacobson and Edith Brown Weiss are the authors of this article, it is very much the result of a collaborative project that has involved the entire research consortium that is responsible for the project and others. The article draws heavily on discussions we have had during the course of the project. It also draws on the various applications we submitted when seeking funding for the project. We particularly wish to acknowledge the rich contribution of Richard Rockwell, who played a major role in drafting the application to the Ford Foundation when he was a program officer at the Social Science Research Council. We also want to acknowledge the vital critical assistance of our research assistants, Cheryl Shanks and Gideon Rottem. The members of the research consortium are Danae Aitchison, Murillo Aragao, Anthony Balinga, Laszlo Bencze, Erach Bharucha, Piers Blaikie, Stephen Bunker, Abram Chayes, Antonia Handler Chayes, Jim Clem, Ellen Comisso, Liz Economy, Fang Xiaoming, James Vincent Feinerman, Koichiro Fujikura, Michael Glennon, Saul Halfon, Peter Hardi, Allison Hayward, Ronald Herring, Philipp Hildebrand, Takesada Iwahashi, Jasmin Jagada, Sheila Jasanoff, Tim Kessler, Ron Mitchell, Elena Nikitina, Kenneth da Nobrega, Michel Oksenberg, Jonathan Richards, Alberta Sbragia, Thomas Schelling, John A. Mope Simo, Alison Steward, David Vogel, Wu Zijin, Zhang Shuqing, Andrea Ziegler, and William Zimmerman. An earlier version of this article was presented as a paper at the Annual Meeting of the International Studies Association, Washington, D.C., March 1994.

3. Materials on the enforcement of domestic environmental law that are relevant include Keith Hawkins, *Environment and Enforcement* (Oxford: Clarendon Press; New York: Oxford University Press, 1984); and Clifford Russell, Winston Harrington, and William Vaughan, *Enforcing Pollution Control Laws* (Washington, D.C.: Resources for the Future, 1986).

4. See especially David A. Kay and Harold K. Jacobson, eds., *Environmental Protection: The International Dimension* (Totawa, N.J.: Allenheld, Osmun, 1983); Robert O. Keohane, *After Hegemony: Cooperation and Discord in the World Political Economy* (Princeton: Princeton University Press, 1984); Oran R. Young, *Resource Regimes: Natural Resources and Social Institutions* (Berkeley: University of California Press, 1982).

5. See Elinor Ostrom, *Governing the Commons: The Evolution of Institutions for Collective Action* (Cambridge: Cambridge University Press, 1990); and the special issue of *Evaluation Review* edited by Steven Rayner devoted to managing the commons, *Evaluation Review: A Journal of Applied Social Research* 15, no. 1 (February 1991).

6. U.S. Government Accounting Office, *International Environment: International Agreements Are Not Well Monitored*, GAO/RCED 92-43 (January 1992).

7. "Survey of Existing International Agreements and Instruments and Its Follow Up," report by the secretary-general of the United Nations Conference on Environment and Development, A/Conf. 151/PC/103 and Addendum 1 (1992). See also the follow-up, expanded version of the study, Peter H. Sand, ed., *The Effectiveness of International Environmental Agreements: A Survey of Existing Instruments* (Cambridge, England: Grotius, 1992).

8. Peter H. Sand, *Lessons Learned in Global Environmental Governance* (Washington: World Resources Institute, 1990).

9. Jesse H. Ausubel and David G. Victor, "Verification of International Environmental Agreements," *Annual Review of Energy and the Environment* 17 (1992): 1-43.

10. David Lewis Feldman, "Institutions for Managing Global Climate Change," *Global Environmental Change* 2 (1992): 43-58. See also Peter M. Morissette, Joel Darmstadter, Andrew J. Plantinga, and Michael A. Toman, "Prospects for a Global Greenhouse Gas Accord," *Global Environmental Change* 1 (1991): 209-223. Although the article looks at the process of reaching the agreement, the process has implications for implementation.

11. U.S. Government Accounting Office, *International Environment*; and "Survey of Existing International Agreements."

12. See Abram Chayes and Antonia Handler Chayes, *The New Sovereignty: Compliance with International Regulatory Agreements* (Cambridge: Harvard University Press, forthcoming); Abram Chayes and Antonia H. Chayes, "On Compliance," *International Organization* 47, no. 2 (Spring 1993): 175-206; Roger Fisher, *Improving Compliance with International Law* (Charlottesville: University of Virginia Press, 1981); Peter M. Haas, *Saving the Mediterranean: The Politics of International Environmental Cooperation* (New York: Columbia University Press, 1990); Peter M. Haas, Robert O. Keohane, and Marc A. Levy, *Institutions for the Earth: Sources of Effective International Environmental Protection* (Cambridge: MIT Press, 1993); Keohane, *After Hegemony*; Robert O. Keohane, "Reciprocity, Reputation, and Compliance with International Commitments," paper delivered at the Annual Meeting of the American Political Science Association, Washington, D.C., 1-4 September 1988; and Ostrom, *Governing the Commons*.

13. See Haas, *Saving the Mediterranean*.

14. The members of the European Union are Belgium, Denmark, the Federal Republic of Germany, France, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, and the United Kingdom.

15. Allen L. Hammond, ed., *World Resources 1990-1991: Guide to the Global Environment: A Report by the World Resources Institute in Collaboration with the United Nations Environment Programme and the United Nations Development Programme* (New York: Oxford University Press, 1990), pp. 244-245, 254-255, 348-349.

16. See Simon Lyster, *International Wildlife Law* (1985): 222-227 (description of implementation in Australia); Daniel B. Magraw, "International Law and Park Protection: A Global Responsibility," in David J. Simon, ed., *Our Common Land* (Washington, D.C.: Island Press, 1988) (brief discussion of implementation of the World Heritage Convention in the United States); Keith D. Suter, "The UNESCO World Heritage Convention," *Environmental Planning and Law Journal* 8 (1991): 4-15; Juliet Bedding, "Private Interests in World Heritage Properties: Peko-Wallsend Versus the Commonwealth," *University of Tasmania Law Review* 9 (1989): 316-324.

17. See Michael Glennon, "Has International Law Failed the Elephant?" *American Journal of International Law* 84 (1990): 1-43. Kathryn Fuller, Ginette Hemley, and Sarah Fitzgerald, "Wildlife Trade Law Implementation in Developing Countries: The Experience in Latin America," *Boston University International Law Journal* 5 (1987): 289-310; Laura Kosloff and Mark Trexler, "The Convention on International Trade in Endangered Species: Enforcement Theory and Practice in the United States," *Boston University International Law Journal* 5 (1987): 327-361; Eric McFadden, "Asian Compliance with CITES: Problems and Prospects," *Boston*

University International Law Journal 5 (1987): 311–325; and Jorgen Thomsen and Amie Brautigam, "CITES in the European Economic Community: Who Benefits?" *Boston University International Law Journal* 5 (1987): 269–287. See also Alan H. Schonfeld, "International Trade in Wildlife: How Effective Is the Endangered Species Treaty?" *California Western International Law Journal* 15 (1985): 111–160; and Gwyreth Stewart, "Enforcement Problems in CITES: Reservations Regarding the Reservations Clauses," *Cornell International Law Journal* 14 (1981): 429–455.

18. See Ursula Wasserman, UNCTAD: "International Tropical Timber Agreement," *Journal of World Trade Law* 18 (1984): 89–91 for brief discussion of the agreement.

19. International Tropical Timber Agreement, 1983, chap. 1, art. 1, par. h.

20. See Daniel Suman, "Regulation of Ocean Dumping by the European Economic Community," *Ecology Law Quarterly* 18 (1991): 559–618. Allan Bakalian, "Regulation and Control of United States Ocean Dumping: A Decade of Progress, an Appraisal for the Future," *Harvard Environmental Law Review* 8 (1984): 193–256; R. G. V. Boelens, "London Dumping Convention: Its Development and Significance to Marine Pollution Control," in *Canadian Conference on Marine Environmental Quality: Proceedings, February 29–March 3, 1988* (Halifax, Nova Scotia: International Institute for Transportation and Ocean Policy Studies, 1988) (issues of economic, social, and geographical differences among the member states); W. L. Lahey, "Ocean Dumping of Sewage Sludge: The Tide Turns from Protection to Management," *Harvard Environmental Law Review* 6 (1982): 395–437 (a study of regulation efforts by the U.S. Environmental Protection Agency); and Judith Spiller and Cynthia Hayden, "The Ocean Dumping Controversy: Social, Economic, Political, and Scientific Issues," *Ocean Development and International Law* 19 (1988): 345–366 (examination of initiatives by developing countries to amend the convention).

21. See Robert Hahn and Albert McGartland, "The Political Economy of Instrument Choice: An Examination of the U.S. Role in Implementing the Montreal Protocol," *Northwestern University Law Review* 83 (1989): 592–611; Orval Nangle, "Stratospheric Ozone: US Regulation of Chlorofluorocarbons," *British Columbia Environmental Law Review* 16 (1989): 531–580; Markus Jachtenfuchs, "The European Community and the Protection of the Ozone Layer," *Journal of Common Market Studies* 28 (1990): 261; Elizabeth P. Barratt-Brown, "Building and Monitoring a Compliance Regime Under the Montreal Protocol," *Yale Journal of International Law* 16 (Summer 1991): 519–570.

22. See "Survey of Existing International Agreements." See also *Effectiveness of International Environmental Agreements*.