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The Influence of State and Treaty Characteristics on Participation in International Environmental Agreements (IEAs)

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ABSTRACT

This study attempts to systematically analyze the determinants of state participation in International Environmental Agreements (IEAs). The study focuses on two core elements: (i) IEA characteristics; and (ii) state characteristics. Hypotheses for state participation in IEAs are formulated based on the two main International Relations theories dealing with cooperation – Realism and Liberalism. The study presents five different models for state participation in IEAs. The first model analyzes the influence of treaty variables, while the remaining four focus on state variables. The second and third models analyze the influence of Realist and Liberal variables respectively. The fourth model specifically focuses on variables which reflect the various socio-economic, political and logistical constraints of developing countries. The fifth model presents an integrated analysis of participation based on the previous models. Results of the study show that participation can be understood in terms of both the Realist and Liberal variables, and that there can be no rarefied partitioning of those factors on participation. More specifically, the study empirically demonstrates that state participation in IEAs is influenced by the following four main factors: (i) the impact of domestic and international institutions (ii) human development; (iii) power motivations; and (iv) IEA design. Policies proposed to increase participation in IEAs therefore have to enhance any positive influence exerted by these parameters, and mitigate their negative influences, if any.

INDEX WORDS: International Environment Agreement, Environmental Treaties, Participation, Environmental Cooperation, Domestic Characteristics, Ratification

THE INFLUENCE OF STATE AND TREATY CHARACTERISTICS ON PARTICIPATION IN INTERNATIONAL ENVIRONMENTAL AGREEMENTS (IEAs)

by

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DEDICATION

I wish to dedicate this work to my husband, R. Girdhar (a.k.a. Waseem), who supported me unreservedly throughout this entire venture.

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LIST OF ABBREVIATIONS

Abbreviation	Full title
AEWA	The African-Eurasian Migratory Waterbird Agreement (16 June 1995)
AEPI	Army Environmental Policy Institute
CBD	Convention on Biological Diversity (5 June 1992, Rio de Janeiro)
CCD	United Nations Convention to Combat Desertification
CDM	Clean Development Mechanism
CFCs	Chlorofluorocarbons
CIESIN	Center for International Earth Science Information Network
CITES	Convention on International Trade in Endangered Species of Wild Animals
CMS	Convention on the Conservation of Migratory Species of Wild Animals (Bonn, 1979)
COP	Conference of Parties
EKC	Environmental Kuznets Curve
ENTRI	Environmental Treaties and Resource Indicators
ESI	Environmental Sustainability Index
GHGs	Greenhouse gases
GDP	Gross Domestic Product
HDI	Human Development Index
HDR	Human Development Report
HELCOM	The Helsinki Commission
ICJ	International Court of Justice
IEA	International Environmental Agreement
IEC	International Environmental Cooperation
IGO	Intergovernmental organization
IPCC	Intergovernmental Panel on Climate Change
IR	International Relations
JB	Jarque Bera
JI	Joint Implementation
KP	Kyoto Protocol to the United Nations Framework Convention on Climate Change
MARPOL 73/78	International Convention for the Prevention of Pollution from Ships
MP	Montreal Protocol on Substances That Deplete the Ozone Layer
NASCO	North Atlantic Salmon Conservation Organization
NGO	Non-governmental organization
N-S	North-South
ODA	Official Development Assistance

ODS	Ozone-depleting substance
OECD	Organization for Economic Cooperation and Development
R&D	Research and Development
SEDAC	Socioeconomic Data and Applications Center
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
VIF	Variance Inflation Factor
WWF	World Wildlife Fund

1. INTRODUCTION

On 2 December 2003, Russia announced that it would not ratify the Kyoto Protocol (KP) to the 1992 United Nations Framework Convention on Climate Change (UNFCCC), following suit to USA's earlier decision in 2001 to withdraw from the treaty. While Russia eventually altered its stance and ratified the treaty on 18 November 2004, thereby allowing the KP to come into force on 16 February 2005, the USA is still not a party to the KP, though it has ratified a host of other international environmental agreements (IEAs). Moreover, despite the reluctance of the USA (and initially of Russia) to participate in the KP, there are around one hundred and forty countries worldwide which have ratified the treaty.

Indeed, states' participation[1] in IEAs can be characterized by its non-uniformity, either spatially or temporally. For example, the US, despite its status as a major superpower and it being a major member of the Organization for Economic Cooperation and Development (OECD), has ratified far fewer IEAs than other developed nations such as Germany, Finland, France, or Italy. Based on data compiled from the Environmental Treaties and Resource Indicators (ENTRI) database of the Socioeconomic Data and Applications Center (SEDAC) and the Center for International Earth Science Information Network (CIESIN),[2] the US has ratified fifty-five global[3] IEAs, whereas Germany has ratified seventy-eight of such treaties. Smaller nations such as Belgium, Greece or the United Kingdom have ratified more IEAs than the US.

[1] Participation is defined as country ratification (or other technical terms deemed equivalent to ratification – such as accession, approval or acceptance) of the IEAs. For more details, see Section 1.2.
[2] This database is accessible online from www.sedac.ciesin.org/
[3] This study is concerned solely with global IEAs as opposed to bilateral or regional IEAs. See Section 1.2.

Further, Chile, a developing nation, has ratified fifty-seven global IEAs, and Brazil is almost at par with the US, having ratified a total of fifty-four global IEAs. On the other hand, there are other nations such as Angola and Eritrea, which have ratified only eight global IEAs.

What factors can explain this differential participation in IEAs? What can account for the low participation of Eritrea or Angola as compared to that of Germany or Finland? Is a country's participation in IEAs aided by its level of economic development, or is it constrained by social and development challenges such as poverty and corruption? Does power matter? Why is the KP subject to such great controversies, while other treaties (e.g. the Convention on International Trade in Endangered Species (CITES)) manage to sustain a high level of international participation without much contentious international debate? Does the legal content of IEAs influence the level of participation sustained by the IEAs?

Despite the tremendous growth in IEAs since the 1970s, systematic empirical research into the determinants of state participation in IEAs has been scant. While studies on environmental regime formation have been rife, not much empirical work has been done on why (i) countries participate differentially in IEAs; and (ii) why specific treaties command a higher level of participation than others. This research aims to bring empirical and theoretical contribution to the study of the determinants of participation in IEAs by focusing on both country and treaty variables. In the next sections, I provide a definition of the terms 'IEA' and 'participation.' I then present an overview of the emergence of participation as an independent element of investigation within the field of international environmental cooperation (IEC). I thereafter delineate a conceptual model to establish domestic country characteristics and treaty variables as potential determinants of participation in IEAs. Finally, I present an outline of the models of this study.

1.1 Definition of terms

International Environmental Agreement (IEA)

According to Article 38(1) of the Statute of the International Court of Justice (ICJ), treaties are a *primary source* of international law[4] (Slomanson 1995 p. 9). The Vienna Convention on the Law of Treaties (VCLT),[5] adopted by the United Nations Conference on the Law of Treaties on 23 May 1969, establishes treaties as an important source of international law and "as a means of developing peaceful cooperation among nations, whatever their constitutional and social systems."[6] Article 2, paragraph 1(a) of the VCLT defines a treaty as:

> "an international agreement concluded between States in written form and governed by international law, whether embodied in a single instrument or in two or more related instruments and whatever its particular designation.

The same definition holds for an IEA because in the jargon of international law, terms such as convention, protocol, accord, covenant, pact, agreement, charter, statutes or regime are commonly used to denote a treaty. The only difference between an IEA and other international treaties lies in the subject matter; otherwise, an IEA, very much like any other treaty, is an agreement which is "governed by international law."

In this study, no distinction is made between the terms international agreement, protocol, convention. The term IEA thus refers to a written legal document, arising out of international negotiations and governed by international law, reflecting international or regional concern over a specific environmental issue, and embodying general and specific commitments to enhance and

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[4] Other sources include: "…b. international customs, as evidence of a general practice accepted as law; c. the general principles of law recognized by civilized nations; d…judicial decisions and the teachings of the most highly qualified publicists of the various nations, as subsidiary means for the determination of the rules of law." (Slomanson, 1995 p. 9, quoting Article 38.1 of the Statute of the ICJ).

[5] Full text available online at www.worldtradelaw.net/misc/viennaconvention.pdf . While the 1969 VCLT governs treaties concluded between States, a 1986 version of the VCLT was negotiated to govern treaties between States and International Organizations or between International Organizations. The 1986 Vienna Convention is not yet in force. For more information, see http://untreaty.un.org

[6] Paragraph 2 of Preamble of VCLT.

improve the environmental situation. Normally, these provisions may include the following, *inter alia*: (i) a general framework for cooperation and collaboration; (ii) specific measures to address the specific environmental problem; (iii) provisions for scientific, technological, and technical cooperation; (iv) provisions for dispute settlement; (v) provisions for ratification, accession, and entry into force; (vi) sanctions in cases of violation; and (vii) monitoring and reporting requirements.

IEAs can be bilateral, regional and global, depending on the scope of the environmental problem or on the scope of membership. A global IEA is normally open to membership from any sovereign country, while a regional IEA is limited to a specific group of countries in a particular region. Bilateral IEAs, as the name suggests, is an agreement between two countries. The present study is concerned solely with participation in *global* IEAs.

According to the principles of International Law, characterized by the lack of a supranational authority for enforcement and a general lack of compellence, states have to *willingly* enter into IEAs. However, once a state has ratified a specific IEA, the IEA is governed by the articles of the VCLT, which bestows certain legal characteristics to IEAs. The most important legal characteristics of IEAs, under the provisions of VCLT, are as follows: (i) IEAs can be made by every independent state (Article 6); (ii) IEAs must be honored by the states entering into them (Article 26); (iii) IEA enforcement is not subject to the internal laws of the parties (Article 27); (iv) an IEA is non-retroactive (Article 28); (v) an IEA does not create either rights or obligations for a third State[7] (Articles 34-37); (vi) an IEA can be amended by agreement between the parties (Article 39); (vii) an IEA may be declared invalid in case of error, fraud,

[7] The VCLT makes the following distinction between the States (Article 2, paragraph 1): (i) A 'negotiating State' is a State which took part in the drawing up and adoption of the text of the treaty; (ii) A 'contracting State' is a State which has consented to be bound by the treaty, whether or not the treaty has entered into force; (iii) 'Party' is a State which has consented to be bound by the treaty and for which the treaty is in force; and (iv) 'Third State' means a State not a party to the treaty.

corruption, coercion, use of force, or conflict with *Jus Cogens* (Articles 48-53); and (viii) a material breach of an IEA by one of the parties entitles the other parties to suspend the operation of the treaty in whole or in part or to terminate it (Article 60).[8]

Participation

The VCLT provides for various means for states to express their consent to be bound by a treaty. While Article 11 of the VCLT enumerates ratification, acceptance, approval, or accession as legal and valid means of signifying consent to be bound, it leaves the final mode for signifying such consent to the treaty-makers. Thus, based on the intent of the negotiating states and the final treaty text adopted, mere initialing or signature may signify that a state is legally bound under International Law to abide by the provisions of the treaty (VCLT, Articles 11, 12); otherwise, such consent may be expressed by ratification, acceptance, approval or accession (VCLT, Articles 2(1)(b), 14, 15, 16).[9]

However, in normal parlance, treaty commencement normally involves the following five steps: (i) *initialing;* (ii) *signature*; (iii) *ratification*; (iv) *accession*; and (v) *coming into force* (Hingorani 1972). These various steps embody a gradual procession from agreement on the treaty text to final consent to be bound by the treaty. Unless otherwise to be gathered from the intent of the treaty negotiators or specifically spelled out in the treaty text, under customary practice, *initialing* "is merely an indication of approval of the text for subsequent signature" (O'Connell 1965 p. 230 as cited in Hingorani, 1972 p. 14). *Signature* of an IEA, on the other hand, means that the negotiating states have agreed to the general wording of the text of the final draft of the treaty (Slomanson 1995).

[8] The relevant articles of the VCLT referred to above are given at Table 1, Annex 1.
[9] Also, see United Nations Treaty Collection. Treaty Reference Guide. http://untreaty.un.org/English/guide.asp#acceptance

Ratification, in International Law, is the main step taken by states to signify their consent to be bound by the treaty once the treaty has been opened for signature. Treaties which require ratification have no legal validity until they are ratified. In between the signature and ratification, the signatory states are bound to obey Article 18 of VCLT, which prevents signatories from engaging in "acts that would defeat the object and purpose of a treaty." *Accession*, as per Articles 2(1)(b) and 15 of the VCLT, is considered at par with ratification in signifying a state's consent to be bound by a treaty. Accession is normally an act of a state which has not participated in the initial drafting process leading to the making of the treaty (Hingorani 1972 p. 23; Slomanson 1995). Accession can only be made in cases where the treaties provide for accession (Hingorani 1972 p. 23), and accession normally does not require ratification, unless otherwise specified by the treaty. Once a state has acceded to a particular treaty, it is considered as a full-blown member of the treaty, on the same level as those which have signed and ratified the treaty (Hingorani 1972 p. 23).

A state is considered to be a participant or party member of an IEA if it has either ratified, acceded to, approved or accepted the treaty (as opposed to merely initialing or signing the treaty) (VCLT, articles 2(1)(b); 14(1); 16). Participation is thus equivalent to ratification, accession, approval, or acceptance.

1.2 Participation as an emerging field of study

In view of the national sovereignty of states of the world, international cooperation has traditionally been heavily premised on agreements between countries. These agreements serve primarily as an embodiment of the agreed upon rights and obligations to secure the required level of commitment and cooperation. Voluntary participation in these treaties is therefore of paramount importance in securing and thereafter sustaining the desired level of cooperation.

In the field of IEC especially, IEAs have become a tool of major importance in enlisting the cooperation of the international community in committing to specific measures to protect the global environment, as attested by an upsurge in the number of IEAs adopted internationally since the 1970s. IEAs take on primal importance in view of their positive role in diffusing potential conflicts and tensions arising out of the natural tendency of states to free-ride on the efforts of others or of fulfilling their national priorities at the expense of neighboring states. In situations characterized by environmental, economic or socio-political asymmetries, for example, IEAs serve as a useful tool to bring equivalence to the relationships among concerned parties. IEAs can, for example, promote a mutual resolution of complexities arising from transboundary transport of pollutants, thereby catalyzing a framework of cooperation for both the 'guilty' party and the 'victim.' By legally codifying common standards and rules, IEAs thus form "the juridical basis for creating rights and obligations between the parties" (Levi 1991), especially so in cases of the global commons, which by definition, are not amenable to any particular national jurisdiction.

In view of the crucial role played by IEAs in enhancing IEC, environmental economists have long been concerned with the theme of treaty participation and alliance building. Economic analyses have been conducted to estimate the likelihood that countries would sign and implement IEAs, the types of countries that are most likely to sign the treaties, and the kinds of treaties that are most likely to be signed (e.g. Congleton 2001; Congleton 1992; Murdoch *et al.* 1997). Researchers within the econometrics field have also typically focused on the optimal size for an IEA, the cost-effectiveness of IEAs, and the design of instrument choices to attract high participation, often commonly referred to in the literature as the "incentive compatibility" of

IEAs for enhanced cooperation (e.g. Carraro 1999a; Downs 1998; Helm and Sprinz 2000; Schmidt 2000 p.4).

The theme of IEA participation has been receiving increasing interest from outside the field of environmental economics as well. Drawing from the insights provided by general theories bearing on international cooperation, several researchers have recently attempted to provide a quantitative determination of the factors influencing state participation in IEAs. This line of research has typically tried to empirically link states' varying levels of participation in IEAs to their domestic characteristics such as their levels of democratic governance, trade openness, economic parameters, pollutant emissions, demographics, or land area, *inter alia* (e.g. Dietz and Kalof 1992; Dolsak 2001; Frank 1999; Fredriksson and Gaston 2000; Neumayer 2002a; Neumayer 2002b; Recchia 2002). In the most recent of such endeavors, Roberts ***et. al.*** (2004) have relied on the perspective of world-systems theory to analyze the participation of 192 nations in twenty-two treaties.

This non-economics-based interest in participation also focuses on treaty design as a potential determinant of state participation in IEAs. Among the emerging studies in that domain is DeSombre's (2001 p.190-228) investigation of the influence of specific treaty clauses or "participation mechanisms" on participation in IEAs. The clauses studied include the following: presence of economic sanctions; provision of environmental aid; differential obligations; and the creation of club goods.

Unfortunately, as detailed in the next section, the present state of research into the field of IEA participation is not well advanced and there is scope for contribution, both theoretically and empirically.

1.3 Limitations of current studies and scope for further study

The present status of the research agenda on IEA participation can be deemed to be still in its infancy, with no well-developed theories and no large-scale empirical foundation. As expounded in more detail in Chapter Three, the studies dealing with participation in IEAs typically suffer from three main lacunae: (i) lack of large IEA sample size; (ii) lack of a clear association between the formulation of hypotheses and basic International Relations (IR) theories dealing with international cooperation; and (iii) lack of systematic quantitative analysis of the influence of variation in treaty design or in country characteristics on state participation levels in IEAs.

Overall, many of the conclusions relating to participation in IEAs are specific to the cases studied and cannot be generalized over the broader range of IEAs adopted internationally or of different types of political regimes worldwide. These studies therefore do not provide a systematic explanation of the influence of the heterogeneity of states, or of the variation in treaty provisions, on states' participation levels in IEAs. From a theoretical standpoint as well, many of the hypotheses being tested in the quantitative cross-national analyses mentioned above do not logically stem out from an application of the basic postulates of the main IR theories governing international cooperation.

Since participation in IEAs is a *sine qua non* of IEC premised on inter-state agreements, an understanding of the determinants of IEA participation becomes necessary for successful formulation and implementation of IEC. This study therefore proposes to enhance the research agenda on IEA participation by contributing empirical and theoretical insight into determinants of state participation in IEAs. The driving question of this research is as follows: Which state or treaty characteristics exert an influence on states' participation in IEAs? In addressing this

question, this study aims to fulfill three main objectives: (i) to formulate hypotheses for state participation in IEAs based on the theoretical underpinnings of IR theories; (ii) to provide a quantitative analysis of the influence of country characteristics on IEA participation; and (iii) to empirically analyze the influence of treaty variation on state participation levels in IEAs. The next sections delineate the research design and the implications of this study.

1.4 A Conceptual Model of State Participation in IEAs

A state's decision to participate in a particular IEA can be influenced by numerous factors, the most prominent being: (i) the science of global environmental change and the nature of the issue area; (ii) the state of the global environment; (iii) the dynamics of world politics and the nature of international negotiations pertaining to the IEA; (iv) the textual characteristics of the IEA adopted; and (v) the domestic conditions or characteristics of the state.

The level of scientific knowledge governing a particular issue area determines the salience of the issue area in both domestic and international politics and the strategies eventually arrived at for addressing the particular environmental problem. Numerous researchers have argued that scientific consensus and the involvement of effective epistemic communities tend to strengthen international commitments to relevant IEAs by sharpening agenda-setting and by the clear articulation of desired goals and objectives (Haas 1989 p. 398; Kolk 1996 p. 31; Krasner 1982 p.510; Weale and Williams 1998 p. 85).

The dynamics of international negotiations clearly impact the form that the IEA eventually takes. For instance, 'who' is negotiating 'what' is very important in shaping the nature and outcome of negotiations. The qualities and level of expertise of international negotiators have been deemed important in determining whether negotiations proceed smoothly or get mired by deadlocks and preventable delays (e.g. Citron 1989; Grunert 1989; Lundstedt 1989). Many

studies have been conducted on international environmental negotiations and researchers have recommended various negotiating strategies to secure wide participation in the instruments finally adopted by the negotiating group (e.g. Arend 1990; Barrett 1992a; Botteon and Carraro 1998; Carraro 1997; Chasek 2001; Dupont 1994; Laws 1990; Mautner-Markhof 1989; Susskind 1994; Tussie 2000a; Underdal 1998). Researchers have often broken down the negotiations process into various phases – a process often referred to as *phased process analysis* (Chasek 2001 p. 35). While many phases have been postulated in the literature (for a summary, see Chasek 2001 pp.38-49), a simple one is that provided by Porter and Brown (1991), who consider that the development of multilateral negotiations involves the following four processes: issue-definition, fact-finding, bargaining, and regime strengthening. Porter and Brown (1991) have further categorized negotiating states into four groups, depending on their stance and moves during international negotiations.[10]

In delineating the conceptual model underlying this study, I argue that the state of the world environment, the dynamics of world politics, the science of global environmental change, and issue area characteristics can be considered as inputs to the processes of international environmental negotiations, effectively impacting upon the bargaining strategies adopted and the compromises struck, and thereby determining the content of the final text adopted. Successful negotiations will result in positive codification of the consensus reached, with stronger

[10] Based on Porter and Brown's definitions, a 'lead state' demonstrates a strong commitment to foster international action on a specific issue, initiates the process of negotiations, makes proposals for an IEA and tries to enlist the support of other states. A 'supporting state' can demonstrate strong commitment during the initial phases of negotiations or it can be relatively non-committed in the beginning and subsequently moves towards stronger support. A 'swing state' generally lacks enthusiasm for a particular IEA and, as such, often requests for significant compensation before it supports the cause of the IEA. Finally, a 'veto state' is a state which opposes the IEA either through inflexibility during the negotiations or by failing to respect the treaty clauses during the implementation phase. Porter and Brown (1991) have documented in detail the different roles played by various countries in the negotiations pertaining to eight main areas – *viz.* acid rain; ozone depletion; whaling; trade in ivory from African elephants; international toxic waste trade; Antarctic minerals; global warming and destruction of tropical forests.

agreements among the negotiating group resulting in strong clauses and contentious debates resulting in weak or ambiguous provisions. The *content* of IEAs, therefore, reflect, more or less, the parameters governing international environmental negotiations, merely by virtue of the fact that IEAs are essentially a *product* of international environmental negotiations.

Since the content of IEAs reflects the dynamics of international negotiations preceding the adoption of the IEAs, rules governing model-building allow me to make certain assumptions and simplifications for isolating the determinants of state participation in IEAs. Considering the IEA as a negotiation outcome and the clauses of the IEA as reflective of the nature and dynamics of negotiations, I treat as exogenous the various inputs that directly impinge on and determine the processes of international environmental negotiations, and focus on the end-product of international environmental negotiations – *viz.* the IEA *as adopted by the international community.* Through this process, I isolate two possible types of explanations for the varying participation levels in IEAs. The first deals with the structure of the IEAs, and the second relates to country conditions (Figure 1).

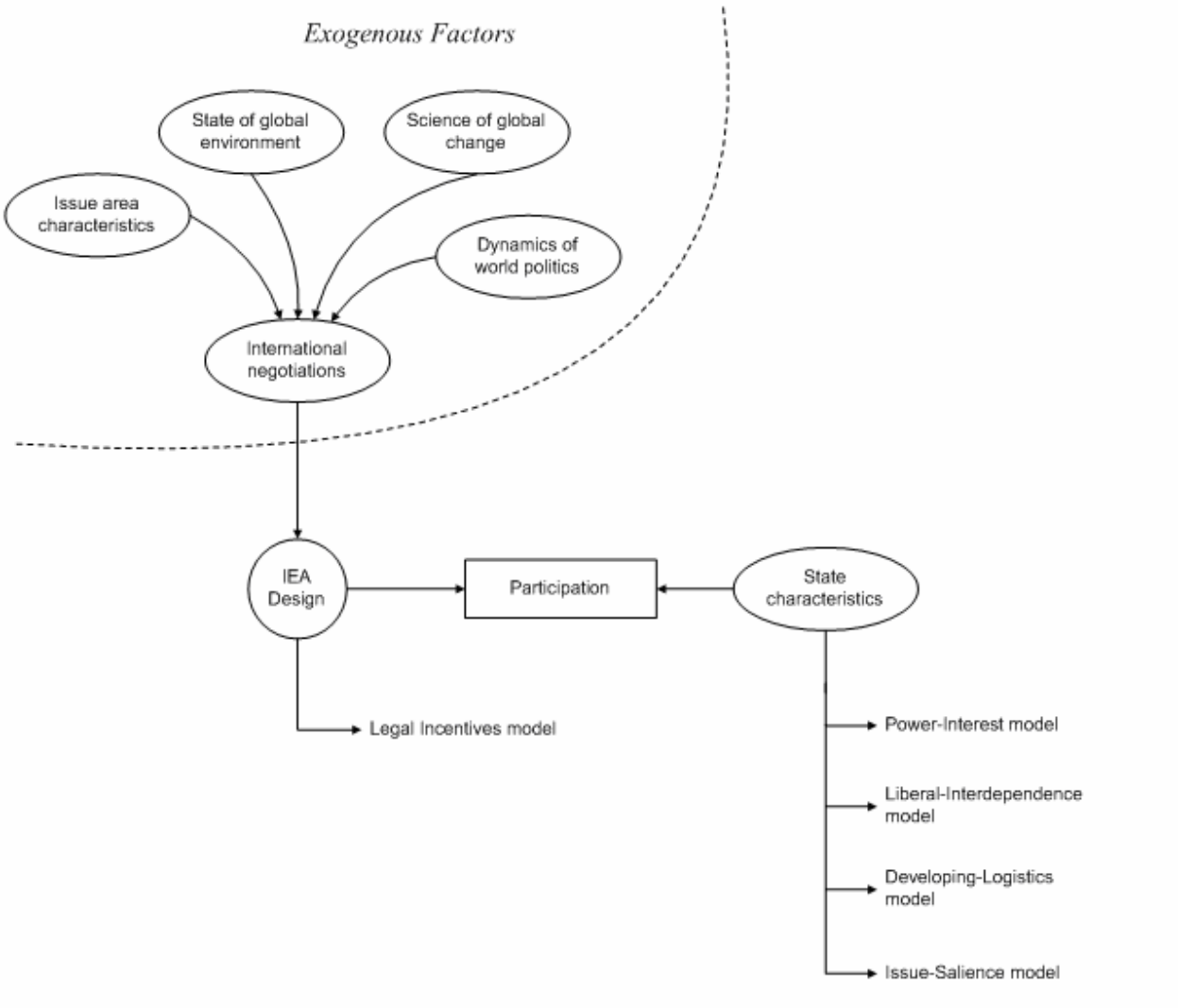

Figure 1: Conceptual Model for Participation in IEAs

This study seeks to provide answers to the following questions: (i) Which state characteristics can account for the variation observed in the level of state participation in IEAs worldwide? and (ii) Which treaty clauses act as incentives (or disincentives) for state participation in IEAs? The dependent variable is 'participation in IEAs,' where participation is defined as ratification, accession, approval, or acceptance (as in Section 1.2 above). This research is not focused on delineating why states participate in *particular* IEAs or *why* IEAs take on different forms. Rather, the study aims to provide an understanding of why some states

participate in IEAs *to a greater (or lesser) extent* than other states, and *whether* the various legal forms of IEAs influence the level of participation sustained by the IEAs. As I later discuss in more detail in Chapter Four, I propose five models to capture the potential relationships, as detailed below (Figure 1).

In order to delineate the influence of potential determinants of state participation in IEAs, I make use of basic concepts governing international cooperation to formulate hypotheses relating a state's level of participation in IEAs to its domestic characteristics. Using the premise of Realist and Liberalist theories on international cooperation, especially those strands which emphasize the national-international linkages (e.g. Bueno De Mesquita *et al.* 1991; DeSombre 2000; Leeds 1999; Owen 1994 p.926; Putnam 1988; Solingen 1994; Sterling-Folker 1997), I posit specific associations between identified potential determinants and participation in IEAs.

The first model, *the legal-incentives model*, is meant to capture the influence of variations in treaty design on participation levels in IEAs. This model relies on the literature on IEC dealing with the design and structure of IEAs. This model predicts that IEAs which secure higher participation rates are those which: (i) are more flexible, (ii) have weaker provisions, (iii) have provisions for capacity-building, and (v) are transparent. Moreover, since it has generally been postulated that the legal provisions of IEAs exert a differential impact on developing countries as compared to developed countries, this model will empirically verify the conditions (e.g. presence of financial transfers) under which this statement is validated (or contested).

The second model, the *power-interest* model, reflects arguments made by the Realist school of thought that states enter into treaties only if the latter enhance their power potential or reduce their threats and insecurities. This general line of thought predicts that a state will participate in more IEAs if it (i) has a high level of industrial production and economic

development; (ii) is politically stable; (iii) has small natural resource base and small extent of raw materials; (iv) has a high level of environmental vulnerability; and (v) a low military power.

The third model, the *liberal-interdependent* model, relies on neoliberal institutionalist literature pertaining to interdependence and institutionalism and focuses on the influence of global economic trade flows, the role of civic engagement, and the domestic political and institutional structures of countries as variables influencing their international behavior. This model predicts that a state will participate in more IEAs if it: (i) is democratic; (ii) has a high quality of life; (iii) has a liberal economy; (iv) has strong environmental institutions; (v) has high volumes of trade; and (vi) has a high level of civic environmentalism.

Scholars contend that the current development paths of developing countries imply that the latter will be the greatest contributors to global environmental problems in the future, and hence there is a need to enlist their participation for success in implementing global environmental protection measures. While the importance of securing the participation of developing countries in IEAs is easily acknowledged, there is no comprehensive empirical work done to analyze the dynamics of developing countries' participation in IEAs. Why do some developing countries participate in more IEAs than others? Are there structural constraints endemic to the developing countries which prevent them from participating in IEAs? The fourth model, the *developing-logistics* model, further deepens the framework of second image theorizing by focusing specifically on the domestic constraints influencing the participation of developing countries in IEAs. This model is deemed necessary in view of the fact that developing countries face special challenges such as high dependence on foreign aid and high levels of malnutrition, which typically are not present in the developed world. An analysis of variation of participation *among* developing countries can thus provide insight into which of

such socio-political or economic challenges exert overriding influence on the levels of participation of developing countries in IEAs. This model predicts that the developing countries which will participate in a greater number of IEAs are those that: (i) have a low level of corruption; (ii) suffer from a low level of social challenges such as malnutrition, poor sanitation, or infant mortality; (iii) are more democratic; and (iii) have a low amount of dependence on foreign aid, *inter alia.*

Finally, this analysis hopes to move beyond the confines provided by an exclusive focus on either the Realist or the Liberalist framework, and aims to arrive at an integrated explanation for participation in IEAs, based on the various models delineated above. Can we explain participation in IEAs merely from the realist or liberalist framework, or is it subject to an interactive framework, whereby both realist and liberalist determinants interact? Can the subject of IEA participation function as a bridge between realist and liberalist concerns? The fifth model of this study, the *interactive model*, attempts to bring crucial factors from the power-interest, the liberal-interdependent, and the developing-logistics models together to arrive at such an integrated and synthesized understanding of state participation in IEAs.

As explained in further details in Chapter Five, the design of this study follows a quantitative approach, relying on the technique of multiple linear regression to determine associations between the dependent and independent variables. For model I, the unit of analysis is the IEA, and the dependent variable is the total participation rate sustained by the IEA. Further, to investigate whether treaty design impacts developing country participation differentially from that of developed countries, the model is also run with two other dependent variables: the total participation rate from developed countries, and the total participation rate

from developing countries. For models II, III, IV and V, the unit of analysis is the state, with the dependent variable being the total number of global IEAs in which the state has participated.

Data for this study was compiled from the ENTRI database of SEDAC/CIESIN. The ENTRI database provides basic information for 464 treaties. However, not all the treaties can be classified as 'environmental' and many of the IEAs are regional in scope. The database was thus parsed out to delineate the global IEAs from the regional ones. 110 of such global IEAs were identified, spanning the period from 1921 to 1998 (see Annex 2). The level of participation of each country across these IEAs, as compiled from membership data available for each of the treaties, provides the dependent variable for the models. The total number of countries included in the dataset for this study is 196, with 152 developing countries and 44 developed nations.

Model I relies on extensive content analysis for the coding of the IEAs based on specific treaty characteristics. Content analysis of the full range of the 110 identified IEAs was beyond the scope of this present study. In view of the time and resources constraints governing the present study, a sample of the IEAs was selected for Model I. In order to maximize the probability of having a normal distribution for the multiple linear regression analysis, a total of thirty-one IEAs was selected (Annex 3). Selection bias was minimized by choosing roughly the same number of IEAs dealing with various issue areas, and including an almost equal number of framework conventions and protocols (see Section 5.3).

1.5 Implications of study

This research consolidates previous efforts made to determine the factors that tend to enhance (or decrease) states' participation in IEAs. In this sense, this study directly addresses the following stipulations of Agenda 21:[11]

> "To identify and address the difficulties which prevent some States, in particular developing countries, from participating in or duly implementing international agreements or instruments…
> To promote and support the effective participation of all countries concerned, in particular developing countries, in the negotiation, review and governance of international agreements and instruments…"

This research will be immediately useful for its contribution in providing empirical validation (or contest) of many general and unsubstantiated statements which have been made regarding countries' participation in IEAs, and to identify variables, hitherto not investigated, which impact participation in IEAs. Undertaking this study will also help to fill gaps in the literature (as identified in the introductory section) dealing with participation in IEAs, and addresses the calls for future research into IEA participation, as made by Breitmeier (1996), Sprinz and Vaahtoranta (1994), Keeley (1990), Helm(2000b) and Carraro (1999), *inter alia,* by providing a systematic large-n analysis of both country and IEA characteristics.

Since IEAs function as a primary instrument which allows nations to cooperate on international environmental matters, a study on participation in IEAs can therefore contribute to our understanding of the dynamics and determinants of IEC. Moreover, apart from being an important precursor of IEC, participation in IEAs also acts as an important *indicator* of the success of IEC, and several researchers have utilized participation in IEAs as a proxy for international environmental commitment (Dolsak 2001; e.g. Neumayer 2002a p. 146; also Neumayer 2002b). Participation in IEAs can thus capture the success of IEC and provide an indication of the commitment of nation states to a particular set of rules and regulations directed

[11] Agenda 21 is a document that was adopted during the Rio Conference in Brazil in 1992. Source of quote: Sections 39.3(a) and 39.3(c) of Agenda 21, accessible online at http://www.un.org/esa/sustdev/documents/agenda21/english/agenda21chapter39.htm

towards a particular aspect of international environmental protection. Especially in this era where global environmental change is occurring at an unprecedented rate (as further expounded in Chapter Two), understanding the determinants of IEC remains imperative.

As discussed later in Chapter Two, I also argue that participation in IEAs should also be significant for the effectiveness of international environmental policies. There can be no compliance and ultimately no implementation of the international strategies embodied within IEA texts if there is an inadequate level of international participation in IEAs. An understanding of participation incentives can thus link directly with the possibility of compliance, and hence ultimately, on treaty effectiveness. My argument is that if there are domestic structural constraints which prevent a state from participating in an IEA, the same variables will, in all likelihood, negatively impact on the implementation and hence effectiveness of the IEA. The logic is simple enough: if we do not have widespread participation, we cannot hope for widespread implementation and therefore strong effectiveness. Participation lies at the foundation of any desired level of implementation and effectiveness.

Furthermore, the successful implementation of new market mechanisms within some recent IEAs (such as the Montreal Protocol (MP)[12] or the KP) rests heavily on the meaningful participation of *both* the developed and developing countries. In the case of the KP, for example, the success of the 'clean development mechanism' (CDM), whereby developed parties can earn emission credits through emission reduction programs in developing parties, is premised on the participation of the latter. Without the willingness of developing nations to open their production processes to the modalities of the CDM, overall global emissions of greenhouse gases (GHGs) will not be successfully (and perhaps significantly) reduced, while developing nations will continue on their unsustainable paths of development. As provided by the KP, the CDM not only

[12] Full title: Montreal Protocol on Substances That Deplete the Ozone Layer.

allows for the reduction of GHGs in developing nations by developed states, but it also allows for developed nations to provide the necessary know-how and technology transfer for developing nations to implement more environmentally sustainable paths of development.

Though it is not within the scope of the present study to fully test and develop a general theory governing IEC, it is hoped however that the present study will aid towards the development of such a theory in later research activities. This study hopes to catalyze the process by identifying crucial variables from the two main IR theories on international cooperation *viz.* Realism and Liberalism, and to integrate these determinants in an integrated model which views IEC as emanating from both power and institutionalist concerns.

This study will also have important implications for policy prescriptions regarding international environmental policies as it will empirically verify the influence of key state variables on a state's decision to participate (or not) in a particular treaty. Variables acting to reinforce participation in IEAs can be considered as an ideal set to be achieved globally for optimal global environmental protection. Global environmental strategies may thus need to be integrated with policies aimed at improving domestic conditions such that the ideal set of domestic variables is achieved worldwide. Similarly, variables acting as constraints need to be managed such that they no longer exert their constraining force on participation in IEAs. This may likely require policies aimed at strengthening political development, resolving social challenges, altering the modalities of international transactions to make them more environmentally friendly and more conducive to promoting international environmental cooperation, or empowering domestic groups, *inter alia.*

Finally, this research will be valuable to treaty negotiators and drafters who are interested in carving out treaty texts that will be most acceptable to as wide an audience as possible. With a

full understanding of which treaty clauses act as incentives and disincentives for participation, negotiators can strike out the right balance, through protracted and positive discussions, for unwilling parties to commit to the codified environmental standards. Such balance may be achieved, for example, by the right mix of financial and technology transfer, capacity building, and trading of emissions, *inter alia.*

1.6 Conclusion

The study of participation in IEAs is still an under-studied field, suffering from the lack of rigorous empirical analysis as well as from insufficient theoretical construction for the various determinants of participation. In this chapter I have expounded the research question for this study, which is as follows: Which country or treaty characteristics exert an impact on a state's participation in IEAs? I have established a general conceptual model to understand the various interactions that can exist among the factors influencing participation. I have also proposed five different models to analyze the influence of specific country and treaty variables on IEA participation.

I provide in the next chapter an overview of the reasons why my dependent variable, participation in IEAs, is legitimate and relevant as an element of investigation and why the topic of participation needs to be taken seriously in analyzing IEC. In Chapter Three, I provide a literature review of the research status in the field of IEA participation. Based on the literature review and relying on the main theories governing international cooperation, I formulate in Chapter Four the general hypotheses underlying this research. Chapter Five expounds on the research design, the analytical templates and a general discussion of the results of the study. Chapter Six presents a general conclusion of the study.

2. WHY STUDY PARTICIPATION IN IEAs?

Increasing participation in treaties concluded by the international community has always been deemed "desirable."[13] Participation in IEAs was a constant theme in the 1992 United Nations Conference on Environment and Development (UNCED), commonly referred to simply as the Earth Summit, or the Rio Conference. Agenda 21, a forty-chapter Plan of Action for global environmental protection adopted during UNCED, recognizes the "essential importance of the participation in and the contribution of all countries…to treaty making." [14]

The importance of securing wide participation in IEAs has also been underlined by Maffei *et. al.* (1996). In the preface to their book *Participation in World Treaties on the Protection of the Environment,* Maffei *et. al.* (1996) note that "[t]oday, wide participation in international treaties for the protection of the environment – and in particular of developing countries – is perhaps even more important than the conclusion of new treaties." Furthermore, from an International Law perspective, a high level of participation is important since it increases the probability that the specific treaties may "take on the stature of customary law" (Vig 1999 p.25) or may "generate customary international law upon coming into force" (Carr and Scott 1999 p. 314).

The purpose of this chapter is to explicate the reasons why I consider that participation in IEAs needs to be studied. In the following sections, I argue that participation is important in view of its association with several other crucial variables of IEC and global environmental protection.

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[13] Report of the International Law Commission on the work of its fifteenth session, May 6-12July 1963. ILC Report, A/5509 (A/18/9), 1963, Chapter III, paragraphs 18-50. Also available at www.un.org.

[14] Agenda 21. Chapter 39. *International Legal Instruments and Mechanisms. Section 39.1(c)* http://www.un.org/esa/sustdev/documents/agenda21/english/agenda21chapter39.htm

More specifically, I advance that there are four main reasons which make an analysis of determinants of state participation in IEAs necessary. First, I argue that participation in IEAs is important because of the urgent need to address *environmental change which is occurring at an increased rate and on an enlarged scale.* Second, I consider that the *complex and interdependent nature* of global environmental issues requires that participation in IEAs be optimal. Third, I posit that the evolution of the dangers posed to our *security* through the processes of environmental degradation and environmental scarcity mandate that the international community cooperate globally to address the impending dangers. Fourth, I argue that participation is important for the successful *operation* of IEAs (see Figure 2). Further details on these issues are presented in the next sections.

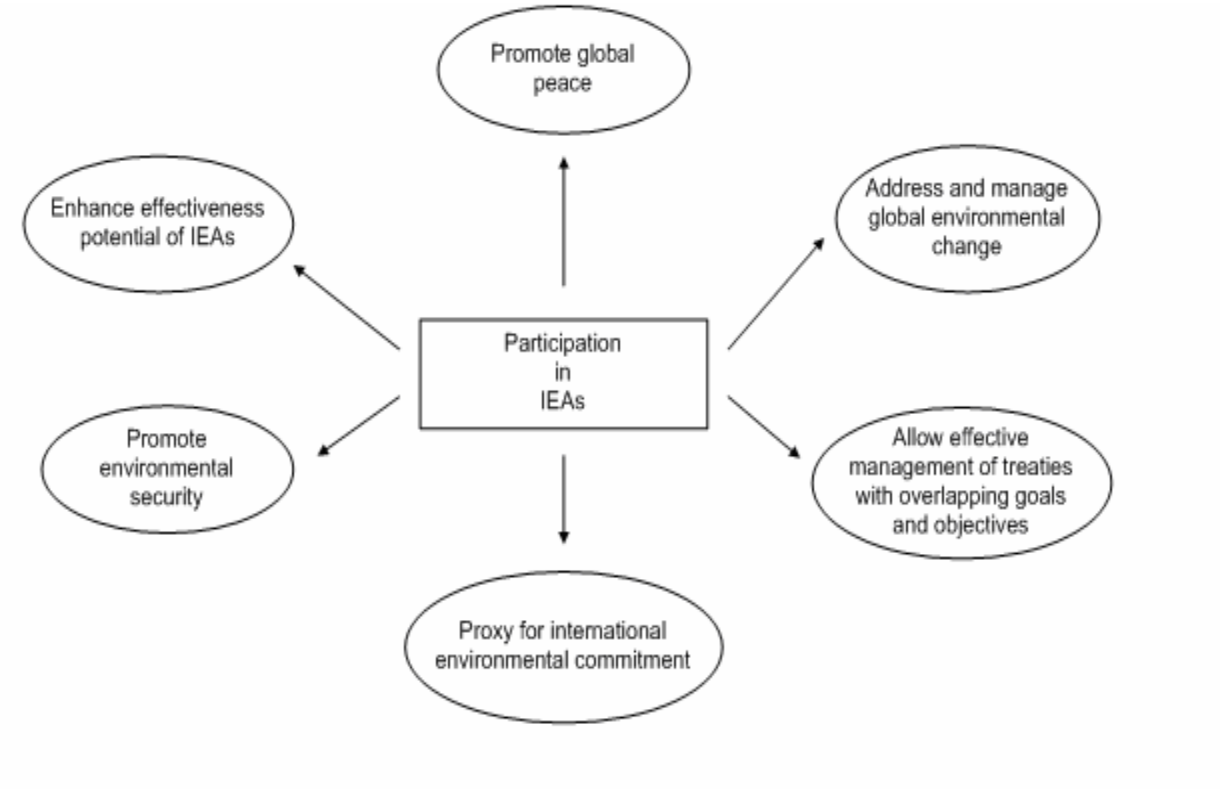

Figure 2: Link of Participation in IEAs with other Variables

2.1 Rapid and Expansive Onset of Environmental Change

At a very basic level, the upsurge in the number of IEAs over the past few decades can be related to our greater understanding of global environmental processes and risks, and to the phenomenon of *global environmental change*. On the international political agenda today, discussions about global environmental change normally pertain to such issues as global warming and climate change, deforestation, stratospheric ozone depletion, desertification, loss of biodiversity, marine water pollution, and acid rain, *inter alia.*

Though environmental change *per se* is not a new event, with the present structure of the world being completely different from that which existed some 300 million years ago (Kutzbach 1989; Mannion 1999 pp. 1, 11; Williamson and Liss 1996 p.29), what is of concern today relates to three dimensions of the processes of environmental change – namely, (i) the pace of the change; (ii) the scale of the change; and (iii) the agent of the change. Environmental change in this era is occurring at an increased pace, with a shift in gear from ecological or geological time to 'human time.' Whereas environmental change was happening over the span of geologic time in the past, nowadays the time duration can be counted only in centuries or decades, and it is impossible to adapt to such tremendous changes over short time intervals. According to Hidore (1996), plant and animal species are becoming extinct at a rate of 24 to 400 species a day and we may be losing as many as 6000 species of plants and animals a year. As cited in Wood (2000), a 1999 World Wildlife Fund (WWF) report considers that the world has lost thirty per cent of its natural wealth from 1970 to 1995. In his book *Climatic Change and Human Society,* Ian Whyte (1995) states that since the early nineteenth century, carbon dioxide levels have risen by around

25 per cent from around 280 ppmv[15] to about 355 ppmv, a figure which has not been reached in the last 160,000 years.

The scale dimension of environmental change relates to the impacts of such change, which have the potential of being reverberated throughout the whole planet. In other words, the impacts are *global* or "*systemic"* (Turner *et al.* 1990 quoted from Kasperson, 2001 p. 2), implying that environmental change in one particular area has the capability of influencing environmental conditions throughout the whole global system. It is for these reasons that global climate change or ozone depletion is considered to be looming threats for the whole planet (see Section 2.4 below).

The third dimension of environmental change pertains to the source of the changes. One of the main characteristics of contemporary global environmental problems is that they can mostly be classified under Hidore's (1996) concept of "anthropogenic change,"[16] which alludes agency to human activities (Blowers and Leroy 1996 p. 259; also DeFries and Malone 1989). For example, though global climate change can occur from several natural processes (e.g. from the changes in Earth's rotation around the Sun or from the changes in oceanic circulation – see Mannion 1999 p. 29), it is generally acknowledged that the release of carbon dioxide from anthropogenic activities is the major driving force for the increased levels of carbon dioxide in the atmosphere (e.g. IPCC 1995).[17] Loss of biodiversity has also been related to anthropogenic activities resulting in the destruction, alteration and loss of the natural habitats of species (Wood

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[15] *i. e.* parts per million by volume.

[16] Hidore (1996) classifies global environmental change into the following categories, based upon the various time duration: (i) *persistent change,* which takes place steadily for millions of years – for example, the slowing of the rate of rotation of the Earth and the resulting longer days; (ii) *rhythmic change,* such as the changes produced by the revolution of the moon about the earth; (iii) *cyclical phenomenon,* such as droughts which recur at regular intervals and with varying intensities; (iv) *short-lived events,* such as lightning, earthquakes, landslides and avalanches; and (v) *anthropogenic change,* resulting mostly from the explosion in human population and from the tremendous progress made in technology.

[17] Intergovernmental Panel on Climate Change (IPCC).

2000 p.5). Blowers and Leroy (1996 p. 259) thus aptly describe the processes of "environmental globalization" as emanating from the anthropogenic "diffusion of sources," which relates to the spread of pollution through industries, technologies, and export of hazardous wastes, *inter alia,* as well as through the natural processes of the "unevenness of impacts," which occur naturally through air, water and the atmosphere. Blowers and Leroy (1996 p. 259) also point out that events which seem to be 'natural' at first sight often end up as being of anthropogenic origin on closer examination.

This general consensus on human agency as a main impetus for global environmental change has resulted in a critical look at man's production and consumption patterns, with special focus on the possible repercussions on the carrying capacity of the planet, the ecosystem impacts of economic policies, and the implications for the health and the survivability of the human species on the planet (see Section 2.4).

2.2 Complex and Interdependent Nature of Environmental Issues

It is almost uncontentious to state that problems such as ozone depletion or global climate change require a systemic approach and a global focus for effective global environmental protection. Researchers routinely agree that there is need for a holistic perspective in carving out strategies to address global environmental issues. This need for a global commitment strategy is engendered primarily by the *nature* of the world environment and of the global environmental problems. Typically, global environmental problems demonstrate such characteristics as global interdependence, transboundary impacts, synergistic effects between various issue areas, and the international corollaries of domestic policies, *inter alia.* The world environment in fact performs as one big interdependent system, where the air and water masses mix and interact with each other. Kupchella and Hyland (1986) say it best:

> …"Without labels and national boundaries it is easier to see that the world is one big system, one thin layer of atmosphere, one enormous ocean into which all rivers drain, one resource of minerals that all living beings must share."

Global interdependence, in so far as environmental issues are concerned, has been amply manifested by the transboundary impacts of air or water pollution. The 1986 Chernobyl accident demonstrated irrevocably that pollution is not restricted by jurisdictional or geographical boundaries. Radioactive fallout spread across former Yugoslavia, France, Italy, Germany, Scandinavia, and even North America (Cunningham and Saigo 1990). The pervasive nature of environmental pollution was also tragically established by the 1984 Bhopal disaster, which claimed thousands of lives in Bhopal, India, through the accidental leakage of the poisonous gas methyl isocyanate from a Union Carbide pesticide plant operating in the area. And of course, modern problems such as global climate change or stratospheric ozone depletion will not be restricted to any one particular region, but will affect the whole Planet. As noted by Harris (2001 p. 26), "global environmental change is one of the most profound manifestations of globalization."

Environmental problems are also typified by close interlinks and mutual interactions among each other. Global warming, for example, is influenced both by the severity of deforestation and the levels of stratospheric ozone depletion, the latter mostly because chlorofluorocarbons (CFCs), an ozone-depleting substance (ODS), also act as a GHG (Barrett 2000 p.123; Schmidt 2000 p. 16). Global warming, on its part, with its manifestation in a rise in sea level and an increased frequency of extreme weather, can cause nefarious impacts on aquatic ecosystems and population, such as the Atlantic salmon population.[18] Salmon stocks can also be

[18] NASCO. *Ten Year Review of the Activities of the North Atlantic Salmon Conservation Organization, 1984-1994.* p.11

negatively impacted through the acidification of the salmon habitat.[19] Further, deforestation can catalyze processes of soil degradation and biodiversity loss (Ross 1996 p. 166).

This close-knit interaction among various elements of the environment is further strengthened by the fact that domestic policies in a remote area can potentially exert an impact on the global environment. Several researchers have attempted to elucidate the various interconnections that exist between domestic environmental policies and global environmental or economic conditions (e.g. Carraro and Metcalf 2001 p.8). Nash (2000 p.241-249), for example, has detailed the interrelationships that exist between domestic transport policies and regional acid rain problems or global warming. Likewise, Barrett (2000 p. 123) has established interconnections between policies relating to land use or forestation and the extent of climate change.

Given this interlinked nature of environmental issues, sporadic regional implementation strategies or selective participation in IEAs may not serve the basic purpose of global environmental protection and conservation, even though the participating countries may be highly committed to resolving the issues. However, due to the different stringency levels of national environmental regulations, the different levels of economic and industrial development, and the varying extent of natural resource endowments, securing the participation of a specific country or a specific group of countries may prove crucial for the success of a particular IEA. If the majority of states participate in an IEA while the greatest contributor to the specific environmental problem shies away, the efforts of the majority may not be sufficient to effectively address the environmental problem. For example, the non-participation of US in the climate change regime means that around 23% of the global emissions of carbon dioxide (the

[19] Ibid. p. 14.

share of US's carbon emissions) will remain outside the purview of the control measures of the climate regime.

This difficulty has not gone unnoticed by IEA negotiators. In order to cater to this problem of potential hold-outs from countries which matter most in addressing a specific environmental problem, some IEAs (e.g. MARPOL 73/78[20] or the KP[21]) specifically require that stakeholders having significant leverage in the environmental issue become parties to the IEAs *before* these can enter into force. However, though some treaties require participation from major stakeholders before entry into force, the participation of lesser contributors to the environmental problem will still need to be promoted. Most countries are on a path of material progress which relies on high levels of industrial development and which, in the process, generate high levels of pollution. Even though some countries may matter more than others in some specific issue area *for the present,* the situation will likely change in the future decades. As the environment is always in flux, adopting a short-term perspective, whereby only those states which matter most right now are given attention, is bound to lead to ineffective global environmental protection policies. To prevent future deterioration of the global environment, a proactive stance needs to be adopted to mitigate and abate future sources of environmental pollutants emanating from countries which do not matter right now, but which will in the future. A global strategy is therefore mandatory to address environmental problems which are global in scope.

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[20] MARPOL 73/78 required ratification from at least fifteen States, the combined merchant fleets of which would constitute at least 50% of the gross tonnage of the world's merchant shipping, before the convention could enter into force.

[21] Article 25(1) of the KP reads: "This Protocol shall enter into force on the ninetieth day after the date on which not less than 55 Parties to the Convention, incorporating Parties included in Annex I which accounted in total for at least 55 per cent of the total carbon dioxide emissions for 1990 of the Parties included in Annex I, have deposited their instruments of ratification, acceptance, approval or accession." Text of the KP is available online at http://unfccc.int/resource/docs/convkp/kpeng.html.

2.3 Environmental Security

In recent years, several researchers have called for a reconceptualization of 'security' in view of the potential for the eruption of conflict generated by environmental scarcity or environmental degradation (e.g. Birnie 1988; Bjorkbom 1988; Brock 1991; Gleick 1993; Hauge and Ellingsen 2001; Homer-Dixon 1991; Mathews 1989; Matthew 2000; Von Moltke 1988). According to Brunnee and Toope (1997), scarcity of resources, especially ones which can easily be degraded or exhausted, has the potential of causing subnational conflict or of negatively impacting on governmental structures and the lives of citizens. This links with Ullman's (1983 p.133) definition of a 'security threat' as constituting a potential for degradation of the quality of life and a limitation on available policy choices.

Apart from the above conflict-related concept of environmental security, environmental degradation also poses risks in terms of the *survivability* of life on the planet. Official institutions are increasingly recognizing this survival-based concept of environmental security. A July 2000 report of the Army Environmental Policy Institute (AEPI) recognizes that environmental security is not restricted to the prevention of damage from war, but also includes threats induced by ignorance or mismanagement of socio-economic activities, terrorism, migration and natural disasters. The report lists thirty-two examples of environmental security threats, among which feature: ozone layer depletion, global climate change, biodiversity loss, deforestation, desertification, soil erosion, radioactive waste management, oil spill, and water scarcity.[22] Other potential triggers of environmental dangers identified in the literature include, *inter alia,* transborder flows of hazardous substances; transboundary air or river water pollution; health impacts from toxins in food chain; decline in natural capital base (e.g. timber, oil, genetic

[22] Joe B. Sills, Jerome C. Glenn, Theodore J. Gordon, Renat Perelet. July 2000. *Environmental Security: United Nations Doctrine For Managing Environmental Issues In Military Actions.* Volumes I. Army Environmental Policy Institute. AEPI IFP 0700A. Page 9.

diversity, water); and the phenomenon of environmental refugees (Barnett 2001 pp. 68, 69; DeSombre 2002 pp. 32, 33; Kolk 1996 p. 25; Matthew 1999 p.156).

Starting from the other end of the spectrum, some scholars have analyzed the environment-security nexus from a peace perspective, which postulates that environmental cooperation can generate international peace. This falls in line with the general finding regarding the inverse relationship between war occurrence and participation in treaties. Quoting the study conducted by Faber and Weaver (1984) on European politics from 1815 to 1915, Vasquez (1998 p. 305) notes that the occurrence of war was found to be inversely related to states' participation in conferences and treaties. In the same spirit, Brock (1991 p. 408) notes that the environment has become "a firmly established item" on the agenda of peace research, with environmental change regarded as a factor spurring international cooperation and thereby reducing conflicts. Brock (p.413) sees environmental cooperation as "a means to build peace," similar to the Baltic Sea regime, which was instrumental in strengthening East-West cooperation. Brock (p.414) in fact establishes "a functional equivalence" between war and environmental depletion, with environmental degradation having the same potential as war in terms of causing loss of lives, and "negating the claim of national integrity and self-determination." The idea that IEC can bring about peace has been further elaborated by Conca (2001 pp. 230-245), who considers that environmental cooperation can trigger and solidify peace through reducing uncertainty, promoting "diffuse forms of reciprocity," strengthening the 'shadow of the future,' creating new forms of interdependence, promoting new norms, strengthening transnational civil society, and increasing transparency and accountability of governmental institutions (also Conca and Dabelko 2002).

Based on the arguments presented above regarding the security risks posed by environmental scarcity and degradation, a cooperative framework for international environmental protection seems promising as a way to save lives and promote peace. IEAs, by virtue of their ability to generate and sustain IEC, stand out as a major tool for enhancing global environmental protection. Widespread participation in IEAs therefore has implications for peace promotion. As per a 1999 report of the North Atlantic Treaty Organization (NATO) on environmental security:[23]

> Taking preventive action on environmental stress thus is the most appropriate approach to preventing environmental conflicts. Such preventive action is needed at all levels, but given that environmental stresses tend to be rooted in transboundary, regional and global environmental problems, *international and regional environmental agreements play a particularly important role in preventing environmental conflict* [emphasis added].

2.4 Operation of IEAs

2.4.1 Effectiveness of IEAs

International negotiators and treaty drafters usually devote lots of attention and energy to ensuring maximum participation in the treaties being negotiated. Implicit in such endeavors is the notion that participation matters for the ultimate effectiveness of the treaties. Ensuring near global participation in IEAs is the first necessary step towards guaranteeing widespread IEC and effective implementation of international environmental policies. Participation thus acts as a necessary precursor for the successful implementation of international environmental strategies. As stated by Barrett and Stavins (2003 p. 350), "successful implementation requires effective promotion of compliance and *participation* [emphasis added]."

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[23] NATO. Committee on the Challenges of Modern Society. 1999. *Environment & Security in an International Contex*t. Report 232. Brussels, Belgium. Quoted from Joe B. Sills, Jerome C. Glenn, Theodore J. Gordon, and Renat Perelet. July 2000. *Environmental Security: United Nations Doctrine For Managing Environmental Issues In Military Actions.* Volumes I. Army Environmental Policy Institute. AEPI IFP 0700A. Page 9.

In the IEA implementation time-frame, participation directly influences the effectiveness *potential* of IEAs. In realization of this, many treaty secretariats regularly emphasize the desirability and often, the *necessity*, of securing maximum participation in the relevant treaties. As stated by the Secretariat for the Convention on the Conservation of Migratory Species of Wild Animals (CMS):[24]

> Agreements concluded under its [CMS] auspices *will show positive results only if a large number of countries whose borders are regularly crossed by migrating animals are bound by common conservation commitments.* For this reason, the conference strongly encouraged more countries to join the Convention, in order to assume their share of the global responsibility for conserving migratory wild animals [emphasis added].

The Governing Council of the United Nations Environment Programme (UNEP) regularly encourages states to ratify or accede to the various treaties falling under its aegis.[25] Similarly, the Conference of Parties (COPs) or other regular meetings of treaty bodies often function as an avenue for treaty bodies to call for increased participation in the relevant treaties. During the 1992 COP of the Basel Convention[26] in Uruguay, for example, the Conference invited "all States who have not done so to become Party to the Basel Convention."[27] Likewise, in an attempt to ensure greater participation in the Ramsar Convention,[28] the COP negotiated a

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[24] Source: UNEP/CMS Secretariat. *Governments Reinforce Species Conservation Efforts. Bonn Convention World Conference Highlights serious threats for the survival of migratory animals.* Also see: UNEP/CMS Secretariat. 24 March 1997. *Review of Article IV: Agreements Concluded Or Under Development.* Report presented at the Fifth Meeting of the Conference of Parties of the Convention on the Conservation of Migratory Species of Wild Animals, Geneva 10-16 April 1997. UNEP/CMS/Conf. 5.9.

[25] See, for example, the 22nd session of the UNEP Governing Council, held in Nairobi, Kenya from 3-7 February 2003, during which delegates were invited to ratify or accede to the Rotterdam and Stockholm conventions. (Source: *UNEP Governing Council takes a number of chemicals-related decisions.* ENB Linkages, www.iisd.ca/recent/recentmeetings)

[26] Full Title: Basel Convention On The Control Of Transboundary Movements Of Hazardous Wastes And Their Disposal (22 March 1989, Basel). Text available online at http://www.basel.int/text/con-e.htm

[27] Decisions Adopted by the First Meeting of the Conference of the Parties to the Basel Convention in Piriapolis, Uruguay on 4 December 1992 Decision I/17 (http://www.greenpeace.org/~intlaw/baseldec.html 11/6/97)

[28] Full title: Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar, 1971).

protocol[29] to the main treaty to include French as authentic language (apart from English) so that France may be enticed to ratify the treaty. The protocol reads:

> The Contracting Parties,
> CONSIDERING that for the effectiveness of the Convention on Wetlands of International Importance especially as Waterfowl Habitat, done at Ramsar on 2nd February 1971 (hereinafter referred to as "the Convention"), *it is indispensable to increase the number of Contracting Parties,* AWARE that the addition of authentic language versions would facilitate wider participation in the Convention…" [emphasis added].

Participation also enhances IEA effectiveness by reducing the vulnerability of the IEA to the potential negative impacts on the IEAs caused by the behavior of non-participants (see Section 2.5.3 for the related problem of free-riding). A concrete example of the negative impacts of non-participating states' behavior on the sustenance of a regime is provided by the case of the North Atlantic Salmon Conservation Organization (NASCO). In 1990, NASCO had to develop special protocols for adoption by *non-Contracting parties* as the latter were fishing for salmon in the Convention Area, thereby undermining the conservation efforts of NASCO parties.[30]

Finally, as mentioned in Section 1.6, the effectiveness of many new market-based incentives within the most recent IEAs relies on the participation of both the developed and developing nations. There can be no successful implementation of the CDM of the KP without commitment to the process by developing nations. Apart from the CDM, the KP also provides for two other market-based incentives: Joint Implementation (JI) and emissions trading. Both JI and emissions trading provide for developed nations to earn or acquire credits through emission reduction programs within other developed nations. Without the participation of the majority of states in these three market mechanisms, effective implementation of the KP will be substantially arrested.

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[29] Protocol to Amend the Convention on Wetlands of International Importance especially as Waterfowl Habitat known as the Paris Protocol, adopted at the Extraordinary Conference of the Contracting Parties, Paris, France, 2-3 December 1982. http://www.ramsar.org/key_paris_protocol.htm

[30] NASCO. *Ten Year Review of the Activities of the North Atlantic Salmon Conservation Organization, 1984-1994.* Page 4.

2.4.2 Overlap and interdependence among treaties

Wide participation in IEAs is rendered crucial by the fact that many treaties often regulate the same environmental parameters – especially those for the protection of fauna and flora, or marine water protection. For example, the importation and exportation of protected fauna is regulated under both CITES (Articles III-V) and the Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere (Article IX). Bird protection is ensured under both CITES and the International Convention for the Protection of Birds. Likewise, the dumping of organohalogen compounds, mercury, cadmium and their compounds, *inter alia*, is prohibited under both the London[31] and Oslo[32] Dumping conventions. Hence, if a state is party to one specific treaty but not to another which is closely related, the success of implementation strategies may not be fully realized.

The above is especially true if the effective implementation of one specific treaty is dependent on the implementation mechanisms set out in other closely related treaties. For example, successful implementation of the African-Eurasian Migratory Waterbird Agreement (AEWA)[33] is dependent on the protection of wetlands and the safeguard of biodiversity in these habitats.[34] Hence, domestic implementation of the terms of AEWA is also dependent on the implementation of the clauses of both the Ramsar Convention and the Convention on Biological Diversity (CBD), which deal, *inter alia*, with the protection of wetlands and the protection of biodiversity respectively. Ideally, therefore, we would want the same groups of nation states to

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[31]Full title: Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, London, 1972. See Articles 1 and 4.

[32] Full title: Convention for the Prevention of Marine Pollution by Dumping from Ships and Aircraft, Oslo, 1972. See Articles 5 and 6.

[33] This agreement, adopted on 16 June 1995, is concerned with the protection of around 172 species of birds which are ecologically dependent on wetlands for at least part of their annual cycle.

[34] UNEP/CMS Secretariat. 24 March 1997. *Review of Article IV: Agreements Concluded or Under Development.* Report presented at the Fifth Meeting of the Conference of Parties of the Convention on the Conservation of Migratory Species of Wild Animals, Geneva 10-16 April 1997. UNEP/CMS/Conf. 5.9.

commit to all of these treaties to facilitate integrated implementation and close coordination of strategies.

In increasing recognition of these interconnections among various IEAs, it is a common feature nowadays to witness treaty bodies endeavoring to link and coordinate their strategies in order to better resolve the relevant environmental problems. For example, a 1996 report of the Helsinki Commission (HELCOM) established the Baltic Sea Area (delineated under Article 1 of the 1992 Baltic Sea Convention[35]) as a Special Area under Annex I of the International Convention for the Prevention of Pollution from Ships (also known as MARPOL 73/78). The report further issued a call for close coordination of policies and collaboration among countries, stating: [36]

> …Since none of the States alone can establish and keep in preparedness the necessary resources of vessels, personnel and equipment to cope with major oil spills, cooperation and mutual assistance between States is necessary.

In the same fashion, during the twelfth session of the Global Biodiversity Forum, held during the 1998 meeting of the COP to the United Nations Convention to Combat Desertification (CCD), discussions pertained specifically to the synergies between the CCD and the treaties relating to biodiversity protection.[37] Linkages have also been established between climate change, biodiversity and desertification.[38]

2.4.3 Problem of free-riding and the economic implications of participation

The global environment can be characterized by its property of 'non-excludability' (Barkin and Shambaugh 1999 p.5; DeSombre 2002 p. 21), which means that every state is free to

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[35] Full title: Convention on the Protection of the Marine Environment of the Baltic Sea Area (Helsinki, 1992). Full text available at http://www.helcom.fi/convention/conventionframe.html
[36] Source: HELCOM. April 1996. Protection of the Baltic Sea – results and experiences. Page 24.
[37] GBF 12-Dakar. *Linking the Biodiversity and Desertification Agendas,* 4-6 December 1998. Dakar, Senegal. http://wri.igc.org/wri/wri/biodiv/gbf/gbf12.htm
[38] World Resources Institute. www.wri.org/wri/wri/biodiv/gbf

consume it or to enjoy the benefits accruing from increased global protection measures implemented by other states. In the case of IEAs, free-riding becomes a persistent problem due to the fact that it is impossible to prevent countries which do not participate in the IEAs to freely benefit from an enhanced global environment emanating from the protection measures implemented by the parties to the IEAs. Finus (2001 p.14) thus rightly considers that IEAs are "typically plagued" by free-riding. This free-riding has the potential of thwarting the efforts of others committed to protecting the resource, and is considered to be among one of the factors that tend to prevent full participation and compliance (Barrett and Stavins 2003 p. 350). Moreover, if enough states decide to free-ride, the whole regime may collapse (DeSombre 2001 p. 191). According to Desombre, this tendency to free-ride makes participation in IEAs "more important than in some other situations of international cooperation" (DeSombre 2001 p. 190; DeSombre 2002 p. 21).

Less than full participation in IEAs also entails economic implications. Within the context of the UNFCCC, for example, the "number and identity" of participating countries have an influence on the costs of emission reductions (Carraro 2002 pp. 5, 14), with a higher participation rate resulting in reduced implementation costs for all party members as well as increased abatement emissions. Carraro (2002 p. 14) therefore argues that "strategies that increase the size and the number of participating countries also increase the environmental and cost-effectiveness" of agreements. Barrett and Stavins (2003 p.351) also recognize that for "cost-effective implementation" of IEAs, full participation is required so that marginal costs can be equally distributed across all countries (also Barrett 2000).

Incomplete participation also hampers trade and increases transaction costs (Barrett 2000 pp.123-139). If we consider as example the KP, less than full participation can give rise to what

is known as the "leakage problem" (Barrett 2000 p.133; Barrett and Stavins 2003; Hoel 2001 p. 178), which refers to an increase in emissions in non-Annex I[39] countries due to a fall in prices of carbon-intensive fuels as participating countries reduce their emissions and cause prices of these fuels to fall. In this sense, less than full participation works against the effectiveness of the KP.

Moreover, lack of worldwide coordination of environmental regulations can become "a source of trade distortion" if some countries decide to use their environmental policies as a "hidden trade barrier" (Gabel and Folmer 2000 p. xxiv). For enforcement measures such as trade restrictions to work, there need to be enough participants for the threat to be credible. In Barrett and Stavins's (2003 p. 365) words, "[t]he greater is the rate of participation, the more credible is the threat to restrict trade." Sand (1991 p. 247) has documented the initial difficulty faced by the OECD while negotiating a regional treaty to control for the transboundary shipment of hazardous wastes. While the OECD succeeded in securing a higher level of cooperation and consensus than would be possible under an international framework, it was also evident that the regional treaty would have "an undesired spillover effect, reorienting trade flows to countries outside the region that were unlikely to abide by OECD-imposed regulation." The OECD finally had to accept a weaker agreement in the form of the 1989 Basel Convention, which was open for participation by all sovereign states of the world.

2.5 Conclusion

In the introductory paragraphs of this chapter, I posed the question: Why is there a need to study state participation in IEAs? I have proposed four main reasons why participation matters. I have argued that participation is important because of: (i) the increased pace and the extensive scale of global environmental change; (ii) the transboundary and global nature of

[39] Non-Annex I countries are the developing countries within the context of the Climate Change treaty.

environmental issues; (iii) the operation of IEAs, which relies on wide participation for the effective implementation of IEA provisions, the reduction of free-riding and the coordination of strategies for highly interdependent IEAs; and (iv) the economic implications of less than optimal participation. Having established the legitimacy and need of studying participation, I now move forward to review the literature governing the current state of research into the field of participation in IEAs. The next chapter provides such a review.

3. REVIEW OF LITERATURE ON PARTICIPATION IN IEAs

In Chapter One, I formulated the main thesis of this research: to analyze the potential determinants of state participation in IEAs by focusing on state and treaty variables. The purpose of this chapter is to review the literature on state participation in IEAs and to provide an analysis of the limitations of current research in the field. A look at the various studies conducted on participation in IEAs shows that several determinants of participation have been identified by researchers. Most of the analyses have been conducted within the framework of environmental economics, which has heavily relied on applications of game theory to explain state participation in IEAs. Despite the predominance of the game-theoretic framework, the study of state participation in IEAs has also benefited from other approaches.

However, in view of the *ad hoc* way in which the theme of participation has been approached, due mostly to a reliance on a set of very broad and general theories, it is not possible to organize this review section based on the various theories governing IR. In the sections that follow, I have therefore organized the literature in such a way as to highlight the various potential determinants of participation identified in the literature. In some instances, studies pertaining to states' international environmental commitments have been included in view of the fact that participation in specific IEAs was used to operationalize the international commitments. As I go about discussing the identified variables, the various theoretical frameworks are addressed in an interdependent fashion as they arise. Moreover, to facilitate the discussions, I divide this chapter into two parts: Part I dealing with state variables; and Part II dealing with IEA

variables. I conclude this chapter with a critique of the current state of knowledge into IEA participation and provide a synopsis of the contribution to be brought about by the present study.

3.1 Part I: State Characteristics

3.1.1 Structure and Stability of Political Structures

Various studies have pointed to the fact that domestic political structures have an influence on the level of states' international commitments as well as on the substance of multilateral regimes. According to Congleton (2001 p.253), different types of political structures command varying demand levels for domestic and international environmental regulations. Democracies and dictatorships are deemed to differ in their preferences for environmental standards, with authoritarians preferring lower environmental standards than their democratic colleagues who are considered to be motivated by the median voter.[40] Further, liberal regimes are also more "likely to find international agreements along similar lines [*i.e.* stringent environmental standards] to be in their interest" (Congleton 1992 p.412). Thus, Congleton (2001 p. 258) concludes that, *ceteris paribus,* "[d]emocracies will be more inclined to sign and implement environmental treaties than dictatorships," with the latter requiring positive inducements (e.g. direct cash or in-kind transfers) to participate in the IEAs. Based on these findings, Congleton (1992 p. 421) predicts that IEAs will attract a higher level of participation as the number of democratic regimes increases worldwide.

Several other studies have similarly posited a positive relationship between democracy and treaty ratification. Based on their analysis of states' ratification delays of the UNFCCC (used

[40] Congleton (2001, p. 258) defines the median voter as being "approximately the voter with the median income share and time horizon," who is deemed to be the "pivotal decision maker within a democratic country." Cowhey (1993 p. 304) has provided a simpler definition, stating "[t]he median voter is a shorthand term for the range of policy preferences around which most voters cluster. Parties have to cover a significant part of this cluster if they want to attract a majority."

as a proxy for a state's level of commitment to the UNFCCC provisions), Fredriksson and Gaston (2000 pp.347, 357, 361) conclude that nations with greater civil liberties ratified the treaty sooner than those with low civil liberties. Neumayer's (2002a p. 156) study on the influence of democracy on international environmental commitments also proves that there is "strong evidence" that "democracies exhibit stronger international environmental commitment than non-democracies," even though, as per Neumayer, the link between democracy and environmental *outcome* (e.g. soil degradation or carbon dioxide emissions) may not be as clear. Based on this finding, Neumayer (2002a) predicts that a vulgarization of democratic ideals around the globe will result in increased international environmental commitment, echoing Congleton's (1992) reflection on this issue, as mentioned above.

Payne (1995) has attempted to provide a rationale for the ways in which democracy can be beneficial for the environment. Payne argues that democratic countries tend to favor environmental protection because of (i) various types of freedoms guaranteed by democracies *viz.* freedom of citizens to lobby their governments; freedom of the press; freedom of speech; freedom to gather and disseminate information; and other types of political liberties; (ii) regime responsiveness and regime accountability, as ensured through the electoral process; (iii) political learning engendered through the free flow of information and global market forces; (iv) internationalism marked by participation in international institutions and the freedom of transnational pressure groups to freely carry out their activities; and (v) open markets.

However, Payne's hypotheses are mostly based on conjecture and anecdotal evidence, with no empirical testing. Midlarsky (1998 p. 344) has questioned this "hypothesized positive relationship" between democracy and the environment. Midlarsky (1998 p. 344) contends that Payne's thesis represents an "idealization of democracy that ignores the rough and tumble of

actual decision-making within the legislative and executive branches of government." Based on his multivariate analysis of several environmental variables (e.g. carbon dioxide emissions, soil erosion by water and chemicals, protected land area, and freshwater availability, among others) on three different measures of democracy (*viz.* Gastil, 1988; Bollen, 1993; and Jaggers and Gurr, 1995), Midlarsky (p. 358) finds that "there is no uniform relationship between democracy and the environment." Although Midlarsky's choice of environmental indicators all pertain to the domestic domain, the result is enlightening in that it establishes that democracy does not necessarily lead to better environment. Thus, if we use Congleton's (1992 p. 412) earlier argument that states choose international environmental standards more in line with their domestic ones, it is not necessarily evident that democracies will want to participate in IEAs which are legally mandating higher environmental standards than their domestic ones.

Other researchers have focused on the structure of the governmental system as an explanatory variable for a state's level of environmental commitment. Dolsak's (2001 p. 426) analysis on states' commitment levels to mitigating global climate change shows that parliamentary systems face lower "political costs of environment/energy tradeoffs" than presidential systems. Recchia's (2002) analysis of the participation of nineteen democracies in fifteen IEAs tests four different theories *viz.* structural constraint theory, political institutional theory, idea-based theory, and interconnectivity theory, to determine causal factors for the varying levels of international environmental commitments of stable democracies. Recchia finds that the "value orientations of the citizenry" and "executive dominance" – key elements of the idea-based theory and the institutional theory respectively – provide the strongest explanations for the international environmental behavior of the countries analyzed. Moreover, Recchia (pp. 487, 488) finds that states with a higher pollution load do not necessarily participate in more

IEAs, while states with "strong executive-centered ratification power" stand more chance of participating, especially when "citizen's demands for international environmental protection are solid."

The political stability of a regime has also been deemed crucial for a state's ability to sustain international cooperation. According to Maoz and Russett (1993 p. 908), the political stability of a state is associated with the "persistence of its regime in years" and the longer that a political regime exists "without fundamental change," the more likely that norms of political conduct will develop that will "form and influence the foreign policy codes of conduct of the regime." It is common wisdom that political contestation occurring within the shadow of impending elections is typically characterized by politicians who notoriously focus on policies with short-term benefits, with no regard for the long-term horizon. As stated by DeSombre (2000 p. 152), "[t]rading uncertain future harm for certain current benefits is a common political choice." Thus, changes in government may induce policy reversals which may renege on prior commitments to international environmental cooperation (Caldwell 1988 pp. 13-28).

Major political destabilization brought about by political corruption or civil wars is also significant in impairing the state of the environment or in constraining choices for effective implementation of environmental policies. The predominance of civil wars in Africa has been identified as a causal factor for the ineffective implementation of natural resources management policies (Brinkerhoff and Cage 2002 p.101; Mallya and Talbott 1990; O'Keefe *et al.* 1991). Morrell and Poznanski (1985 p. 165) contend that widespread corruption in many developing countries prevents the latter from implementing effective strategies for environmental protection.

3.1.2 Level of Development

It has generally been noted that the level of economic development is related to the environment (e.g. Asthana and Shukla 2002 p. 271; Evans 2000 pp. 42-63; Hurrell and Kingsbury 1992; Von Prittwitz 1990), with the general notion that developed countries have stronger environmental protection policies than developing states. Young (1982 p. 739), for example, considers that the incidence of "negotiated orders" is greater in "advanced industrialized societies" which are "highly developed and not severely constrained in functional terms." According to Desombre (2000 p.2), countries with "advanced environmental protection policies" are more involved in internationalizing their domestic environmental regulations – which implies that the developed countries (e.g. EU countries, Canada, Norway, US) will more likely participate in IEAs than the developing ones.

Income levels are deemed to be related to environmental quality through the notion that environmental quality is a 'luxury' or 'superior' good (e.g. Schulze and Ursprung 2001b pp. 27, 42). The richer and developed countries of the North are considered to value environmental quality more than the developing countries (Schulze and Ursprung 2001b p.28), whereas low incomes have been associated with a "high degree of tolerance to environmental hazard" and a low willingness to pay for improved environmental quality (Rauscher 2001 p. 148). This line of reasoning also argues that the population in developed countries exert greater pressure on their governments to enforce environmental protection (Ervin 2001 p.85; Sage 1996). Fredriksson and Gaston (2000 p. 357) find that though larger economies tend to have higher total pollution levels, they exhibit shorter delays in ratifying the UNFCCC due to greater internal or external political pressure to ratify the treaty. Neumayer (2002a; 2002b p. 823) has also shown that per capita income has a positive relationship with a country's willingness to ratify or sign IEAs. Focusing

on a world systems theoretical perspective, Roberts *et. al.* (2004 p. 56) have demonstrated that "larger, wealthy, "core" countries tend participate in more IEAs than do very small and/or poor, "peripheral" countries."

The relationship between income levels and environmental quality has also been analyzed through what is generally known as the Environmental Kuznets Curve (EKC), based on Kuznet's research on income inequality across developing countries, which posits that as per capita income rises, income inequality initially rises, and then subsequent falls (Jha and Whalley 2001 pp. 228-230; Schulze and Ursprung 2001a). The EKC hypothesis suggests the following relationship between demand for environmental quality and per capita income: as per capita income rises, pollutant levels (e.g. sulfur dioxide, particulate matter, nitrogen oxides, carbon monoxide, carbon dioxide, CFCs, etc.) per capita rise, and then fall after a threshold level is reached, yielding what has been widely termed as the 'inverted U-relationship' (Perrings 2001 p.321). However, there are many researchers who have contested the applicability of the EKC hypothesis, arguing, for example, that "there appears to be nothing automatic about this relation" (Jha and Whalley 2001 p. 230), or that the hypothesis applies only to certain air pollutants (e.g. sulfur dioxide emissions) and not to other environmental problems such as deforestation (for critiques see Jha and Whalley 2001 pp. 228-230).

It is widely acknowledged that the developed and developing nations face different aspirations where environmental protection is concerned (e.g. Wells 1996), an asymmetry often reflected in the North-South (N-S) [41] conflict in international environmental negotiations. At the

[41] In International Relations, the term 'North' comprises both the "West" (rich countries of Western Europe, North America and Japan) and the old "East" (the former Soviet Union and its bloc of allies). The South includes Latin America, Africa, the Middle East and much of Asia. The South is often called the "third world" (third after the West and East). Countries in the South are also referred to as "developing" countries or "less developed" countries (LDCs), in contrast to the "developed" countries of the North (Goldstein, 1994).

root of this N-S divide, according to some analysts, lies the fact that the *nature* of environmental problems in developing countries is not the same as that in the developed countries (e.g. Jha and Whalley 2001 p. 217). Protecting the environment in the developing countries is viewed, most often than not, as a struggle between the environment and meeting immediate socio-economic needs for daily subsistence (Atkinson 1991; Ledec 1985; Miller 1991). Barbier (2001 p. 242) notes that whereas environmental problems in the developed world are understood mostly in terms of "conventional pollution problems" such as pollutant discharges or emissions, in the developing world, environmental problems tend to be associated with "uninternalized externalities" and environmental '*degradation,'* which carry different economic and environmental implications than those from emissions or pollutant discharges. Such 'degradation' problems include deforestation, desertification, soil erosion, congestion, depletion of fisheries stocks, improper solid waste disposal, urban congestion, and environmental and health problems such as infectious diseases, poverty, untreated water, low sanitation, and watercourses polluted with untreated sewage discharges, *inter alia* (Barbier 2001 p. 242).

Tussie (2000b p.1) also makes such a distinction when she differentiates between the "Northern" or "green agenda" characterized by issues such as climate change, biodiversity, and fisheries, and the "Southern" or "brown" agenda dominated by drinking water, poverty alleviation, trade, market access, technology transfer or flows of development assistance. Tussie (2000b) further considers that the concept of sustainable development connotes different meanings for the developed and developing countries, with the former associating it with "meeting the needs of the present generation without compromising the ability of future generations to meet their own needs," and the latter equating it to poverty alleviation and future economic development. Rosenberg (1994 pp. 129,130) suggests that poverty in the South,

coupled with the "fiscal austerity and protectionism in the North," has resulted in the fact that the "sustainable development bandwagon has thus far been characterized by inaction and more than a little hot air."

3.1.3 Power of States and Environmental Vulnerability

Within the field of IEC, the overall power potential of a state has to include considerations of the level of vulnerability to transboundary environmental and ecological disturbances. Sprinz and Vaahtoranta (1998 p. 13) have used a combination of the concept of maximization of self-interest and the game-theoretic framework of a unitary rational actor model to build an 'interest-based theory' of international environmental regulation. Sprinz and Vaahtoranta (p.14) focus on two domestic factors to explain nations' support for international environmental regulation: a country's level of ecological vulnerability towards pollution, and the economic costs of pollution abatement. They argue that countries which are ecologically vulnerable and have low abatement costs tend to participate more in IEAs than those with low ecological vulnerability and high abatement costs. Similarly, Helm (2000a p. 134) considers that non-signatories of the Helsinki Protocol tend to be countries which "are either substantial net emission exporters or have a low ecological vulnerability." This ties in with Recchia's (2002 p. 483) finding that polluted democracies do not necessarily ratify more treaties. Similarly, Mitchell (2003 p. 449) considers that countries with high ecological vulnerability and low adjustment costs tend to participate in more IEAs than those that have low vulnerability and high costs

The traditional association of state power with military prowess is reshuffled in the domain of IEC. Researchers often talk about a new form of power – *viz.* the "power to destroy" (DeSombre 2002 pp. 15, 181; Downie 1999), where large developing countries become 'powerful' in the sense that they muster the power to potentially destroy the environment due to

their future development paths. Due to this new "power to destroy," developing countries can dictate the terms of their participation in IEAs. Developing states also become 'powerful' in the sense that they possess resources which the international community is intent on protecting, and thus they can prescribe the terms of access to these resources or the international protection strategies being envisaged (DeSombre 2002 p. 181).

The effects of population growth have been linked to increased environmental degradation triggered by the greater pressures on land and other resources, and an erosion of the environmental carrying capacity (Markandya 2001 p. 198). On the other hand, low population density implies less vulnerability since there are less people affected by environmental problems (Rauscher 2001 p. 148). However, the exact role of population growth in engendering environmental degradation has often been contested, with some scholars (e.g. Markandya 2001 pp. 198-200) contending that population growth can result in increased productivity. This is often known as the Boserup hypothesis, which argues that with scarcity of land relative to labor, there ensues an intensification of agriculture and increased productivity per unit area (Boserup 1965 quoted from Markandya, 2001 p. 198).

3.1.4 Non-state Actors

It is well-established that non-state actors such as non-governmental organizations (NGOs) have an influential role to play in raising environmental awareness among the public, in agenda-setting at either national or international levels, and in the various stages of regime formation (e.g. Bramble and Porter 1992; Feld *et al.* 1994; Handl 1991; Lindborg 1992; McMahon 1993; Porter and Brown 1991; Princen and Finger 1994; Raustiala 1997; Rittberger 2000; Stairs and Taylor 1992; Wapner 2000). The influence of NGOs in the field of state participation in IEAs has been studied as well. Roberts *et. al* .(2004 p. 28), for example, use the

total number of NGOs as a proxy for the strength of a state's civil society and for the level of environmental pressure brought to bear on the state. Their results show that the total number of NGOs (among other factors such as the narrowness of national export base and the voice and accountability of citizens) in a state has a significant influence on the state's participation in IEAs (Roberts *et. al.* p. 39). They thus conclude that "institutional and grassroots democratization" are important for commitment to IEAs (p. 45). Gulbrandsen and Andresen (2004 p. 57) also find that NGOs can play important roles in supporting and calling for ratification of treaties. Similarly, Raustiala (1997 p. 731) assigns the role of 'facilitators of ratification' to NGOs.

3.1.5 Trade Openness

It has been argued that trade openness is "good for the environment" and that it can foster IEC (e.g. Antweiler *et al.* 2001 p. 878). In his analysis of the effect of trade openness on IEC, Neumayer (2002b p. 830) finds that there is "some evidence that general trade openness promote[s] multilateral environmental cooperation." However, though trade liberalization can provide benefits to the environment, this relationship does not happen "automatically" (Brack 1995 p. 501). According to Brack, appropriate policies will need to be implemented to make trade regimes more conducive to environmental protection.

Moreover, the relationship between trade openness and increased potential for IEC is not straightforward either. The expansion of trade can have negative environmental repercussions such as higher release of air or water pollutants, the introduction of invasive plant and animal species which can negatively impact local species, or to the depletion of natural resources, *inter alia* (Brack 1995 p. 499; Copeland and Taylor 1994; Ervin 2001 p.85; Tussie 2000b p.1). Copeland and Taylor (1994 pp. 756, 757, 781) have further demonstrated that the effects of

economic growth on pollution are not the same in an autarky and in a free trade regime. They find that "economic growth in autarky has no effect on pollution levels, but economic growth in a trading environment can raise pollution levels" (p. 756).

Developing countries are often considered to be more vulnerable to the negative impacts of trade liberalization (Ervin 2001 p. 94). It has been commonly stated that bigger and more powerful countries can significantly influence world prices "through their trade and environmental policies" while smaller economies take these as "given" (Schulze and Ursprung 2001b p.17; Steinberg 1997 p. 232). It is also often feared that free trade might result in "environmental dumping," which refers to the possibility that all countries might relax their environmental policies and standards in order to gain competitive advantage in the promotion of their products (Carraro 2001 p. 348; Schulze and Ursprung 2001a p.45). According to Schulze and Ursprung (2001b p. 42), trade liberalization may "decrease the welfare of the country with high preferences for environmental quality." The trade-environment debate also includes arguments suggestive of the relocation of industries to those countries with lax environmental standards, dubbed as 'pollution havens,' in order to maximize competitiveness (Carraro 2001 p. 348; Esty 2001 p. 121). However, the evidence for this 'race to the bottom' is widely considered to be 'mixed' or unconvincing (e.g. see Esty 2001 p. 124; Schulze and Ursprung 2001a p. 61).

Finally, the trade-environment debate brings contention pertaining to issues of fairness and equity. As epitomized in Rauscher (2001 p. 148), if we accept the logic of trade combined with economic theories pertaining to the law of comparative advantage, toxic wastes should be stored or treated where the environmental costs are low – that is, in poor and under-populated areas (Rauscher 2001 p. 148). Terms such as 'toxic colonialism'(Hilz and Radka, 1990) have indeed been used to refer to industrialized countries' strategies of dumping their toxic wastes in

developing countries, which often might not have the means or facilities to manage these hazardous wastes safely (also Dasgupta and Maler 1994). Perceptions of inequities and unfairness certainly accounted for the failure of the Basel Convention in enlisting the participation of the majority of developing countries, who ultimately negotiated their 'own' hazardous waste treaty in the form of the Bamako Convention.[42]

3.2 PART II: IEA Design

Regime Design Matters. This title of Mitchell's 1994 article clearly captures the general recognition in the literature on IEC of the importance of the design of IEAs as a "crucial" determinant of participation in IEAs, as well as a significant factor influencing the "stability and global efficiency" of the environmental coalition (Finus 2001 pp. 236, 238; Helm and Sprinz 2000; Helm 2000b p. 164; Sand 1992; Schmidt 2000). In the case of the UNFCCC, for example, Barrett and Stavins (2003 p. 366) note that the *architecture* of the climate change regime can influence both participation and compliance.

The current state of research into IEA design points to the following factors as being most influential in impacting state participation: (i) the flexibility of the agreements; (ii) the strength of the IEA provisions; and (iii) participation incentives. Moreover, various researchers have analyzed the influence of the minimum ratification clause, also commonly known as the threshold number, on the level of participation in IEAs. Details on each of these potential determinants of participation are provided below.

[42] Full title: Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa, Bamako, 1991.

3.2.1 Flexibility of the IEA

Most IEAs provide party members with the possibility of entering into reservations, of opting out of certain clauses, or of completely withdrawing from the treaties. It is generally agreed that allowing reservations tends to favor participation because it increases the flexibility of the IEAs (Harvard Law Review 1992). On the other hand, disallowing of reservations, while effective in maintaining the desired strength of the IEAs, may nevertheless work against high rates of participation by being inflexible and by not meeting the needs of potential party members. As stated by DeSombre (2002 p. 11):

> Although many complain about opt-out provisions in regulatory treaties, the fact that no state can be bound by international law against its will makes them a necessary evil. Without them few states would agree to regulation created by less than unanimous voting.

Similarly, encouraging flexible means of dispute resolution (e.g. through negotiations) tends to appeal to a wider audience than strict requirements for recourse to the International Court of Justice (ICJ). The 1963 Optional Protocol Concerning the Compulsory Settlement of Disputes, negotiated under the 1963 Vienna Convention on Civil Liability for Nuclear Damage, succeeded in securing *only two* parties as at September 2003, compared to the thirty-two parties to the parent treaty.[43] Under the Optional Protocol, all disputes arising under the parent treaty are to be dealt "within the compulsory jurisdiction of the International Court of Justice" (Article 1), unless the parties agree to alternate measures within a period of two months after notification of the dispute.[44] The low rate of participation in the Optional Protocol may be due to the general unpalatability within the international community of submitting disputes to the ICJ, or due to the

[43] Yearbook of International Cooperation on Environment and Development. 2003/2004. http://www.greenyearbook.org/agree/nuc-saf/civillia.htm

[44] Text of the parent treaty and the optional protocol available online at http://sedac.ciesin.org/entri/texts/acrc/ProtVienna.txt.html or at the IAEA site at http://www.iaea.org/Publications/Documents/Infcircs/1996/inf500.shtml.

inflexible language of the text of the Protocol, connoted, for example, by the word "compulsory."

3.2.2 Strength of IEAs

Several researchers have argued that the stricter the requirements of an IEA, the less likely it is that countries will participate in the IEA (e.g. see Schmidt 2001 p. 214), and free-riding incentives will prevail (Finus 2001 p. 279). Carraro (1999b p. 9), for example, notes that those treaties which are "rather empty in terms of quantitative targets and/or deadlines" tend to enlist greater participation than those with precise commitments. Likewise, Finus (2001 p.314) considers that more countries sign IEAs which are meant to "achieve little." In his analysis of the UNFCCC, Barrett (2000 p. 119) considers that the UNFCCC benefited from earlier ratification and entry into force than the KP because it did not require any "particular target by any particular date."

3.2.3 Participation Incentives

Recently, calls for increased membership in IEAs have been further qualified to include specific encouragements for developing countries to participate in the treaties. Two types of incentives are mentioned in the literature: positive incentives, such as side-payments and financial or technical assistance; and negative incentives such as external threats and trade restrictions (Barrett and Stavins 2003 pp. 361-367; Underdal 1998 p. 106). Many IEAs do recognize the fact that the special needs of developing countries need to be taken into consideration, and that developed nations need to provide financial and technical assistance to allow the developing states to comply with their international environmental obligations without jeopardizing their development needs (Caldwell 1988; Chasek 2000; Evans 2000).

Principle 9 of the Stockholm Declaration[45] recognizes that conditions of underdevelopment and natural disasters lead to environmental deficiencies which can be improved by rapid development fostered by the transfer of financial and technological assistance to supplement the domestic effort of the developing countries. The most recent IEAs (e.g. the MP, the UNFCCC, and the CBD)[46] contain special provisions for financial assistance, technological transfer, technical support and scientific collaboration. Both the UNFCCC and the CBD mention that the extent to which developing countries succeed in implementing their commitments under the conventions depends, in the first instance, on the *developed countries' fulfillment of their obligation* to provide financial and technological assistance. Developed countries are held responsible for the proper implementation of the CBD by the developing countries, thus attesting to the worldwide acceptance of the necessity for compensating the developing world for their efforts to preserve and conserve their natural resources.

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[45] Principle 9 reads: "Environmental deficiencies generated by the conditions of under-development and natural disasters pose grave problems and can best be remedied by accelerated development through the transfer of substantial quantities of financial and technological assistance as a supplement to the domestic effort of the developing countries and such timely assistance as may be required." Text of the Declaration is accessible online at http://www.unep.org.

[46] Further details on the provisions are as follows: (i) the Montreal Protocol (1987) - Article 5, paragraphs 1 and 2 of the Protocol allow developing countries a moratorium of ten years to comply with control measures and implement the quantitative targets and also allow them quick access to alternative technology; moreover, the MP requires the developed countries to disburse funds to meet the incremental costs incurred by the developing world in adapting technology to reduce the emissions of ozone-depleting substances (ODS); (ii) the Convention for the Protection of the Mediterranean Sea Against Pollution (Barcelona, 1976) recognizes that priority needs to be given to the developing countries in the Mediterranean region for provision of technical cooperation in the field of marine pollution.(Re: Article 12(3)); (iii) the Climate Change Convention - Article 12(7) requires the Conference of Parties (COP) to arrange for the provision of technical and financial assistance for reporting requirements and for implementing projects and measures adopted under Article 4 of the Convention;[46] and (iv) the Convention on Biological Diversity recognizes the special needs of developing countries for research and training, exchange of information, technical and scientific cooperation for implementing the Convention. The Convention also includes special provisions for the participation of developing countries in biotechnological research activities and for access to the results and benefits of biotechnologies based upon genetic resources provided by the developing countries (Article 19, paragraphs 1, 2). Article 20 also stipulates that developed parties shall help developing countries meet incremental costs incurred to them in the implementation of the obligations of the Convention.

3.2.4 Minimum Ratification Clause

The minimum ratification clause, often also called the threshold number or the *n*-rule (Black *et al.* 1993 p. 281), normally specifies the total number of ratifications that are needed for a treaty to enter into force. The minimum ratification clause has been considered as an "internal stabilization" instrument, making participation "contingent" on the participation of others (Schmidt 2001 p. 220). Black *et. al.* (1993) have analyzed the threshold number "as an instrument to create incentives" for IEC, and they report that the threshold number helps to increase participation in IEAs while deterring free-riding (also Barrett 2000 p. 137; Carraro *et al.* 2003). In this sense, the threshold number is seen as being important in making cooperation more profitable (e.g. Black *et al.* 1993) and more stable by decreasing the number of free-riders and increasing the number of signatories (Carraro *et al.* 2003). However, Schmidt (2001 p. 220) warns that "the more successful the minimum ratification clause is in making a large number of countries sign the agreement, the greater are the incentives to breach it afterwards."

3.3 Critique of current state of research and proposals for advancement of knowledge

As mentioned in Chapter One and as detailed in the preceding sections, environmental economics has had much to contribute to the field of state participation in IEAs. The game-theoretic framework has been used extensively to explain environmental coalitions and participation in IEAs. These economic analyses have focused on country characteristics as well as on the structure and design of IEAs as potential determinants of participation.

However, though these econometric analyses have contributed positively to our understanding of IEC, they suffer from several limitations, many of which have been recognized by the environmental economists themselves. The econometric explanations, for example, often "rely on *ad hoc* arguments rather than on scientific and empirical foundations" (Finus 2001 p.

105), and most of the research is deemed to be 'theoretical' rather than relying on 'observation' or empirical insights. Moreover, the econometric models are highly "stylized," being based on "simplifying assumptions" to apply two-player models to large N situations, or to extrapolate findings based on the homogeneity of countries to heterogeneous countries (Finus 2001 p.12; Helm 2000a p.2). These far-ranging assumptions often diminish the utility of the analyses since the findings are not directly transportable to the general field of global environmental policy formulation. As rightly noted by Jeppesen and Andersen (1998 p. 80), while the games used in Game Theory (e.g. Prisoners' Dilemma and Chicken Game) may be useful as "analytical and theoretical instruments," they are nevertheless "distant from reality" when it comes to actual negotiation and cooperative processes. The final results of econometric analyses often therefore necessitate disclaimers on the applicability of the results to actual policy formulation, an example of which is Schmidt's (2000 p. 193) following statement:

> The results of this analysis have been derived using highly stylized models. In the light of the various simplifications there clearly are limitations to the scope of the present study. The findings therefore cannot be directly applied to real-world political decision-making and have to be interpreted with some caution.

Another example is Barrett's (1994 p.879) following listing of his assumptions for his study on self-enforcing IEAs:

> By necessity, the analysis imposes a number of restrictive assumptions, and the above result must be seen in the light of these. The most important assumptions are: (1) that all countries are identical; (ii) that each country's net benefit function is known by all countries, and known to be known by all countries; (iii) that the choice instrument is restricted to pollution abatement; (iv) that abatement levels are instantly and costlessly observable; (v) that the pollutant does not accumulate in the environment; and (vi) that the cost functions are independent.

The applicability of Barrett's findings are therefore of little relevance for the purpose of environmental policy formulation in view of the fact that: (i) not all countries are identical; (ii) there is no transparent system or international information-sharing for all cost-benefit settings; (iii) pollution abatement does not figure as the sole instrument of choice in international standard setting; (iv) abatement levels are neither instantly nor costlessly observable; (v) pollutants

accumulate in the environment; and (vi) cost functions are not independent. Thus, in real case scenario, all of the assumptions are violated, which renders a direct application of the results to actual policy-making illegitimate.

Moreover, econometric analyses of why countries support or veto specific IEAs have been mostly case-specific, and have tended to be restricted to one particular type of IEAs – *viz.* emissions-based IEAs. Many researchers have, for example, focused almost exclusively on IEAs pertaining to global warming, ozone depletion, or acid rain (e.g. Finus 2001; Helm and Sprinz 2000; Hoel 1992; Kaitala and Pohjola 1998; Murdoch and Sandler 1997; Murdoch *et al.* 2003; Schmidt 2000), with the almost complete failure to address other types of IEAs, such as those dealing with natural resource protection, biodiversity, and water resources. Also, such analyses have generally relied mostly on two or three-player models. In his attempt to provide a general model for the "forms of international cooperation," Morrow (1994) based his analysis on a two-actor game-theoretic model to demonstrate the usefulness of leadership and institutions in helping actors engage in cooperation. Schmidt's (2000) analysis on the design of IEAs also focused on two or three countries. In several other investigations, researchers have either assumed identical or symmetric countries (e.g. Barrett 1994; Carraro and Siniscalco 1993; Finus 2001), or have focused on two groups of countries that can act as single agents (Endres and Finus 1998; also Hoel 1992).

In view of the above constraints, many researchers from within the econometrics field have called for further research on participation in IEAs. Carraro (1999b), for example, solicited more empirical analysis to test whether theoretical results derived from the assumption of symmetric countries still hold when the heterogeneity of countries in terms of size, natural resource endowments, and development stages, *inter alia,* is taken into account. Finus (2001 p.

234) and Helm (2000b p.166) have called for further research into the design IEAs. Sprinz and Vaahtoranta (1994; 1998 pp. 36, 41), in their presentation of the "interest-based approach" to international environmental regulation pertaining to ozone depletion and acid rain, acknowledged that future research on international environmental negotiations needed to focus on "a few additional domestic factors."

Many of the cross-national analyses of state participation in IEAs conducted outside the framework of game theory suffer from several lacunae as well. As stated in Chapter One, these analyses present three main problems – *viz.* they do not benefit from a rigorous theoretical foundation, and they have a small sample size for either the IEAs or the countries analyzed. For example, though Roberts *et. al.* (2004) consider treaty engagement among 192 countries, the number of IEAs tested in the analysis amounts to only twenty-two treaties. Dietz and Kalof's (1992) analysis considers only twelve treaties, while Dolsak's (2001) and Fredriksson and Gaston's (2000) studies analyze participation only with respect to the climate change regime. Recchia's (2002 p. 479) study falls short in terms of the sample size of countries analyzed. Recchia's study focuses only on nineteen states which have been "continuous democracies for at least 20 years." By resorting to the 'most similar comparative approach,' the analysis fails to consider variation in participation levels among "authoritarian regimes, poorer economies, and non-Western countries." Smaller democracies (e.g. the Bahamas) are also not included in the analysis as these are considered not to be active participants in the international negotiations preceding the enactment of the treaty (Recchia 2002 p. 479).

Similarly, Neumayer's study on the influence of democracy or of trade openness on participation tests the formulated hypotheses only with regard to four[47] and six[48] IEAs respectively (Neumayer 2002a; Neumayer 2002b). Further, Neumayer (2002b p. 819) fails to make the technical distinction between signature and ratification (see Section 4.6.2), even though he concedes that "[t]here is a disadvantage connected to analyzing signature rather than ratification" since "[s]ignature is not a formal commitment."

From a theoretical standpoint, many of the hypotheses being tested in the quantitative cross-national analyses mentioned above do not logically stem out from an application of the basic postulates of the main IR theories governing international cooperation. For example, while Roberts *et. al.* (2004 pp. 25-29) have provided a good overview of realism, constructivism, and institutionalism in explaining IEC, their analysis lays greater emphasis on world-systems theory and on the impacts of the "colonial history" of states on their levels of IEA ratification, without any adequate application of the postulates of theories reviewed. Similarly, Neumayer's (2002a) analysis does not provide adequate theoretical justification for the selection of the variables used in the analysis. For example, though the reasoning behind the influence of democracy on international environmental commitment is provided, there is no definition provided for the term 'importance' as used in the analysis to determine the importance of the states, nor is there adequate theoretical justification provided for the use of the proxy variable of 'population size' to determine the 'importance' of states (see Neumayer 2002a p. 150). Fredriksson and Gaston's (2000 pp.350, 353-356) selection of specific variables for country characteristics also suffer from

[47] *viz.* the KP, the Cartagena Protocol on Biosafety, the Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (Rotterdam Convention), and the Copenhagen Amendment to the Montreal Protocol.
[48] *viz.* CITES, the MP, the Convention on Biological Diversity (CBD), the KP, the Rotterdam Convention, and the Cartagena Protocol.

a lack of theoretical justification, with most of the arguments for such selection centering solely around considerations pertaining to maximization of self-interest or minimization of costs.

Finally, the analysis of the influence of treaty design variations on IEA participation suffers from a clear lack of quantitative determinations. In his discussion of treaties relating to non-proliferation, Keeley (1985 p.103) notes that though treaties have been used as "indicators or points on measurement scales," "as independent variables," and as "guides to state interaction patterns," what is missing is a "close quantitative analysis of the contents of treaties." Among the very few studies that have focused on systematic design analysis is DeSombre's (2001 p.190-228) investigation of the influence of specific treaty clauses or "participation mechanisms" on participation levels in IEAs, as stated in Section 1.2. The clauses studied include the following: presence of economic sanctions; provision of environmental aid; differential obligations; and the creation of club goods. However, this study remains a qualitative undertaking, focusing only on a handful of IEAs,[49] and providing only anecdotal evidence (based on the case of the MP mostly) that financial assistance helps to increase participation in an IEA. DeSombre concedes that it is difficult to compare among the various approaches because of the varying contexts of the treaties. She states (page 221):

> It is not simple to draw conclusions across mechanisms. There is no real way to do a controlled study that would examine which mechanisms work best under which circumstances, since they are not all tried in analogous situations, or even independently. Some agreements, like the Montreal Protocol, make use of all of the mechanisms examined here to some extent; others use only one or two, but in vastly different situations.

[49] *e.g.* CITES, the International Convention for the Conservation of Atlantic Tunas, the Whaling Convention, the Montreal Protocol (MP); and the UNFCCC, *inter alia*.

3.4 Conclusion

Present research into the field of IEA participation has shown that several variables are important in determining state participation in the IEAs. Some of these variables include political stability, economic development, the level of environmental vulnerability, and the strength, flexibility or participation incentives offered by the treaty provisions. However, many of the conclusions reached on the theme of participation in IEAs are specific to the cases studied and cannot be generalized over the broader range of IEAs adopted internationally or of the different types of political regimes worldwide. These studies therefore do not provide a systematic explanation of the influence of the heterogeneity of states, or the variation in treaty provisions, on states' participation levels in IEAs.

Moreover, many of the analyses conducted on IEA participation suffer from the lack of a good theoretical treatment, especially from the perspective of IR. What is the role of power on participation rates in IEAs? Are non-state actors important? What is the influence of a state's acculturation to international norms and standards on its participation level in IEAs? These questions have not been addressed in any systematic fashion and they are open for investigation. This current state of affairs presents scope for both theoretical and empirical contribution to the study on participation in IEAs. The present study aims to fill the gaps in the literature by generating hypotheses based on the main IR theories on international cooperation and by enlarging the IEA and country sample size, as further detailed in Chapter Five.

In the next chapter, I provide an overview of the main IR theories governing international cooperation and thereafter expose the hypotheses governing this study based on an application of the IR theories to the field of IEC.

4. DEVELOPMENT OF HYPOTHESES

The literature reviewed in Chapter Three provided a map of the factors that have been identified as potential causes for state participation in IEAs. In particular, I highlighted specific state characteristics such as level of development, political stability, or environmental vulnerability, and IEA characteristics such as strength and flexibility. Furthermore, I have pointed out the need to generate hypotheses which better reflect the main strands of IR theorizing and which better validate the choice of variables to be associated with states' participation levels in IEAs.

In this Chapter, I put forth the rationale for the hypotheses to be tested in the present study and introduce the models guiding the analysis. In attempting to link possible causal variables of state participation in IEAs to IR theories, I focus on the main theory governing IR, *viz.* Realism, and its major contender, Liberalism. Both Realism and Liberalism explain the general patterns of international cooperation that is sustained in the international system. For example, while Realism emphasizes the role of power and relative gains, Liberalism focuses on the role played by international institutions and the maximization of absolute gains.

However, the pattern and mode in which this maximization of gains (whether relative or absolute) occurs is preponderantly determined by the inherent domestic structures of the states. Calculations of costs and benefits, and hence the final strategies adopted for the maximization of gains, cannot be dissociated from the domestic configurations of states. Starting from the premise that domestic parameters are important in determining IEC, I apply basic postulates of

Realism and Liberalism to the domestic conditions of states to propose hypotheses for a state's propensity to participate in IEAs. In the next section I present a brief note on this "domestification of International Politics" (Caporaso 1997). I subsequently introduce the models and put forth the hypotheses of this study.

4.1 Consideration of Domestic Factors in IR

While many scholars would argue for a systemic analysis of IR, there has been growing recognition in the literature of the need to consider both domestic and systemic factors in an integrated framework to better understand states' international behavior. Moravcsik (1993), for example, favors the inclusion of domestic factors in IR studies in order to overcome the indeterminacy of "pure" IR theories. Similarly, Gourevitch (1978) has proposed the "second image reversed." According to Leeds (1999), domestic variables need to be considered when analyzing international cooperation as they influence leaders' calculation of costs and benefits of engaging in specific international acts. As stated by Wendt and Friedheim (1995 p.691), "systemic theories cannot explain all of world politics, since much state action is driven by domestic politics or leader psychology." Thus, it seems that there is a need to open the "black box" of the state (Owen 1994 p.926). Moreover, favoring systemic factors at the expense of domestic ones, or *vice versa*, creates "inaccurate homogenization" (Singer 1961 p. 839), resulting in only a partial understanding of the full range of determinants of international behavior.

Though traditionally IR theories have relegated domestic conditions to being merely the discarded "second image" of Waltz's (1959) postulate on IR, or as "constraints" to international cooperation (Knopf 1998 p. 677), there has been a resurgence of interest in this very second image due to the fact that extant theorizing has failed to account for many important domestic

determinants of international behavior, especially in the field of foreign relations and international political economy (e.g. Barnett 1990 p.529). IR and domestic politics are now seen as "interrelated," implying that they should be "analyzed simultaneously, as wholes" (Gourevitch 1978 p.911). Some researchers have therefore called for more research into "linkage politics" (James and Rioux 1998 p. 783; Lamborn 1997 p. 201) in order to thrash out the interconnections between international and domestic politics. Similarly, Knopf (1998 p. 692) has illustrated, through quantitative analysis, that citizen activism played a role in US's willingness to engage in arms cooperation with the former-USSR, thereby showing that domestic pressure could directly influence a state's preferences for international cooperation.

In line with this emerging focus on the consideration of domestic components of international politics, this research focuses of the domestic determinants of states' participation in IEAs. The models are developed mostly through a reliance of "second image theories," which focus on the role played by specific domestic constraints on the international behavior of states. However, reliance on these second order analyses does not necessarily mean that we can overlook the fact that the states are all intricately involved in, as well as *determining*, the international structure of the world system. I argue that the international structure is not an entity which self-generates – rather, it is generated through the international configuration of states, which predominantly reflects the various domestic conditions and their individual national capabilities. Thus, factors which underlie the theory of Realism, such as relative power considerations, can play an important part in the calculations of states when deliberating on possible participation in IEAs. Similarly, international institutions can play a significant role in making a state more open to the adoption of international norms and standards. This analysis

therefore uses Realism and Liberalism as a core premise to generate possible hypotheses governing the participation of states in IEAs.

4.2 Models and Hypotheses for the Analysis of State Participation in IEAs

4.2.1 Analysis of treaty characteristics

(i) Model I: The Legal-Incentives model

The first model, the Legal-Incentives model, is formulated to capture the influence of variation in treaty design on state participation in IEAs. This model relies on the literature on international environmental cooperation dealing with the design and structure of IEAs. Hypotheses for this model are formulated mostly based on the premise of previous work done in the area, as summarized in the literature review (Section 3.3). The specific hypotheses formulated for this part of the study are detailed below.

Hypotheses

Researchers have stated that certain positive incentive structures, such as financial transfers and Research and Development (R&D) cooperation, tend to enlist greater participation in IEAs, especially from developing countries (e.g. Barrett 1992b; Barrett and Stavins 2003 pp. 361-367; Carraro 1999a; Helm and Sprinz 2000; Schmidt 2000; Underdal 1998 p. 106). Financial transfers may seem attractive to both the developed and developing countries in view of the added benefits to be accrued therefrom. For the developed countries, the possibility of providing financial assistance may likely imply some control over how that money is to be used within the developing economies, which also often imply control over the use of technology and processes. Thus, disbursing funds may be of benefit to local industries within the developed world. Similarly, the availability of funds for implementation of IEA provisions may be seen as

attractive by developing nations as this would mean financial empowerment to address environmental concerns and to improve production processes. However, *ceteris paribus,* while financial mechanisms within IEAs may be favored by both the developed and developing nations, it is likely that such financial transfers may be more influential on the decision of developing countries to participate in IEAs or not, due mostly to the fact they are normally less empowered economically than their developed counterparts. This argument leads to the following hypotheses:

$\underline{H1a_1}$: The inclusion of provisions for financial assistance in IEAs tends to increase participation in IEAs.

$\underline{H1a_2}$: The inclusion of provisions for financial assistance in IEAs tends to increase participation from developing countries.

Many IEAs also provide for the possibilities of technical training and capacity-building, especially for developing party members which do not have the necessary technical and technological infrastructure for the implementation of the IEAs. Developed countries especially may prefer to provide technical training and capacity-building rather than having to disburse funds for developing countries to implementation the IEA provisions. For developing countries, possibilities for benefiting from technical know-how and much needed training can prove to be an attractive package for participation. I can thus formulate the following hypotheses:

$\underline{H1b_1}$: The presence of clauses allowing for training and capacity-building tends to increase participation in IEAs.

$\underline{H1b_2}$: The presence of clauses allowing for training and capacity-building tends to increase participation from developing countries.

It has also been suggested that the minimum ratification clause (or the threshold number) acts as an incentive for enhanced IEC by minimizing opportunities for free-riding, and by providing more instances for additional benefits (e.g. Barrett 2000; Black *et al.* 1993; Carraro *et al.* 2003). Further, states' concerns with preventing loss in their relative or absolute power, and their interest in preventing loss of control on their national sovereignty may incite them to participate in IEAs only if they can be sure that a good enough proportion of the international community is committing to the same obligations and constraints stipulated within the relevant treaty texts. A high threshold number can therefore have a positive influence on participation in IEAs.

H1c: The higher the threshold number, the greater is the level of participation in an IEA.

While negotiating the texts of IEAs, there is always a concern with resolving the tension between IEA strength and IEA flexibility. It is critical to strike the right trade-off in order to secure maximum participation in the relevant IEAs. Several mechanisms have been utilized to increase the flexibility of IEAs *viz.* (i) the permissibility of reservations; (ii) the allowing of withdrawals from the treaty; and (iii) the provision of flexible dispute resolution methods. It is to be expected that countries prefer to sign flexible IEAs – for example, those offering the possibility of reservations (e.g. Birnie 1988; GAO 1992; Granda 1990; Hurrell and Kingsbury 1992; Sand 1992). Flexibility helps to provide a reassurance mechanism that states can still maintain their own control over their political and socio-economic decision-making and they can always find means to 'get out' if the IEAs prove to be too costly to them. This suggests that we can expect IEA flexibility to exert a positive effect on participation level. Thus, the following hypothesis can be postulated:

H1d: The more flexible an IEA is, the greater the level of participation in the IEA.

Closely related to the above argument is the fact that countries tend to prefer less binding commitments (Carraro 1999a). Strong IEA clauses clearly limit a state's ability to maintain full control over its domestic policies, which in essence translate into a loss of power. A few researchers (e.g. Sand 1992) have stated that developing countries seem to prefer to participate more in those conventions which have no binding commitments, and which are merely declaratory. This may likely be true since developing countries are still lagging behind the developed countries in terms of their economic and industrial development, and may therefore not welcome constraints of their development processes. In this context, a weak IEA may indeed seem more preferable than a strong one. The following hypotheses will test the influence of IEA strength on participation levels.

H1e$_1$: The stronger the IEA is, the lower the level of participation.

H1e$_2$: The stronger the IEA is, the lower the level of participation from developing countries.

Game theorists often claim that the nature of information available to countries is of fundamental importance for the latter to determine their costs and benefits for engaging in IEC. It can therefore be assumed that mechanisms which help to reduce uncertainties and increase transparency are bound to favor IEC. Accordingly, several researchers have stated that reporting requirements, by increasing transparency on implementation, help to reduce fears about other parties' free-riding and thereby increase the possibility of cooperation (Chayes and Chayes 1991; Chayes and Chayes 1995; Victor 1994). An increasing number of IEAs now include provisions for observership, either by NGOs or by other interested parties (e.g. other non-member states or United Nations (UN) agencies). I thus propose the following hypothesis to test the influence of transparency mechanisms on participation levels.

H1f: Presence of transparency requirements tends to increase the level of participation in the IEA.

4.2.2 Analysis of state characteristics

(i) Model II: The Power-Interest Model

Realist theory subscribes to the Hobbesian understanding of human nature, implying that human nature is evil, with a "lust to dominate" and driven by power motivations and security concerns (Kegley 1995 p.5; Smith 1986). With its state-centric focus on sovereignty, national security and power maximization, Realism considers that nation-states, viewed as unitary actors, are always struggling for power in an anarchic international system (e.g. Carr 1946; Morgenthau 1948 p. 28). World order is maintained through a perpetual quest for power balancing (Rengger 2000 p. 38). In this framework, therefore, states are concerned with 'relative gains.'

The Power-Interest model captures the major influence of Realist considerations on state participation in IEAs. Applying the Realist thesis to the field of participation in IEAs, I argue that states participate in IEAs only if the latter serve their national interests or enhance their power potential. In this model, national self-interests are to be understood as endeavors aimed at reducing environmental vulnerability and preventing negative economic impacts on the countries. I also use this model to test whether power, a core concept in Realist thought, has any influence on countries' levels of participation in IEAs. Traditionally, the following has been considered as basic sources of power: geographic size and position, natural resources, population, raw materials, military power, and industrial capacity (Mingst 2001 p. 106; Morgenthau 1948). I analyze some of these sources of power to determine their influence, if any, on participation level.

Hypotheses

A country which is strong militarily can be assumed to be able to impose its wishes on its neighbors and, in cases where the international community is involved, on the international community as well. Military power ensures that the state will be better able to safeguard its national security and its national self-interests. Thus, a country with great military power will be able to ward off international pressure for international environmental protection. It will participate only in those IEAs which do not pose any threat to its national security and self-interests and will shun those which do not benefit it. Also, it will not be too much concerned with international environmental standard-setting as it can easily dictate its needs to relevant countries through bilateral agreements. Hence, all things being equal, it is likely that substantial military power, or the desire to become more powerful militarily, will be positively related to a low level of participation in IEAs. This argument leads to my first hypothesis:

H2a: The greater the military power of a country, the lower its level of participation in IEAs.

However, the power of a state is not the exclusive domain of the military arena. It is generally acknowledged that high economic development enhances the power potential of a state. Apart from the fact that an economic hegemon can easily impose its wishes on the international community, developed countries also have to contend with domestic demands. Developed countries generally tend to have a more environmentally aware population and greater local environmental activism. Starting from the general premise that the catering to domestic public opinion is a strategy to maintain power and political stability, I expect that developed countries will be engaging more strongly in environmental protection in order to appease domestic public pressure. This higher level of domestic environmental regulation,

however, may negatively impact the competitiveness of the developed countries in the international market. As noted by several analysts, in view of the possibility of other countries 'free-riding' as well as producing pollution havens for industrial production, there is a possibility that the developed countries may suffer loss of their competitive advantage if environmental standards are not implemented globally (Congleton 1992 p. 412; Sage 1996). Relying on the general observation that developed countries are concerned with domestic environmental pressure and with the need to maintain economic and industrial power by deterring free-riding, I argue that developed countries will participate extensively in IEAs. This argument leads to my second hypothesis:

H2b: *The higher the level of economic and industrial development of a country, the higher its level of participation in IEAs.*

Closely linked to the notion of environmental security is the concept of environmental vulnerability. A state with a high degree of environmental vulnerability will face increased risk to its national security and hence will make increased efforts to engage in enhancing environmental protection. When threats to national security emanate from outside the territories of the state, the latter will make efforts to secure adherence to international norms and standards and to assurance mechanisms which provide security to its citizens. Environmentalists commonly consider high population density as aggravating a state's environmental vulnerability in view of the pressure exerted on the environment by the sheer number of people. Thus, states with high population density will feel the need to implement environmental measures to reduce their vulnerability, and in the process, will favor internationalization of environmental norms in order not to be at a competitive disadvantage globally.

Moreover, geographic contiguity, which in routine conflict studies tends to be correlated, together with military capability, with conflict-prone behavior and war-proneness (Doyle 1983 p. 878; Maoz and Russett 1993 p. 902; Vasquez 1993), takes on added importance in the field of IEC. Geographic contiguity, by virtue of its ability to render a state vulnerable (e.g. through the transboundary flows of pollutants) and thus less powerful, becomes a crucial variable potentially influencing states' participation in IEAs. A state which has a greater number of contiguous neighbors is more vulnerable to cross-border transport of environmental pollution than a state with a smaller number of such neighbors. Thus, to reduce its environmental vulnerability, the state will be more open to international standards. Based on these arguments, I formulate the next two hypotheses as follows:

H2c: A state with a high population density will participate in more IEAs than one with a low population density.

H2d: A state with a higher number of contiguous neighbors will participate in more IEAs than a state with a smaller number of contiguous neighbors.

Since Realist thought is preponderantly premised on the concept of national security, it can be stated that environmental protection, especially international environmental protection, will always take second place to national security. When there are issues related to domestic political destabilization, environmental protection will in fact become 'low politics'[50] and take the back seat. I therefore propose that countries with political instability will participate less in IEAs than those with political stability.

H2e: A politically stable country will participate in more IEAs than one with political instability.

[50] Researchers have traditionally made the distinction between the "low politics" of the environment as compared to the "high politics" of military and security issues (Keohane and Nye 1997 p.718; List and Rittberger 1998 p. 68; Schmidt 2002 p. 11).

It is also acknowledged that the scarcity of environmental resources has the potential of destabilizing internal security by giving rise to "internal decay and collapse" (Homer-Dixon 1991; Kaplan 1994). In order to avoid these threats to national security, states with access to limited resources will therefore try to regulate the environment both nationally and internationally in order to prevent internal destabilization. On the other hand, states with extensive natural resource bases, and with greater extent of raw materials, do not have to factor struggles over access to these resources within their short-term political decision-making. They will be able to exploit these resources unhampered and will not welcome extensive environmental regulations which may limit the use of these resources and thereby result in decreased economic, industrial and technological power. Hence, these states will not favor extensive participation in IEAs. This argument leads to the following hypothesis:

> *H2f: The larger the natural resource base of a country, the lower its level of participation in IEAs.*

(ii) Model III: The Liberal-Interdependent Model

Liberalism is generally associated with the freedom of the individual and the attendant rights and institutions (Doyle 1983 p. 871), a belief in the superiority of markets as compared to state regulation (Fukuyama 1992 p.44; Keohane 1989 pp. 10, 11), minimal government, and a liberty to participate in public affairs (Rosenau and Durfee 2000 p. 34). Institutions are deemed to change the payoff structure and catalyze cooperation though processes of iteration, the enhancement of transparency, the monitoring of violators' actions, and through the creation of a long 'shadow of the future' (Keohane 1984; Oye 1986).

In contrast with Realism, the Liberal school of thought considers states to be concerned with the maximization of 'absolute gains' as opposed to 'relative gains.' However, states are not

central to international politics. Also important are transnational and non-state actors. Keohane and Nye's (1997 p.718) concept of "complex interdependence" challenges Realism's core assumptions about the primacy of force in an international system characterized by state actors struggling for the maximization of power (also Keohane 1984). Complex interdependence is about a world in which non-state and transnational actors have a role to play in world politics, acting as "transmission belts" between governments (Keohane and Nye 1997 pp. 719, 720). Complex interdependence is also characterized by the absence of a "clear hierarchy of issues," such that there is no perpetual dominance of military security concerns (Keohane and Nye 1997 p. 719). Moreover, military force is often seen as an "ineffective instrument of policy," not always relevant for the resolution of disagreements (Keohane and Nye 1997 p. 719).

The Liberal-Interdependent model relies on the general propositions of the Liberal paradigm to arrive at possible determinants of state participation in IEAs. This model is a pure "second image" model in view of the fact that the premise of liberalism is grounded in domestic and transnational parameters. As stated by Legro (1999 p.10), "liberal assumptions underlie most of what are referred to as "second image" and many "second-image reversed" theories." This model tests hypotheses relating global trade flows, the role of civic organizations, and the domestic political and institutional structures of countries as variables influencing their levels of participation in IEAs. The specific hypotheses proposed are given hereunder.

Hypotheses

The 'Democratic Peace Theory' posits that liberal democratic states cooperate more easily with liberal democracies than with non-democracies (Chander and Tulkens 1997; Russett *et al.* 1993). This means that a liberal democratic state will tend to be more inclined to international cooperation than a non-democratic one, provided there is an international

preference for democracy, as is the case presently. Applying this premise for international cooperation to the field of international environment, I propose that liberal democracies will be desirous to cooperate more with each other to ensure international environmental protection than with non-democracies. An IEA being an instrument of international environmental cooperation, I thus expect that democratic countries will tend to participate more in IEAs than non-democratic ones (which is a general statement also made by Congleton 1992, among others; Neumayer 2002a; Sand 1992).

H3a: Countries which have a democratic political system tend to participate more in IEAs than those which have non-democratic political structures.

Moreover, strong and effective domestic governmental institutions can be considered as a prime element in ensuring meaningful commitment to international environmental protection. Without the necessary institutional framework, participation in IEAs can pose structural and logistic challenges. To capture this line of thought, I propose the second hypothesis for this model:

H3b: Countries with strong governmental institutions tend to participate in more IEAs than those with weak institutions

A state's level of participation in international environmental institutions may render that state more amenable to accepting international standards and obligations embodied within treaty texts by virtue of the state's higher exposure to international norms, principles and standards than another state which shies away from the international institutions. Thus, countries which are more densely involved in international environmental institutions can be assumed to be more likely to participate in IEAs in view of their greater acculturation to international environmental norms and standards. I propose the following hypothesis:

H3c: Countries which participate in international environmental institutions tend to participate in a greater number of IEAs than countries which do not participate in such institutions.

Analysts have shown that liberal economies tend to be typified by high levels of privatization and a good quality of life (e.g. Asthana and Shukla 2002). Moreover, liberal economies can also be characterized by economic freedom and high volumes of trade. If we consider that liberal states tend to participate in more IEAs than non-liberal ones, the following hypotheses can be postulated:

H3d: Countries with a higher quality of life will participate in a greater number of IEAs than those with a lower quality of life.

H3e: Countries with a liberal economy will participate in more IEAs than those with lesser economic freedom.

H3f: Countries with high volumes of trade will participate in more IEAs than those with low volumes of trade.

Under the liberal framework, citizens are deemed to be free to participate in national policy-making and in organizing based on their interests. Agenda 21 includes several sections dealing with the strengthening of civil society in order to facilitate citizens' participation in policy formulation for sustainable development (OECD 2001 p.109). Thus, for sound environmental policies, it can be deemed that citizens who are environmentally aware will organize better to strengthen the civil society as well as to promote environmental protection than those who are illiterate and unaware of the issues. I thus argue that local civic environmentalism will foster greater participation in IEAs.

H3g: Countries with a greater extent of civic environmentalism will participate in a greater number of IEAs than one with low civil society engagement.

(iii) Model IV: The Developing-Logistics Model

Prior to the Rio Conference, the Forum of International Law of the Environment, which was convened in Siena from 17-21 April 1990, considered the issue of IEA participation and the means of widening such participation, with particular emphasis on overcoming the difficulties met by developing countries in ratifying such treaties (Maffei *et al.* 1996). The desirability of securing the participation of developing countries in treaties has also been recognized in Agenda 21.[51] However, securing commitment from developing countries needs to overhaul many of the traditional N-S acrimonies which have typified international debates for decades.

Developing countries view the developed world's call for greater environmental protection with distrust, equating it with attempts to subvert their economic development or trade (Springer 1988 p.51; Wells 1996 p.6), while at the same time enhancing their own economic interests (Harvard Law Review 1992). The North, on the other hand, believes that the South only indulges in "pressure tactics" to obtain foreign aid (Najam 1993). Issues on which there has always been discord are the seemingly diverging goals of environmental protection and the need for development. While the North focuses on measures to protect the environment, the developing countries tend to be concerned with "market access, investment, access to technology, and financing" (Rosenberg 1994).

The fourth model of this study, the developing-logistics model, aims to provide a means of assessing determinants of developing country participation in IEAs. Variables which will be

[51] Agenda 21. Chapter 39.1(c). Available at the web page of the UN Department of Economic and Social Affairs. Division for Sustainable Development.
http://www.un.org/esa/sustdev/documents/agenda21/english/agenda21toc.htm

analyzed are those that bear special significance to developing countries – for example, foreign aid dependency, corruption, poor sanitation, malnutrition, and high rates of infant mortality, *inter alia.* The hypotheses for this model are given below.

Hypotheses

For successful formulation and implementation of environmental policies, a state needs to benefit from political stability and a well-functioning government system (Brinkerhoff and Gage 2002; Cowhey 1993), low levels of corruption (Morrell and Poznanski 1985), a strong civil society, an environmentally aware population, and good economy (Evans 2000; Von Prittwitz 1990). These influences seem to be more decisive for developing countries as they seem to be more prone to problems associated with corruption, high levels of debt, unstable governing structures, and poor quality of life, *inter alia.*

High poverty levels within the developing world cannot be dissociated from the latter's high debt burdens and high dependency on foreign aid. Debt servicing allocates much needed resources away from programs to improve citizens' quality of life, with the result that there is no social and environmental improvement. Poverty thus establishes a vicious circle, where poverty, combined with other stressors such as population growth, perpetuates a deterioration of environmental and social living conditions. The scourge of poverty is also often compounded by internal problems associated with political corruption and drug trafficking. Marshall J. (1991) has documented extensively the corruption of political leaders and their connection with or their protection of major drug traffickers in third world countries such as Mexico, Bolivia, Colombia, Thailand, and Peru, among others. Unfortunately, few studies have elaborated on the degree of corruption and no empirically validated links have been established between corruption levels and participation in IEAs.

Assuming that commitment to domestic environmental protection also leads to international environmental commitment, I argue that developing countries' participation in IEAs is determined by factors such as malnutrition, high rates of infant mortality, poor sanitation, corruption, and foreign aid dependency, *inter alia.* These social challenges are deemed to erode the capacity of the developing countries to commit to international environmental protection measures. I thus formulate the following hypotheses to test the influence of these parameters on the participation of developing countries in IEAs:

H4a: A developing country with a greater control on corruption will tend to participate in more IEAs than one with a lower level of such control.

H4b: A developing country with a higher level of undernutrition will participate in fewer IEAs than a developing country with a lower level of undernutrition.

H4c: A developing country with a higher level of infant mortality will participate in fewer IEAs than a developing country with a lower level of infant mortality.

H4d: A developing country with a higher level of sanitation will participate in a greater number of IEAs than a developing country with a lower level of sanitation.

H4e: A developing country with a greater extent of foreign aid dependency will participate in fewer IEAs than one with a smaller dependence of foreign aid.

Developing countries are typically not empowered to produce military equipment. They rely mostly on arms imports from other countries to build their military arsenal. It is quite a paradox that while many developing countries cannot allocate much scarce resources for the improvement of their citizens' quality of life, they nevertheless spend enormous amounts of economic resources on empowering their military divisions. This state of affairs can sometimes be related to problems of civil war, or to insecurities elicited by neighboring hostile countries or

external powers exerting their military prowess in an international structure governed by anarchy and concerns with relative power gains. It can thus be assumed that developing countries which are investing heavily in empowering their military divisions through massive arms imports will be less likely to be concerned with the international environmental protection. This leads to the following hypothesis:

H4f: Countries which are engaged in higher levels of arms imports will tend to participate less in IEAs than countries which do not import high amounts of arms.

On the more positive side, it may be expected that developing countries which exhibit greater economic development or which are more open to trade may likely be more willing to participate in more IEAs than those which do not exhibit such tendencies.

H4g: Developing countries which exhibit greater economic development or which are more open to trade tend will participate in more IEAs than those which have lower economic development or trade transactions.

Finally, it can be hypothesized that developing countries which benefit from greater levels of democracy and greater levels of local environmental activism will participate more in IEAs in view of the positive role that democracy plays in empowering the population and in opening up national debates on environmental protection.

H4h: Developing countries which are more democratic will participate in more IEAs than those which are less democratic.

H4i: Developing countries with a higher level of civic environmentalism will participate in more IEAs than their counterparts with a lower level of such civic activism.

(v) The Interactive Model

While models II-IV above provide a snapshot of potential determinants of participation, they nevertheless provide only a partial understanding of participation. It is not likely that a 'pure' Realist or a 'pure' Liberal explanation of participation can provide a true picture of how decisions are made by national leaders. While the dichotomization of theorizing on IEA participation provided by Models II and III above provide a parsimonious understanding of potential determinants of participation, there is a need to test the independent effect of each of the crucial variables of each model, while holding constant the variables of all the other competing models. This is the purport of this fifth model, the interactive model.

The interactive model posits that both Realist and Liberal considerations may likely play a role in influencing state participation in IEAs. While a state may participate in more IEAs if it faces a greater level of environmental vulnerability, that state may also be less likely to participate in IEAs if it has weak governmental institutions, if it has low density of interaction in international environmental institutions, or if it is simply logistically constrained by endemic factors such as poverty and corruption. Similarly, even if a state is powerful militarily, it may still be open to participation in IEAs in view of pressures placed on its decision-making mechanisms by civic environmentalism or a democratic political system which opens up avenues for citizens' contest of the decisions of political figures. It is also possible for a state with a high participation in international environmental institutions or with high levels of economic freedom and high volumes of trade to resist participation in IEAs because of concerns with the negative impacts on those of its industries which are heavily reliant on natural resource exploitation.

Which of the above scenarios actually play out in real policy-making? It is likely that environmental vulnerability may play an important part in a nation's decision to participate in an

IEA, irrespective of its level of economic or political development. Thus, variables such as contiguity and population may matter in the overall decision-making process. Further, concerns with maintaining power cannot be overruled in political calculations. This means that we need to include military expenditures and the extent of natural resource base of a state to control for this concern with power enhancement and sustenance. Apart from these Realist variables, it is likely that the political system is also open to Liberal considerations in national policy-making. The nature of the political regime certainly matters as it acts as the basic source of all national and international policies. The permeability of the state to the influence of international environmental institutions will also likely influence the propensity of the state to participate in IEAs. Finally, the influence of inherent domestic constraints such as poverty and corruption need to be considered in tandem with the other variables.

4.3 Conclusion

As I have presented in the conceptual model (Figure 1) in Chapter One, participation in IEAs can be considered to be influenced parsimoniously by: (i) IEA characteristics; and (ii) state characteristics. The various models proposed in this study test various treaty and state characteristics which may potentially impact a state's decision to participate in an IEA or not. Model I focuses on specific treaty variables such as strength, flexibility, and threshold number. Models II and III test variables that matter in the Realist and Liberal schools of thought. Model IV analyzes endemic structural constraints of the developing world. Finally, to provide an integrated understanding of state participation in IEAs, Model V tests the independent effect of the crucial variables of Models II-IV, with all the other predictors being held constant.

In the next Chapter, I establish the research design for the study and present the results of the analysis.

5. RESEARCH DESIGN AND ANALYSIS

The previous chapter delineated the hypotheses to be tested in this study. In the present Chapter, I specify the research design for the analysis and provide the results of the study. I conclude this chapter with a general discussion of the findings of the study.

5.1 Research Design

In this study, the dependence of IEA participation on specific country and treaty characteristics is investigated using multiple linear regression analysis. For the analysis of IEA design, the dependent variable is the total number of countries that are participants to each specific treaty. For the analysis of state characteristics, the dependent variable, IEA participation (P), is the total number of global IEAs ratified by any specific country. The general formula summarizing this study can be given as:

$$P = F\ \{f_1(\text{IEA characteristics}), f_2(\text{state characteristics})\}$$

This analysis is divided into two parts:

(i) analysis of the influence of IEA characteristics on state participation in IEAs; and

(ii) analysis of the influence of state characteristics on state participation in IEAs.

5.2 Model Building

5.2.1 Model I: Influence of IEA design on IEA participation

This section of the study uses the legal provisions of IEA texts as the unit of analysis. The analysis therefore relies on extensive content analysis with appropriate coding of the IEAs based on variables of interest. Thirty-one treaties (as given at Annex 3) were selected so as to have

roughly the same number of IEAs from various issue areas. The IEAs were selected as follows: 10 IEAs dealing with natural resources and nature conservation; 7 IEAs dealing with the atmosphere; 6 IEAs dealing with hazardous substances and nuclear radiation; and 8 IEAs dealing with marine waters and marine resources. Moreover, eight of the IEAs were framework conventions and six were protocols.

The dependent variable, participation, was compiled based on membership data obtained from the ENTRI database of SEDAC/CIESIN. For this model, three dependent variables are used: (i) total participation, $P_{T,}$ calculated as a percentage of total allowable parties; (ii) developed country participation, $P_{DD,}$ calculated by dividing the total number of developed country members by the total number of developed countries allowed to participate; and (iii) developing country participation, P_{DG}, obtained by dividing the total number of developing party members by the total number of developing countries allowed to participate.[52]

This part of the analysis relies on the hypotheses formulated in Section 4.3.4 and the main themes to be examined pertain to treaty provisions relating to strength, flexibility, transparency, financial transfers, capacity building, and threshold number.

The following equation summarizes the investigation:

$$P_{T/DD/DG} = \alpha + ß_1(\text{strength}) + ß_2(\text{transparency}) + ß_3(\text{financial mechanism}) + ß_4(\text{threshold number}) + ß_5(\text{capacity-building}) + ß_6(\text{flexibility}) + \xi$$

Operationalization of variables

A strong IEA characteristically embodies clear quantitative targets, implementation deadlines, requirements for enactment of legislation, review and verification mechanisms, and

[52] All the IEAs considered in the analysis were global IEAs. The total number of countries included in the dataset is 196, with 44 developed and 152 developing states. Thus, for total participation, $P_{T,}$ actual participation level was divided by 196, and by 44 and 152 to yield the percentages for developed and developing country participation respectively.

membership or trade sanctions, among others. To construct the 'strength' variable, the total score of the IEAs was calculated based on the presence (or absence) of each of these measures for 'strength.' Transparency was obtained by adding the score for: whether the IEA allows NGOs and other organizations to act as observers in the proceedings of the treaty affairs; the requirement to prepare yearly reports either by the parties or by the treaty bodies; and the requirements for parties to report on their implementation measures. Capacity-building relates to whether the IEA allows for education, training or specifically refers to the term 'capacity-building' in its provisions. Flexibility of the IEA is determined by whether the agreement allows individual party to propose amendments and whether the IEA allows parties to settle disputes through negotiations first. The threshold number is obtained direct from the IEA text which normally specifies the minimum number of ratifications required before the IEA can enter into force. Similarly, the text also normally specifies whether financial transfers can occur.

Presence of specific treaty provisions was coded as 1; absence was coded as 0. The coding template is provided in Table 1 below and the full dataset is as given at Table 16 at Annex 4. Table 17 at Annex 5 summarizes the descriptives of the dependent and independent variables for Model I.

Table 1: Operationalization of variables for Model 1

MODEL IV **Legal-Incentives**		
CODE	Legal provisions analyzed	VALUES
Strength	Presence of: (i) legislative requirements [1,0]; (ii) review [1,0] and verification mechanisms [1,0]; (iii) target deadlines [1,0]; (iv) trade [1,0] or membership sanctions [1,0]; (v) requirement for participation for specific countries (or group of countries) before into force [1,0]	Maximum possible value of 7; minimum 0.
Transparency	Presence of: (i) observership by NGOs [1,0] and other interested parties [1,0]; (ii) presence of reporting requirements [1,0]; (iii) requirements for submission of yearly reports	Maximum possible value of 5; minimum 0.

	by parties [1,0] and by treaty bodies [1,0]		
Threshold	Minimum participation requirement		As stipulated in treaty text: minimum value of 3; maximum of 60
Dispneg	Provisions for dispute resolution by negotiation first		Minimum of 0; maximum of 1.
Amendpty	Provision for any party to propose amendments to the treaty		Minimum of 0; maximum of 1.
Fintransfers	Provisions for financial transfers among parties		Minimum of 0; maximum of 1.
Capacity	(i)	Provisions for education, training, or capacity-building [1,0]	Minimum of 0; maximum of 3.
	(ii)	Provisions for technical and scientific cooperation [1,0]	
	(iii)	Provisions for cooperation on Research and Development [1,0]	

5.2.2 Models II, III, IV and V: Influence of country characteristics on IEA participation

The unit of analysis for this portion of the research template is the 'sovereign state.' This analysis relates selected country variables to their total level of participation in IEAs. The participation of 196 nations in 110 global IEAs (as at Annex 2) is analyzed. The dependent variable, P, was compiled based on participation data obtained from the ENTRI database of SEDAC/CIESIN. The total number of global IEAs to which a specific country is a party member was totaled to give that country's level of participation, P. Details on each of the models for this part of the analysis are provided below.

(i) Model II: Power-Interest Model

To establish the relationship between P and characteristics governing Model II (Power-Interest model), the following equation is used:

$$P = \alpha + \beta_1 (\text{industrial development}) + \beta_2(\text{economic development}) + \beta_3(\text{political stability}) + \beta_4 (\text{natural resources}) + \beta_5 (\text{raw materials}) + \beta_6(\text{population density}) + \beta_7(\text{contiguity}) \beta_8(\text{military power}) + \xi$$

Operationalization of the independent variables

Industrial and economic development can be obtained fairly accurately from the level of industrial and economic growth sustained by the relevant states. Thus, industrial development is operationalized by using the average annual percentage industrial growth and economic development was operationalized through use of the Gross Domestic Product (GDP) per capita. A direct measure of political stability is not readily available. To operationalize 'political stability,' I have coded the countries dichotomously: countries which have experienced a military coup from 1945 onwards or which are presently engaged in civil wars have been coded as 1; those which have been free from such political turmoil have been coded as 0.

There is no single measure for the full natural resource base of a state. To operationalize this variable, I have considered the extent of forest resources and the extent of raw materials as proxies for the natural resources of the state. Within the context of global environmental protection, forest resources are highly prized in view of their various functions in maintaining ecological stability and protecting against global warming. Raw materials are also important in view of their association with pollutant loads, mostly through extractive processes, and with the concept of power. An overall index for the complete set of raw materials of countries could not be identified. As a proxy for the extent of raw materials, I have therefore used the total value of mineral production, relying on the assumption that states with a higher extent of mineral resource production (as deduced from the value of mineral production) will likely be the depositories of a large extent of such raw materials.

An overall index of environmental vulnerability is non-existent. To capture the variable 'environmental vulnerability,' I have used the proxies of population density and contiguity. It is widely acknowledged in the literature of environmental management that high population density exerts a pressure on the environment by either causing greater environmental degradation or greater depletion of the environmental resources. Thus, high population density results in enhanced environmental vulnerability in view of the greater scarcity of resources, as well as the greater level of environmental deterioration engendered by the higher numbers of people per unit area. Contiguity also enhances a state's environmental vulnerability as it makes the state more susceptible to cross-border transport of pollutants. A nation with a high density of contiguous neighbors will have porous international borders in terms of diffusion of pollutants. The state will thus be vulnerable to any possible laxity in environmental measures present in the neighboring states since pollution transfers do not respect geographical or jurisdictional boundaries.

(ii) Model III: Liberal-Interdependent Model

To establish the relationship between P and characteristics governing Model II (Liberal-Interdependent model), the following equation is used:

$$P = \alpha + \beta_1 (\text{democracy}) + \beta_2(\text{quality of life}) + \beta_3(\text{liberal economy}) + \beta_4(\text{strong governmental institutions}) + \beta_5(\text{trade volume}) + \beta_6(\text{participation in international environmental institutions}) + \beta_7 (\text{local environmental activism}) + \xi$$

Operationalization of the independent variables

The level of democracy is given by the Polity score obtained from the 2005 Environmental Sustainability Index (ESI) database,[53] which is an average of the Polity scores for 1993-2002. To measure the strength of governmental institutions, World Bank's measure of governmental effectiveness is used. This measure assesses the "quality of public service provision, the quality of bureaucracy, the competence of civil servants, the independence of civil service from political pressures, and the credibility of the government's commitment to policies" (ESI, 2005). The Human Development Index (HDI) of the United Nations Development Programme (UNDP) is used to provide an indication of the quality of life in a country. HDI is a composite measure of the level of achievement of a country in three areas: longevity (measured by the life expectancy at birth), knowledge (measured by a combination of the adult literacy rate and the combined primary, secondary and tertiary gross enrolment ratio), and the standard of living (GDP per capita, PPP $US).[54]

To operationalize 'liberal economy,' the proxy of 'economic freedom' is used, based on the argument that all liberal economies can be characterized by a certain degree of economic freedom. An index of economic freedom is available from the dataset provided in the 2002 World Rankings database. Volumes of trade are measured directly by the total volumes of trade carried out in the state, and this is available from the World Development Indicators database. Civic environmentalism is generated by the local involvement of civic groups in environmental governance issues. UNCED's Agenda 21 promotes the development of local development initiatives within communities worldwide to promote environmental sustainability. As a proxy for civic engagement, the total number of such local Agenda 21 initiatives in a particular country is used. As a measure of the level of state participation in international environmental

[53] Accessible online at http://www.ciesin.columbia.edu/indicators/ESI/ ; full dataset available at http://www.yale.edu/esi/

[54] More details on the calculation of the HDI are provided at http://www.undp.org/.

institutions, the participation of states in environmental intergovernmental organizations (IGOs) is used.

(iii) Model IV: The Developing-Logistics Model

To establish the relationship between P and characteristics governing Model IV (Developing-Logistics Model), the following equation is proposed:

$$P = \alpha + \beta_1(\text{corruption}) + \beta_2(\text{foreign aid dependence}) + \beta_3(\text{undernourishment}) + \beta_4(\text{infant mortality}) + \beta_5(\text{access to proper sanitation}) + \beta_6(\text{democracy}) + \beta_7(\text{arms imports}) + \beta_8(\text{volume of trade}) + \beta_9(\text{civic engagement}) + \beta_{10}(\text{economic development}) + \xi$$

Operationalization of the independent variables

Many of the variables for model IV can be measured directly by existing data. For example, undernutrition, infant mortality, access to proper sanitation facilities, trade volume, and arms imports can be directly operationalized, respectively, by the percentage of population suffering from malnutrition, the rate of infant mortality, the percentage of population with access to proper sanitation facilities, the trade in goods as a percentage of GDP, and arms imports as a percentage of total trade. Corruption is operationalized through a measure obtained from the 2005 ESI database, which provides an indication of the level of control on corruption within states. This measure (GRAFT) is based on surveys of households, firms and public officials. Foreign aid dependence is proxied by the level of official development assistance (ODA) received by a state per capita, relying on the presumption that the more ODA received by a state per capita, the greater the reliance of the state on foreign aid. This measure is directly available from the Human Development Report (HDR) of the UNDP. Finally, democracy, civic environmentalism and economic development are measured in the same way as detailed for Model III above.

Model V: The Interactive Model

Based on Section 4.3.2 (v), the following equation is proposed to capture the independent influence of variables from Models II, III and IV above.

$$P = \alpha + ß_1(\text{corruption}) + ß_2(\text{foreign aid dependence}) + ß_3(\text{contiguity}) + ß_4(\text{volume of trade}) + ß_5(\text{military power}) + ß_6(\text{democracy}) + ß_7(\text{participation in international environmental institutions}) + ß_8(\text{mineral resources}) + ß_9(\text{civic engagement}) + ß_{10}(\text{quality of life}) + ß_{11}(\text{HDI}) + \xi$$

The operationalization of these variables has already been described in the relevant sections above. Tables 5, 6 and 7 provide a summary of the independent variables for the various models as well as the sources of data.[55] Table 18 at Annex 6 summarizes the descriptives of the dependent and independent variables for Models II, III and IV (and therefore V).

Table 2: Independent variables for Model II

POWER-INTEREST MODEL
Dependent variable: Participation, P

Independent Variables	Description	Source	Measure of
Gdpcap1	GDP per capita, 1999 (PPP $US)	Human Development Report (HDR), 2001,[56] Table 1	Economic development
Indgth	Average annual percentage industrial growth, 1990-2000	World Development Indicators (WDI), 2002 Table 4.1	Industrial development
Milcoup	Political stability[57]	Countries of the world and their leaders yearbook, 1993; Wikipedia online encyclopedia[58]	Political stability

[55] Model V is not included in the tables as the independent variables are the same as those from Models II, III and IV.
[56] Accessible online from http://hdr.undp.org/
[57] Countries which have experienced military coups from 1945 onwards or which are presently engaged in civil wars are coded as 1; the remaining countries are coded as 0.
[58] Accessible through www.wikipedia.org/

Forest	Forest area, as a percentage of total land area, 2000	World Development Indicators (WDI), 2002 Table 3.4	Extent of natural resources
Mineral	Mineral Production Value in US$(m), 2001	World Rankings, 2001,[59] Table 12.3	Extent of raw materials
Popdens	Population density, people/km^2, 2000	WDI, 2002 Tables 1.1 and 1.6	Environmental vulnerability
Contiguity	Total number of contiguous neighbors[60]	Wikipedia online encyclopedia	Environmental vulnerability
Milexp	Military expenditures, % of central government expenditures, 1999	WDI, 2002 Table 5.7	Power

Table 3: Independent variables for Model III

LIBERAL-INTERDEPENDENT MODEL
Dependent variable: Participation, P

Independent Variables	Description	Source	Measure of
Polity	Democracy measure (high values correspond to high levels of democratic institutions); Average of 1993-2002 Polity.[61]	Environmental Sustainability Index (ESI)[62] 2005;	Democratic governance
HDI	Human Development Index, 1999	HDR, 2001	Quality of life
Ecofree	Economic Freedom Index, 2001 (lower values correspond to greater economic freedom)	World Rankings, 2001, Table 8.12	Liberal economy
Goveff	Strong governmental institutions, 2002	World Bank[63]; also available from ESI 2005	Strength of governmental institutions
Tgoods	Trade in goods, % of GDP, 2000	WDI 2002, Table 6.1	Volume of trade
Eionum	Number of memberships in environmental intergovernmental organizations (out of 100), 2003-2004	ESI 2005	International acculturation to environmental norms and standards

[59] Kurian, George Thomas. 2001. *The Illustrated Book of World Rankings.* Armonk, N.Y.: Sharpe Reference.
[60] The total number of contiguous neighbors for each country was totaled, based on information provided on each country as provided by the Wikipedia Online Encyclopedia.
[61] Also available at http://www.cidcm.umd.edu/inscr/polity/#exec
[62] Accessible online at http://www.ciesin.columbia.edu/indicators/ESI/ ; full dataset available at http://www.yale.edu/esi/
[63] Data available from http://www.worldbank.org/wbi/governance/govdata2002/index.html

Agenda21	Number of Local Agenda 21 initiatives per million population, 2001	ESI, 2005	Civil society engagement in environmental governance

Table 4: Independent Variable for Model IV

DEVELOPING-LOGISTICS MODEL
Dependent Variable: Participation, P

Variable Code	Description	Source	Measure of
Graft	Corruption measure (high scores correspond to effective control of corruption), 2002	ESI 2005	Corruption
Undernutrition	Prevalence of undernourishment, % of population, 1996-1998	WDI 2002, Table 2.18	Quality of life
Sanitation	Access to sanitation facilities, % of population, 2000	WDI 2002, Table 1.3	Quality of life
Imortality	Under five mortality rate per 1000 live births, 1999	HDI 2001, Table 8	Quality of life
Odacap	ODA received per capita , US$, 1999	HDR, 2001 Table 15	Foreign aid dependency
Arms	Arms trade, Imports as % of total imports, 1999	WDI, 2002 Table 5.7	Arms imports
Gdpcap1	GDP per capita, 1999	HDI 2001, Table 1	Economic development
Tgoods	Trade in goods, % of GDP, 2000	WDI, 2002, Table 6.1	Volume of trade
Polity	Democracy measure (high values correspond to high levels of democratic institutions), average of 1993-2002.[64]	Environmental Sustainability Index (ESI)[65] 2005;	Democratic governance
Agenda21	Number of Local Agenda 21 initiatives per million population, 2001	ESI, 2005	Civil society engagement in environmental governance

The variables for Model V are extracted from Models II-IV and these have already been described above.

[64] Also available at http://www.cidcm.umd.edu/inscr/polity/#exec
[65] Accessible online at http://www.ciesin.columbia.edu/indicators/ESI/

5.3 ANALYSIS

The various models have been analyzed through multiple linear regression analysis with Stata 8.0. Preliminary analyses of Pearson's correlation coefficients do not show any strong correlations among the independent variables (Tables 9-13 at Annex 7). For Model I, the highest correlation is between threshold number and provisions for financial transfers (fintransfers), with a correlation of 0.821. For Model II, the highest correlation is between GDP per capita (gdpcap1) and mineral production value in its natural log form (mineral_t), being of a value of 0.387. For Model III, the highest correlation of 0.686 is between local Agenda 21 initiatives in its natural log form (agenda21_t) and governmental effectiveness (goveff). The highest correlation in Model IV is of 0.652 between infant mortality (mort) and the population's access to sanitation facilities (sanitation). For Model V, mineral production value, in its natural log form, shows a correlation of 0.6291 with HDI, the highest for the model.

The high correlation of 0.821 in Model I does not seem to constiture a collinearity problem for Model I. The Variance Inflation Factor (VIF) for the different regressors of Model I all range below 5, showing that collinearity is not affecting the regression coefficients. Models II, III, IV and V also do not depict collinearity problems, as shown by their low VIF values (see Annex 8).

Two-way scatter plots between the dependent and independent variables show that some of the relationships are not linear. For example, the graph of participation and ODA/capita, or of participation and population density are not linear. For multiple linear regression to provide unbiased estimates of the parameters, variables can be transformed to establish a linear relationship where such is not apparent. Using the 'ladder' function in Stata 8.0, the best transformation for the non-linear variables was obtained based on the chi-square value of the transformation. For the non-linear variables of population density, mineral value production,

number of Agenda 21 initiatives, ODA/capita, and population suffering from undernutrition, the natural log transformations were the best, with the smallest chi-square. These transformations were further checked for linearity by their partial plots.

A preliminary analysis was done for all the models and the plots of residuals versus predicted values were analyzed to detect any patterns in the plots. Though there was no definite pattern in the plots, which hints at lack of heteroscedasticity, the regressions were rerun with robust standard errors to control for any non-visual heteroscedasticity that may be present in the data. Moreover, to test the normality assumptions underlying the multiple linear regression analyses, I made use of the Jarque-Bera (JB) test, which provides a test for any non-normality in the residuals. The hypotheses for the JB test are as follows:

H_o: The residuals are normally distributed

H_a: The residuals are not normally distributed

For all models, the JB test fails to reject the null hypothesis of the distribution being normal at a significance level of 0.05. In other words, the JB test shows that no statistically significant claim can be made that the distribution is not normal.[66]

The results of the regression analyses are presented in Tables 5-11 below.

5.4 RESULTS

5.4.1 REGRESSION RESULTS FOR MODEL I

Table 5: Regression Results for Model I

Model I Total Participation					
	Unstandardized		Standardized		

[66] For Model I, the probability that the JB statistic of 1.41 would exceed the critical value is 0.4929 for the first regression; for the second regression, the JB is 2.24 and the prob > chi2 is 0.3263; for the third regression, the JB statistic is 0.29 and prob >chi2 is 0.8640. For Model II, the JB statistic is 0.87 and prob > chi2 is 0.6484; for Model III, JB = 0.66, and prob >chi2 is 0.7176; for Model IV, the JB statistic is 0.01 and prob >chi2 is 0.9970. For Model V, the JB statistic is 0.50 and prob >chi2 is 0.7791.

P_T	coefficients		coefficients		
	B	Robust Standard Error	Beta	t	Significance
Constant	19.381	8.376		2.31	0.030
Strength	-12.247	5.370	-0.453	-2.28	0.032**
Transparency	7.728	3.273	0.441	2.36	0.027**
Threshold	0.291	0.441	0.155	0.66	0.515
Dispneg	19.404	10.650	0.331	1.82	0.081*
Amendpty	6.334	9.946	0.095	0.64	0.531
Fintransfers	2.488	15.463	0.036	0.16	0.874
Capacity	-1.085	5.707	-0.043	-0.19	0.851

N	31
R^2	0.5009
F-statistic$_{(7, 23)}$	8.47***

*** significant at the 0.005 level
** significant at the 0.05 level
* significant at the 0.1 level

For the above model, the F-value of 8.47 is statistically significant at $p < 0.005$, showing good model fit. In line with theoretical expectations, stronger agreements show a negative association with participation, and flexible provisions such as emphasizing negotiations as a means of dispute settlement or allowing any party to propose amendments to the IEA texts, show a positive relationship with participation. The variable 'capacity' is showing a negative relationship with participation, implying that there is a tendency among states to view provisions for capacity-building in an unfavorable light.

Variables which are statistically significant at the 5% level are 'strength' and 'transparency', while 'dispneg' (dispute settlement through negotiation) is statistically significant at the 10% level. The threshold number, together with 'amendpty' (amendment by party), 'fintransfers' (financial transfers), and 'capacity' are not statistically significant.

From these results we can conclude that IEAs which have strong clauses tend to elicit lower participation rates, while IEAs which favor dispute resolution through negotiation tend to sustain higher levels of participation from the international community. Further, IEAs which

include transparency measures, such as allowing NGOs and other interested parties to act as observers, or requiring parties to report on their implementation, tend to elicit higher participation rates from the international community.

With all other variables held constant, the incorporation of an additional clause for strengthening an IEA will result in a loss of participation from 12 states, while the inclusion of an additional clause for increasing the transparency of an IEA will cause the IEA to sustain participation from 7 additional states. The legal possibility of resolving disputes through negotiations first will tend to increase participation in an IEA by 19 more states.

From the beta weights of the variables, the strength of an IEA seems to exert the greatest influence on total participation, followed very closely by the transparency provisions of the IEA. With all other variables held constant, an increase of one standard deviation in the strength of an IEA will result in a decrease of 0.45 standard deviation in total participation, while an increase of one standard deviation in the transparency of the IEA will result in an increase of 0.44 standard deviation in total participation. Similarly, with all other variables held constant, an increase of one standard deviation in the variable 'dispneg' (dispute resolution through negotiation) will cause an increase of 0.33 standard deviation in participation.

Table 6: Regression Results for Model I - Developed Countries

Model I Participation from developed countries P_{DD}					
	Unstandardized coefficients		Standardized coefficients		
	B	Robust standard error	Beta	T	Significance
Constant	35.584	12.820		2.78	0.011
Strength	-12.336	5.515	-0.472	-2.24	0.035**
Transparency	7.767	3.860	0.458	2.01	0.056*
Threshold	0.044	0.520	0.024	0.08	0.933
Dispneg	20.639	10.862	0.364	1.90	0.070*
Amendpty	-1.990	13.004	-0.031	-0.15	0.880
Fintransfers	-4.652	14.626	-0.069	-0.32	0.753
Capacity	2.261	6.654	0.093	0.34	0.737

N	31
R^2	0.4178
F-statistic$_{(7, 23)}$	4.21***

*** significant at the 0.005 level
** significant at the 0.05 level
* significant at the 0.1 level

The F-statistic (value of 4.21) is significant at $p < 0.005$, attesting to good model fit. Strong clauses within an IEA seem to detract from high participation from developed countries, while transparency provisions seem to attract more developed states to participate in the IEA. Moreover, developed countries seem not to favor clauses allowing any party to propose amendments to the treaty text, as well as clauses allowing financial transfers to take place among parties. On the other hand, developed countries seem to favor measures for capacity-building.

Variable 'strength' is statistically significant at the 5% level, while 'transparency' and 'dispneg' (dispute settlement through negotiation) are statistically significant at the 10% level. Variables 'threshold', 'amendpty', 'fintransfers' and 'capacity' do not show any statistical significance with participation from developed countries.

The results show that developed countries tend to participate less in stronger agreements, and more in those agreements which include provisions enhancing transparency or favoring dispute settlement through negotiations. With all other variables held constant, the inclusion of one additional clause for strengthening an IEA will cause a decrease in participation from 12 developed countries. One additional clause for enhancing the transparency of an IEA will result in an increase in participation from 7 more developed nations. Presence of a clause allowing dispute resolution through negotiation will result in an increase in participation from 20 developed countries.

From the beta weights, the strength of an IEA seems to exert the greatest influence on participation from developed countries, followed by the presence of transparency clauses. With all other variables held constant, an increase of one standard deviation in the strength of an IEA will result in a decrease of 0.47 standard deviation in participation from developed countries, while an increase of one standard deviation in the transparency of an IEA will result in an increase of 0.46 standard deviation in participation from developed countries. Though not statistically significant, the presence of a clause allowing for financial transfers seems to have an adverse impact on participation from developed countries, as does a clause allowing parties to bring amendments to the IEA texts.

Table 7: Regression Results for Model I - Developing Countries

Model IV Participation from developing countries P_{DG}					
	Unstandardized coefficients		Standardized coefficients		
	B	Robust Standard Error	Beta	T	Significance
Constant	14.746	7.610		1.94	0.065
Strength	-12.042	5.442	-0.433	-2.21	0.037**
Transparency	7.791	3.258	0.432	2.39	0.025**
Threshold	0.328	0.438	0.170	0.75	0.461
Dispneg	19.016	11.017	0.316	1.73	0.098*
Amendpty	8.383	9.526	0.122	0.88	0.388
Fintransfers	4.509	16.527	0.063	0.27	0.787
Capacity	-1.875	5.739	-0.073	-0.33	0.747

N	31
R^2	0.504
F-statistic$_{(7, 23)}$	9.22***

*** significant at the 0.005 level
** significant at the 0.05 level
* significant at the 0.1 level

The F-statistic (value of 9.22) is statistically significant at a p-value of less than 0.005 level. The direction of the regression coefficients show that developing countries tend not to favor strong IEAs and those which have provisions for capacity-building, and to prefer IEAs

which are transparent, include provisions for amendments by any party, allow for dispute resolution through negotiations first, and include mechanisms for financial transfers.

The variable 'Strength' and 'transparency' are both statistically significant at the 5% level, while 'dispneg' (dispute settlement through negotiation) is statistically significant at the 10% level. The variables threshold, 'amendpty' (any party to bring amendment to IEA text), 'fintransfers' (provisions for financial transfers) and 'capacity' do not depict statistical significance with participation from developing countries.

The results show that developing countries tend to participate less in stronger IEAs than in weaker ones, and that they favor IEAs which enhance transparency and favor flexibility. With all other variables held constant, an additional clause meant to strengthen an IEA will result in a loss of participation from 12 developing countries, while an increase of an additional clause on transparency will result in an increase in participation from 7 developing nations. The possibility of resolving disputes through negotiation causes an increase in participation from 19 developing countries, if all other variables are held constant.

Both the strength and transparency provisions of IEAs seem to exert the same level of influence on participation from developing countries. If there is an increase of one standard deviation in the strength of an IEA, participation from developing countries will decrease by 0.43 standard deviation, while all other variables are held constant. Similarly, if transparency of the IEA increases by one standard deviation, participation from developing countries increases by 0.43 standard deviation, when all other variables are held constant.

5.4.2 REGRESSION RESULTS FOR MODELS II, III, IV and V

(i) MODEL II: Power-Interest

Table 8: Regression Results for Model II

Model II	Unstandardized		Standardized		

	coefficients		coefficients		
	B	Robust Standard Error	Beta	t	Significance
Constant	12.874	5.362		2.40	0.018
Gdpcap1	0.0015	0.0002	0.600	6.74	0.000***
Indgth	0.018	0.196	0.004	0.09	0.926
Forest	-0.046	0.050	-0.049	-0.93	0.355
Mineral_t[67]	1.862	0.419	0.270	4.44	0.000***
Contiguity	0.881	0.418	0.119	2.11	0.038**
Popdens_t[68]	1.380	0.925	0.102	1.49	0.139
Milexp	-0.439	0.130	-0.200	-3.38	0.001***
Milcoup	-2.910	2.150	-0.078	-1.35	0.179

N	108
R^2	0.7469
F-statistic$_{(8,99)}$	41.58***

*** significant at less than 0.005 level
** significant at less than 0.05 level

The F-statistisc of 41.58 is statistically significant at $p < 0.005$ level, showing that Model II has statistically significant predictive capability. The signs of the estimated coefficients for economic and industrial development, and environmental vulnerability (population density and contiguity) depict a positive association between the predictors and the criterion, thus being in line with theoretical expectations. For natural resources, the proxy of forest area shows a negative relationship with participation, while the proxy of mineral resource production value associates positively with the independent variable. Political instability and military expenditures show a negative relationship with participation.

From Model II, the following variables show statistical significance at the 0.5% level: gdpcap1 (GDP per capita), mineral_t (transformed mineral production value), contiguity, and milexp (military expenditures). Industrial growth, forest areas, population density and political instability are not statistically significant. Based on these results, we can argue that countries which are more closely surrounded by contiguous neighbors, which produce more mineral

[67] Mineral_t stands for the natural log transformation of the variable mineral *i.e.* Mineral_t = ln(mineral).
[68] Similarly, popdens_t = ln(popdens).

resources for commercial exploitation, and which have high economic growth tend to participate in more IEAs than countries which are less vulnerable environmentally, are less involved in mineral resource production, or which have lower levels of economic development. The results also show that countries which spend a higher percentage of their national budget on military expenditures tend to participate in IEAs to a lesser extent than countries which spend a smaller percentage of their national budget on such military expenditures.

With all other variables held constant, an increase in military expenditures by 1% of the central government expenditures in a state will cause a decrease in the state participation by 0.44 IEAs. Similarly, with all other variables held constant, an increase of $US 1 in the GDP per capita of a state will result in an increase in state participation by 0.001 IEAs, and an increase in the number of contiguous neighbors by one will result in an increase in participation by 0.88 IEAs.

If we compare the beta weights for the independent variables, we can state the GDP per capita seems to have the greatest influence on participation, followed by the mineral production value (in its natural logarithmic form), expenditures on military, and the contiguity score. With all other independent variables held constant, an increase of one standard deviation in GDP per capita causes an increase of 0.6 standard deviation in participation. Similarly, with all other variables held constant, an increase of 1 standard deviation in the mineral production value (in its natural logarithmic form) will result in an increase of 0.27 standard deviation in participation, and an increase of 1 standard deviation in the expenditures on military, when calculated as a percentage of total government expenditures, will result in a decrease of 0.20 standard deviation in participation. Countries which have a contiguity score 1 standard deviation higher than

another country will have a participation which is 0.12 standard deviation higher, with all other variables held constant.

(ii) MODEL III: Liberal-Interdependent

Table 9: Regression Results for Model III

Model III	Unstandardized coefficients		Standardized coefficients		
	B	Robust standard error	Beta	t	Significance
Constant	-23.174	15.643		-1.48	0.144
HDI	22.954	13.130	0.185	1.75	0.086*
Eionum	1.326	0.220	0.412	6.02	0.000***
Ecofree	12.163	4.401	0.248	2.76	0.008**
Goveff	9.127	2.847	0.455	3.21	0.002***
Tgoods	-0.084	0.026	-0.163	-3.23	0.002***
Polity	0.247	0.212	0.075	1.16	0.250
Agenda21_t[69]	1.680	0.920	0.170	1.83	0.073*

N	64
R^2	0.824
F-statistic$_{(7,56)}$	45.11***

*** significant at the 0.005 level
** significant at the 0.05 level
* significant at the 0.1 level

The F-statistic (45.11) is statistically significant at $p< 0.005$ level, demonstrating good model fit. The signs of all the regression coefficients meet theoretical expectations, except for the variable measuring volumes of trade (tgoods) and economic freedom (ecofree), which depict negative associations with participation. Higher values of 'ecofree' signify lower levels of economic freedom. Hence, the results show that lower degrees of economic freedom (i.e. higher values of 'ecofree') tend to be positively associated with higher levels of participation, which is in antithesis to the posited relationship.

Variables which are statistically significant at the 0.5% level are 'eionum' (participation in environmental IGOs), volumes of trade (tgoods), and governmental effectiveness (goveff). Economic freedom is statistically significant at the 5% level, while HDI and local Agenda 21

[69] Agenda21_t = ln (Agenda21).

initiatives (in its natural logarithmic form) are statistically significant at the 10% level. The variable 'polity' does not show any statistical significance with participation in IEAs.

The results show that countries which have higher levels of human development, have higher density of interaction in international environmental institutions, have stronger governmental institutions, and higher levels of civic environmentalism tend to participate in IEAs to a greater extent than countries which have lower degrees of each of the mentioned parameters. The results also show that countries which are involved in higher volumes of trading and which have a higher level of economic freedom tend to participate less in IEAs than countries with lower trade openness and lower levels of economic freedom.

With all other independent variables held constant, an increase in governmental effectiveness by one score will cause a state to participate in 9 additional IEAs, and an increase of one unit in the HDI score will result in the state participating in 22 more states. Similarly, when other variables are held constant, an increase of one unit in membership in environmental IGOs will result in an increase in participation by 1 IEA. On the other hand, a decrease in economic freedom by one score will result in an increase in participation by 12 IEAs, while an increase in the amount of trade by 1% of GDP will result in a decrease in participation by 0.08 IEAs, with all other variables held constant. If the number of local Agenda 21 initiatives increases by 1%, this will result in an increase in participation by 0.02 IEAs.[70]

If we compare the beta weights of the independent variables, we can state that governmental effectiveness and membership in environmental IGOs seem to exert the greatest influence on participation. With all other variables held constant, an increase of one standard deviation in governmental effectiveness will result in an increase of 0.45 standard deviation in

[70] Because of the natural log transformation, a change of 1% in X is associated with a change of $0.01b_1$ in Y. This is because $Y + \delta Y = b_0 + b_1 \ln(1.01X)$, which makes $\delta Y = b_1 \ln(1.01)$ i.e. $\delta Y = 0.01b_1$.

participation, while an increase of one standard deviation in membership in environmental IGOs will result in an increase of 0.41 standard deviation in participation. Similarly, with all other variables are held constant, an increase of one standard deviation in the amount of trade (when calculated as a percentage of GDP) will result in a decrease of 0.16 standard deviation in participation; an increase of one standard deviation in HDI will result in an increase of 0.19 standard deviation in participation; and an increase of 1 standard deviation in 'ecofree' will result in an increase of 0.25 standard deviation in participation.

(iii) MODEL IV

Table 10: Regression Results for Model IV

Model IV	Unstandardized coefficients		Standardized coefficients		
	B	Robust Standard Error	Beta	t	Significance
Constant	67.764	8.547		7.93	0.000
Graft	6.221	2.305	0.293	2.70	0.010**
Sanitation	0.037	0.048	0.077	0.77	0.447
Undernutrition_t[71]	-5.955	1.690	-0.414	-3.52	0.001***
Imortality	-0.029	0.019	-0.160	-1.56	0.127
Odacap_t[72]	-3.791	0.922	-0.449	-4.11	0.000***
Polity	0.231	0.211	0.113	1.09	0.280
Arms	-0.722	0.307	-0.270	-2.36	0.023**
Tgoods	-0.061	0.040	-0.143	-1.51	0.138
Agenda21_t	0.651	1.009	0.088	0.64	0.523
Gdpcap1	-0.0007	0.0007	-0.161	-0.97	0.339

N	52
R^2	0.649
F-statistic$_{(10, 41)}$	15.44***

*** Significant at the 0.005 level
** Significant at the 0.05 level

The F-statistic (value of 15.44) is statistically significant at the 0.5% level, thereby demonstrating good model fit. Except for the variables 'tgoods' (volumes of trade) and

[71] Undernutrition_t = ln(undernutrition)
[72] Odacap_t = ln(odacap)

'gdpcap1' (level of economic development), the signs of the regression coefficients all tally with theoretical expectations.

Undernutrition and foreign aid dependency are statistically significant at the 0.5% level. Control on corruption (variable graft) and arms imports are statistically significant at the 5% level. The variables sanitation, infant mortality, polity, volumes of trade, Agenda 21 initiatives and GDP/capita do not show any statistical significance with participation from developing countries.

From these results, we can state that developing countries which have better control on corruption, have lower dependence on foreign aid, have lower percentage of the population suffering from undernourishment, and which have lower volumes of arms imports tend to participate in IEAs to a greater extent than developing countries which exhibit the opposite trends in these domestic components. With all other variables held constant, an increase of one unit in the control on corruption in a developing country will result in that state participating in 6.2 additional IEAs, while an increase in arms imports by 1% of the total imports will result in a decrease of developing country participation by 0.7 IEAs. An increase in foreign aid dependency by 1% in a developing country will result in that country reducing its participation by 0.04 IEAs[73].

If we compare the beta weights, foreign aid dependence seems to exert the greatest impact on participation from developing countries, followed by the percentage of population suffering from malnutrition, the control on corruption, and the extent of arms imports, in that order. With all other variables held constant, an increase of 1 standard deviation in foreign aid dependence (in its natural logarithmic form) will result in a decrease of 0.45 standard deviation in participation from developing countries. Similarly, with all other variables held constant, an

[73] Because of the ln transformation, a 1% increase in Odacap results in 0.01*(-3.79) = 0.038

increase of 1standard deviation in the level of undernutrition (in its natural logarithm) will result in a decrease of 0.41 standard deviation in participation from developing countries; an increase of 1 standard deviation in the control of corruption will result in an increase of 0.29 standard deviation in participation from developing countries; and an increase of 1 standard deviation in arms imports will result in a decrease of 0.27 standard deviation in participation from developing countries.

Model V

Table 11: Regression Results for Model V

Model V	Unstandardized coefficients		Standardized coefficients		
	B	Robust Standard Error	Beta	t	Significance
Constant	8.687	9.355		0.93	0.357
Contiguity	0.966	0.420	0.181	2.30	0.025**
Milexp	-0.393	0.130	-0.300	-3.03	0.004***
Graft	6.385	2.207	0.334	2.89	0.005***
Polity	0.229	0.253	0.109	0.90	0.369
Eionum	0.997	0.278	0.309	3.59	0.001***
Mineral_t	0.477	0.669	0.095	0.71	0.479
Odacap_t	-1.599	1.064	-0.165	-1.50	0.139
Agenda21_t	0.342	1.078	0.041	0.32	0.753
Popdens_t	1.418	0.915	0.132	1.55	0.127
HDI	22.685	12.055	0.279	1.88	0.065*
Tgoods	-0.051	0.034	-0.137	-1.52	0.135

N	67
R^2	0.6650
F-statistic$_{(11, 55)}$	12.23***

*** Significant at the 0.005 level
** Significant at the 0.05 level
* Significant at the 0.1 level

The F-statistic of 12.23 is statistically significant at p <0.005 level, showing that Model V as a whole has statistically significant predictive capability. All the regression coefficients demonstrate an association with participation which is in line with theoretical expectations, expect for the variable 'tgoods' (volume of trade), which is showing a negative relationship with participation.

Military expenditures, control on corruption, and participation in international environmental IGOs are statistically significant at the 0.5% level. Contiguity is statistically significant at the 5% level, while HDI is statistically significant at the 10% level. The variables polity, mineral value production, foreign aid dependency, Agenda 21 initiatives, population density and trade volumes are not statistically significant.

These results show that states which invest more heavily in their military empowerment are less likely to participate in IEAs than those which do not devote as much resources for their military build-up. Moreover, states which have better control on corruption and which participate in environmental IGOs are more likely to participate in IEAs than states which suffer from high degrees of corruption or which shy away from participation in international environmental institutions. Further, a state which is surrounded by a great number of contiguous neighbors is more likely to participate in IEAs than one which is more isolated. Also, it seems that states which have a high quality of life, as denoted by their high HDI scores, tend to participate in IEAs to a greater extent than states with lower levels of human development.

With all other variables held constant, an increase of 1% in the military expenditures of a state will cause that state to be less likely to participate in 0.39 IEAs. On the other hand, with all other variables held constant, an increase of one unit in corruption control will likely increase participation by 6 IEAs. A state which participates in one additional environmental IGO is more likely to participate in one additional IEA, when all other variables are held constant. A state which has one contiguous neighbor more than another state will be more likely to participate in approximately one IEA more than the other state, keeping constant all other variables. Moreover, with all other variables held constant, a one unit increase in the HDI of a state will make that state more likely to participate in 22 additional IEAs.

Looking at the beta weights, corruption control seems to exert the greatest influence on participation in IEAs, and contiguity seems to exert the least influence. The influence of military expenditures is almost at par with that of participation in environmental IGOs. When all other variables are held constant, an increase of one standard deviation in the variable 'graft' will result in an increase of 0.33 standard deviation in participation. An increase of one standard deviation in the level of a state's participation in environmental IGOs will result in an increase of 0.31 standard deviation in participation; an increase of one standard deviation in military expenditures will result in a decrease of 0.30 standard deviation in participation; an increase of one standard deviation in HDI will result in an increase of 0.28 standard deviation in participation; and an increase of one standard deviation in contiguity will result in an increase of 0.18 standard deviation in participation, when all other variables are held constant.

5.5 Discussion of Findings

Treaty Provisions

Model I shows that participation in IEAs tends to be negatively impacted by strong and binding provisions and seems to be enhanced by provisions which promote transparency and flexible means of dispute settlement. Contrary to expectations, Model I shows that *both* developed and developing countries seem to disfavor IEAs which have requirements for enactment of domestic legislation for treaty implementation, which specify quantitative targets and implementation deadlines, which include verification and review mechanisms, which include sanctions, or which require a specific group of countries to participate for entry into force of the treaty. Model I thus disproves the common statement made by several researchers alleging that developing countries tend to prefer weaker IEAs, with the underlying assumption that developed countries exhibit contrary tendencies. I suspect that statements referring to the preference of

developed countries for stringent environmental measures may fit the regional landscape better than the global one. While developed countries may be highly committed to strong regional environmental measures, perhaps because they are directly impacted by the environmental externalities, their preference for weak global IEAs is at par with that of the developing nations.

The natural predilection on the part of both the developed and developing countries for transparent measures within IEA texts and for flexibility to resolve potential disputes through negotiations first can be understood in terms of states' concerns with satisfying themselves that other party members are not free-riding and that they can maintain some level of control on the treaty implementation process. Clauses enhancing transparency will likely make the processes of treaty implementation more open to international scrutiny and any potential opt-outs or free-riders can be easily identified and dealt with, such that the costs of implementation do not fall disproportionately on any particular group of states. Transparency also increases the likelihood that the IEA will be effective by shedding light on various management problems such as misuse of funds transferred for treaty implementation, or inadequate domestic efforts to fully comply and implement the IEA provisions.

Control over dispute resolution is crucial in international relations among states. Loss of such control can potentially be viewed as an erosion of national sovereignty, and thus less palatable to a state concerned with the maintenance or increase in its power potential. The general preference for negotiations as the first means of addressing conflicts points to the fact that, at least in the international environmental domain, countries are interested in avoiding protracted tensions in their relationships and believe that they can arrive at mutually agreeable positions through the processes of negotiations. This is an important finding as it holds promise for peace. A preference for negotiations is a potential harbinger of friendly debates and an open

and frank atmosphere to resolve conflicting interests and establish mutually recognized rights and obligations.

The variable 'threshold' does not show any direct impact on total participation, as well as on participation from the developed or developing nations. This is antithetic to the increasing economic exposés which posit that IEC tends to increase when there is a minimum ratification clause embedded in the treaty text. While economic analysis seems to argue that making participation contingent on that of other states will likely increase overall participation, in real policy-making contexts, this need not be an automatic outcome. Overall, a ratification threshold does not inevitably translate into higher levels of participation. It is likely that countries may not be concerned so much about the number of required ratifications, as about the *nature* of participation. In other words, while countries may not care about how many other states have already ratified a particular treaty, they may nevertheless be interested in whether *a* particular country or a particular group of countries are ratifying or not. This would explain why the majority of ratifications for the KP, especially from the OECD countries, occurred in 2002 and not before. It is quite likely that before US's decision to withdraw completely from the treaty, the majority of OECD countries were potentially holding out until US, the major emitter, commit to GHG reduction targets mandated by the KP. Only after it became clear that such would not occur did the majority of states ratify the KP in 2002 to signify their decision to go ahead with the KP, even without the participation of the US. It is interesting to point out also that the KP does not merely include a simple ratification threshold. As present in other IEAs such as MARPOL 73/78, the KP includes a minimum ratification threshold *as well as* the requirement for ratification from major GHG emitters, which would ensure that a minimum percentage of emissions is covered by

the ratifications. This added requirement is meant to strengthen the treaty and ensure its effectiveness.

Though the variables 'threshold', 'amendtpty' (amendment by any party), 'fintransfers' (financial transfers), and capacity-building do not depict any statistical significance, they depict different directions of causation for the developed and developing countries. The results show a tendency among developing countries to favor provisions facilitating financial transfers as well as provisions allowing any party to propose amendments to the treaty. Moreover, developing countries seem not to prefer measures for capacity-building. Developed countries, on the other hand, show a tendency to favor the absence of clauses allowing amendment propositions from any party member, the absence of requirements for financial transfers, and a positive legal requirement for capacity-building measures (see Table 12).

Table 12: Differences of IEA Preferences for Developed and Developing Countries

Treaty Characteristics	**Preference**	
	Developing	Developed
Capacity-building provisions	No	Yes
Amendment by any party	Yes	No
Financial mechanism	Yes	No

The low preference from developed countries for provisions for financial transfers probably stems from the fact that they will, in all probability, be the ones responsible for disbursing funds for the financial transfers. Developed countries often resent the fact they are being called to disburse valuable financial resources to fund development projects within developing countries, which in many cases, often misuse or misappropriate the transferred funds. The fact that corruption within the developing world (as shown in Models IV and V) seems to detract from participation attests to the lack of commitment to international environmental protection on the part of corrupt political figures within the developing world. The concerns of

the developed world may thus not be misguided. This may explain why developed countries seem to prefer to invest in measures for capacity-building (such as training, technology transfers, and R&D cooperation) rather than on direct monetary transfers.

On the other hand, it may seem unfair and inequitable to request developing countries to implement treaty provisions with their own scarce resources for the protection of the global environment - an environment which has been spoilt mostly by the development processes of the developed world. The preference of developing nations for financial transfers may thus be understood in terms of their perceptions that they are "entitled" to such disbursements since they were not responsible in creating the environmental problems in the first place. This goes to the heart of the underlying rift between the North and the South: developing countries fear that they will lose their freedom to follow their desired development paths by participating in strong IEAs which place all sorts of restrictions on their development processes, without however providing any compensation to them to meet their development needs; and the developed North viewing the developing south as a world of corruption and inefficiencies. Developing countries often argue that global environmental problems such as global warming and ozone depletion have been caused by the developed nations and thus it is only fitting that they share the higher burden of abatement and mitigation.

In one sense, however, allowing financial transfers makes sense if the goal is to increase international commitment to the protection of the global environment. Model IV provides some light into why this is so. Based on Model IV, low participation among developing countries can be attributed to their endemic socio-economic constraints. The fact that developing nations are often heavily dependent on foreign aid and face high levels of various social ills (such as undernutrition) makes their demands for financial transfers legitimate. This line of argument has

found its place within the texts of recent IEAs (e.g. the UNFCCC, the MP, and the KP) which specifically includes provisions acknowledging the special conditions of developing nations and provides special mechanisms for financial transfers. The low preference of developing countries for measures geared towards capacity-building only strengthen the finding that financial transfers seem to be a better strategy to attract developing nations to participate in IEAs. Developing nations' low preference for capacity-building provisions may stem from the fact that such measures often do not have concrete plans of action and no concrete outcomes. Moreover, the promise of capacity-building may not materialize in the short-time frame, as opposed to financial transfers, which have clearly specified *modus operandi* and which occur within clearly demarcated time-frames.

The difference in preference between developed and developing nations in so far as amendment clauses are concerned can also be understood in terms of the different concerns and priorities of the two groups. Developed nations do not prefer the ability for any party member to bring amendments to the treaty texts, most likely because they are the ones who have been responsible for the drafting and finalizing of the treaty texts. It is no surprise that they will try to restrict the freedom of other party members to bring changes to compromises which have been reached after innumerable sessions of negotiations and bargaining. Moreover, allowing amendments by any party member will likely alter the structure of the calculations of costs and benefits which the developed nations relied on to participate in the IEAs in the first place. Suddenly, the IEAs may not seem beneficial at all. Given the fact that withdrawing from IEAs is not without costs itself, amendments can only be a trigger of additional costs rather than benefits for the developed world.

On the other hand, the fact the developing nations prefer to be able to bring amendments to IEA provisions may merely reflect their desire to safeguard their national interests and concerns in a process which did not involve them significantly in the initial phases. Though IEA negotiations are more open to participation from developing countries nowadays, in the past, most of the IEAs were sponsored by the developed world. It is thus likely that the developing nations may not find all aspects of the IEA to be in their favor and they may desire to have the freedom to request for a modification of the *status quo* if need be.

State Characteristics

The power-interest model illustrates that power considerations do matter in a state's decision to participate in IEAs. For example, a desire to reduce its level of environmental vulnerability will make a state more likely to agree to the international norms and standards embodied within treaty texts. Thus, a nation which has a higher number of contiguous neighbors will tend to participate in more IEAs than another state with a lower level of contiguity. Similarly, a state with a greater amount of economic power will participate in more IEAs than one with a lower level of economic development, probably to safeguard its competitive advantage in the international market.

Military power stands as an opposing force to participation. The power-interest model establishes that a state is more likely to participate in an IEA if it is less invested in enhancing its military potential. It is well-known that the military is often responsible for a high level of environmental pollution, either through its routine practice sessions, or in real deployment. In both cases, the military makes use of munitions which have been proven to be harmful to the environment and to life. A state interested in empowering its military on in investing larger portions of its national budget on military expenditures will likely invest less resources and

attention to global environmental protection. Such a state will thus tend to participate less in IEAs than another state not so bent on military empowerment. The negative association of the variable 'milexp' (military expenditures) with participation thus reflects an inherent tension between the military and the environment, as well as the conflicting priorities brought to bear on policy-makers by the need to build up the military arsenal and the need to commit to global environmental protection.

The positive association of mineral production value with participation negates hypothesis H2f, which postulated a negative association. This result, as compared to the negative impact on participation depicted by the variable 'forest' (forest resources as % of land area), shows that the influence of natural resource endowment on participation may be highly dependent on which *type* of resources we are including in the model – i.e. whether we are considering renewable or non-renewable resources. Since mineral resources are non-renewable resources, thus necessitating prudent management strategies for their long-lasting benefits, it is likely that a certain element of caution and environmental prudence may be motivating decision-makers, thereby accounting for the positive association of the variable with participation (this positive association is also maintained in Model V). Forest resources, on the other hand, are very heavily exploited in most parts of the world, and are more amenable to renewal strategies than mineral resources. The negative association may reflect the unwillingness of states which are heavily reliant on their forestry industries to agree to lower economic returns, as well as the tendency to rely on reforestation and other forestry management strategies to address any depletion of the forest resources that may be occurring due to timber exports or consumption.

The liberal-interdependent model, true to its purported objective, attests to the fact that institutions (whether domestic or international) have an impact on participation. High levels of

participation in environmental IGOs make a state more likely to participate in IEAs. This is probably due to the fact that the state undergoes a process of international acculturation to environmental norms and standards, and the mechanisms of the IGOs may exert a pressure on the state to commit to the legal norms and standards in IEAs. It is not likely that the variable 'eionum' (participation in environmental IGOs) merely reflects an underlying commitment by the state for international environmental protection and does not therefore provide an independent explanation for participation. Participation in environmental IGOs and participation in IEAs are different processes and involve different actors and calculations. IEAs, by their very nature, are legally binding, subject to International Law, and subject to the principle of *pacta sunt servanda*.

Moreover, participation in IEAs is a more serious business than participating in an environmental IGO: the former often requires binding commitments to arrest or alter national development priorities, to adopt new production processes, to disburse funds, or to reallocate much scarce national resources; the latter, on the other hand, often does not require such wide-ranging policy shifts and are more open to flexible means of enforcement. It is likely therefore that the significant positive relationship between 'eionum' and participation illustrates the independent influence of environmental IGOs on participation. Participation in environmental IGOs may provide a learning experience for the states, where they get to be familiar with the nature of the global environmental problems and are sensitized to the need for international cooperation on the subject. Further, it is likely that members of the IGOs may act to exert a pressure on other members who have not yet ratified a particular treaty to do so. It is also quite possible that membership in the environmental IGOs may require adoption or commitment of

specific measures detailed in IEAs, which will make participation in those IEAs an attractive feature in terms of integrating policies and strategies.

On the domestic front, the strength of governmental institutions seems to exert a positive influence on participation. For a state to eventually participate in an IEA, lots of background work need to be conducted: first, in anticipation of the international negotiations to take place for the adoption of the draft treaty text; and second, for the processes of treaty ratification within the domestic political structure. Delegates to the international conferences need to be well-versed in the treaty processes and in the treaty stipulations, which often require close collaboration among various branches of the government. Further, the attractiveness or unattractiveness of a particular IEA is subject to the stance of domestic agencies bestowed with the mandate of dealing with the theme dealt with by the treaty. Bureaucrats who deal with the specific issues on a daily basis therefore have an important role to play in determining the position of the country vis-à-vis the treaty. Thus, calculations of costs and benefits occur at various levels of the political machine, which render participation in IEAs vulnerable to how well that machine functions. Weak governmental institutions may not grasp the essential thesis of a particular IEA or may simply be too lax in ensuring that ratification processes go smoothly. Hence, strong governmental institutions may likely be a crucial factor in explaining state participation in IEAs. This is indeed validated by the beta weight of the variable ‘goveff’ in Model III.

The results from Model III specifically negate hypotheses H3e and H3f. Contrary to the hypothesized relationships, both economic freedom and high volumes of trade seem to exert a negative impact on participation. One possible explanation for this finding is that trade provisions often run counter to environmental policies. States which are involved in high levels of international trading will likely desire to maximize their economic gains and minimize

potential losses. In view of the inherent tensions that exist between the trade-environment interface, high volumes of trade may run counter to international environmental goals. In this conflict, trade almost always wins. Thus, a state with high volumes of trade, and for that matter, a high level of economic freedom, will be less desirous of curbing its international trade policies to participate in IEAs. The goals of free trade often stand in opposition to global environmental protection, causing states favoring free trade through their liberal economic policies to shy away from the global norms and standards codified in IEAs.

The positive association between HDI and participation shows that states with high quality of life invest in or commit to more in global environmental protection. High values of HDI reflect both economic *and* human development. With improvements in the quality of life of its citizens, national leaders face less constraints to devote resources for meeting urgent domestic priorities. There is scope therefore for concentrating on the international forum. Moreover, countries with high human development tend to have a well-educated population. Environmental awareness among the population may likely trigger processes for placing the country on the international front for global environmental protection. This tends to be strengthened by the positive impact of local Agenda 21 initiatives on state participation in IEAs. A higher number of local initiatives reflect the level of environmental awareness of the population and their commitment to environmental protection. Popular movements often compel national leaders to alter their projected paths and to implement measures supported by the people. Even if local Agenda 21 initiatives do not automatically translate into a direct pressure for national policy-makers to participate in IEAs, the fact that the population has demonstrated a willingness to strive for environmental protection may suggest to the leaders that non-participation may be a costly enterprise.

The significance of HDI has to be understood in light of the various endemic constraints highlighted in Model IV. Indeed, *the developing-logistics model* suggests that developing nations face certain socio-economic and political challenges which render them less amenable to participating in IEAs. In Model IV, foreign aid dependency seems to exert the greatest negative impact on participation. Foreign aid dependency in a sense suggests that poverty acts as a constraining determinant of participation. Poor nations typically lack adequate resources to meet basic survival needs. In such a context, commitment to global environmental protection cannot become a national objective. The need to feed the population cannot be overridden by global environmental concerns.

Thus, states with high dependency on foreign aid and with high levels of undernutrition are, not surprisingly, less likely to participate in IEAs. Economic development, likely to be low, therefore does not seem to exert any statistically significant on participation. Though not statistically significant, the negative correlation between GDP/capita and participation in Model IV hints at the fact that developing nations are concerned with achieving higher standards of living and economic development through industrial production and technological development. In this quest for rapid industrial progress, concerns with environmental protection are dampened within the national policy debate as the goals of environmental protection and unhampered industrial development often clash with each other. In any case, endemic social challenges relating to survival issues and high levels of poverty seem to act as major constraining forces on any positive impact on participation that might be accrued from a certain level of economic progress and civic environmentalism. Further, while strong governmental institutions seem to catalyze participation in IEAs, Model IV shows that lack of control on corruption is detrimental to participation. Corruption entails mismanagement of public funds, public distrust in the

political process, and lack of commitment to the improvement of the citizens' quality of life. Within such a framework, participation in IEAs may be seen merely as a cost.

In tandem with the finding regarding military expenditures in Model II, developing nations which invest heavily in arms imports tend to be less likely to participate in IEAs. Apart from the inherent incompatibility between military and environmental goals, as discussed already, another plausible explanation for the limiting impact of military build-up on participation is that, and especially so within the context of developing countries, scarcity of resources may dictate the relegation of environmental concerns as a non-priority. If scarce funds and other resources are earmarked for military arsenal build up, there is not much left over for global environmental protection.

This raises the question as to why nations, especially those which are poor, invest so heavily in arsenal build-up? Plausible explanations may be found within the literature dealing with the role of ideational factors in global politics. The way that national leaders perceive their roles and functions, and their own understandings of their identities, in concert with those of their counterparts in the international system, may generate a commitment to military empowerment, at the expense of other more laudable goals. On the other hand, the desire (and perhaps the need) to invest in military empowerment may merely reflect the current structure of the international and domestic system. In the international field, concerns with relative power may compel leaders to engage in perpetual military empowerment. Within the domestic arena, the high arms imports of developing countries may merely reflect ethnic tensions, propensity to suffer from civil wars, or insecurity concerns due to their strategic positions.

What is the impact on participation of military empowerment when we factor in the positive impact of participation in environmental IGOs? What is the independent impact of the

Realist variables when they are juxtaposed with the Liberal variables? *The Integrative Model* attempts to present an integrated understanding of the determinants of participation. It tests for the independent impact of each variable from one school of thought, when the variables from the competing theory is held constant. Model V shows that both power concerns and institutionalization matter when we consider state participation in IEAs. Contiguity still maintains its positive influence on participation, and military expenditures its negative impact. Moreover, participation in environmental IGOs is conducive to participation in IEAs, as is a high level of human development.

A variable which has not been discussed so far, but which is important in view of its statistical *non*-significance in Models II-V is the variable 'polity.' It seems that the level of democracy within states does not act as a direct determinant of that state's participation in IEAs. This is contrary to arguments made by researchers such as Neumayer or Congleton, but more in line with Midlarsky's observation that the association between democracy and participation may not be that straightforward. When considered in concert with the statistical non-significance of political stability in Model II, it is possible to argue that the exact placement of states on their paths of democratization, if such is occurring at all, or their level of domestic political instability, does not seem to impact states' participation in IEAs.

While this may seem counter-intuitive at first sight, deeper probing shows that it is quite likely that domestic political instability may not adversely impact state participation in IEAs. The two processes can be easily compartmentalized in a rarefied fashion by the national leaders, who often associate participation in IEAs as a statement of their belonging to the 'international community,' and as an avenue for national prestige building and for deflecting, even if in a very small measure, international criticism on their domestic policies. There are indeed several

instances of states which are facing great political instability or which are famous for non-democratic ventures, but which do in fact participate in IEAs. Bosnia and Herzegovina and Croatia, for example, have each become parties to 19 and 46 IEAs respectively since their formation in 1992. Moreover, Cuba is party to 34 IEAs, comparable to the participation of Israel, which is party to 33 IEAs.

Whatever the exact motivations of the leaders, the finding that domestic political complexities associated with non-democratic tendencies or instabilities do not exert constraining forces on participation is welcome as it shows that there are prospects for enhanced international environmental cooperation, irrespective of the domestic political idiosyncrasies. Notwithstanding, it is legitimate however to wonder how meaningful such participation is. Participation may have been intended, right from the start, as a political statement rather than as a commitment to global environmental protection. Even if such be the case, participation is still to be preferred over non-participation, as participation will likely involve the party member in a process of international acculturation to environmental norms and standards. Regular COP meetings and regular dissemination or reports on treaty implementation can spike interest in the policy measures incorporated within the treaty provisions and may incite otherwise recalcitrant parties to comply. Finally, participation subjects the party member to potential international "shaming mechanisms," which might 'compel' the member to enunciate policies to implement the treaty provisions.

5.6 Conclusion

The purpose of this chapter was to test if participation in IEAs is determined by country characteristics and IEA characteristics. Each model of this study provides some insight into participation. The legal-incentives model, for example, highlights the fact that strong and binding

provisions within treaty texts seem to be viewed unfavorably by both the developed and developing world. The power-interest model has emphasized the role of power and environmental vulnerability, while the liberal-interdependent model has highlighted the role of institutions and good governance. Issues which are prominent in the developing logistics model relate to poverty, low quality of life, and corruption. The integrative model provides a synopsis of Models II-IV, and show that both power concerns and institutions matter in determining state participation in IEAs. Furthermore, human development seems to be a good precursor of higher levels of state participation in IEAs.

These findings have important policy implications for international environmental governance. In the next Chapter, I address these briefly and provide suggestions for future research.

6. CONCLUSION

"…this world of nations has certainly been made by men, and its guise must therefore be found within the modifications of our own human mind."
- Vico, 1744, from Cox,(1986).

International environmental governance presupposes a strong framework of international cooperation which clearly sets out rights, obligations and liabilities. IEAs often manage to provide such a structure for international environmental cooperation. However, for IEAs to be effective in improving the global environment, the participation of the whole international community is warranted. Since some countries are more prone to participating in IEAs than others, and since some IEAs manage to sustain higher rates of participation than others, it becomes an interesting undertaking to try and understand which underlying factors tend to account for such differential levels of participation in the IEAs. The desire to investigate causal factors for states' varying participation in IEAs was the motivating idea behind this research.

In the following section I summarize the findings of this study and thereafter address their implications for international environmental policies. I finally propose some suggestions for future research in the field.

6.1 Overview of the research findings

This research set out to analyze the influence of country and IEA characteristics on participation levels in IEAs. The basic research question governing this study is as follows: which country and treaty characteristics determine a country's participation in IEAs? This study relies on the dominant theories governing IR, namely, Realism and Liberalism. These theories

have been integrated into the field of IEC through the development of the (i) the power-interest model, which emphasizes military and economic power; and (ii) the liberal-interdependent model, which considers the role of international institutions and civic engagement. Moreover, to take account of the differing socio-economic realities of developing countries, the developing-logistics model has been proposed to capture the influence of conditions endemic to the developing world on their level of participation in IEAs. In an attempt to provide an integrated understanding of the determinants of participation, the integrative model is developed to consider the independent impact on one set of variables, while maintaining constant the competing set of variables. Further, to capture the influence of treaty design variations on participation levels, the legal-incentives model has been developed, which emphasizes variations in treaty clauses on IEA participation.

This study has employed multiple linear regression analysis to establish statistical dependence of IEA participation on specific treaty and country variables. Where treaty characteristics are concerned, the analysis shows that IEAs which appear to be more attractive to the international community are those which are flexible and transparent. IEAs which embody requirements for enactment of legislation, which enunciate quantitative deadlines, which stipulate sanctions for non-compliance, or which mandate ratification from specific groups of countries for entry into force, tend to secure lower levels of participation than weaker IEAs. Contrary to some researchers' claim, *both* the developed and developing countries seem to favor weaker IEAs over stronger ones.

The empirical tests also show that countries which tend to participate to a greater extent in IEAs are those that have high levels of economic and human development, high involvement in environmental IGOs, strong governmental institutions, good quality of life, strong civic

engagement, and high levels of environmental vulnerability. On the other hand, domestic conditions which tend to detract from high participation in IEAs involve high military expenditures, high volumes of trade transactions, economic freedom, high levels of corruption, social challenges associated with survival issues and mismanagement of national resources. The various profiles for a potential participant in IEAs, as obtained from the regression models, are provided in Table 13.

Table 13: Profile of Likely Participants in IEAs

	Model II	Model III	Model IV	Model V
State profile	High economic development	Low volumes of trade	Low levels of corruption	Low levels of corruption
	High mineral production value	High participation in environmental IGOs	Low levels of population undernutrition	High participation in environmental IGOs
	High number of contiguous neighbors	Low economic freedom	Low foreign aid dependency	High number of contiguous neighbors
	Low military expenditures	Strong governmental institutions	Low arms imports	Low military expenditures
		High human development		High human development
		High levels of civic environmentalism		

From the above results, we can conclude that different socio-economic conditions generate different levels of international environmental commitments: poor countries which rely on foreign aid are less amenable to participating in IEAs than other countries benefiting from high levels of human and economic development. The overriding concerns with military empowerment also seem to be a major factor detracting from wide participation in IEAs. Based on the above results, we can now understand why Angola and Eritrea participate in IEAs to a

lesser extent than developed nations such as US or Finland, as well as other developing countries such as Brazil or Chile.

As shown in Table 14 below, Angola and Eritrea's domestic conditions reflect severe incapacities related to low levels of human development, low GDP/capita, high levels of malnutrition, and high foreign aid dependency. Moreover, both Angola and Eritrea spend a huge proportion of their national budget for military matters, and their arms imports share a higher percentage of their total imports as compared to the other countries listed in Table 14. Moreover, the USA, despite its status as a highly developed economy, participates in less IEAs than other developed nations such as Germany or Finland due to its higher levels of military expenditures, its lower vulnerability to transboundary pollution (due to its low contiguity score), its lower population density, its lower level of civic engagement, its greater economic freedom, its lower control on corruption, its weaker governmental institutions, and its lower participation in environmental IGOs.

Table 14: Summary of Data for Selected Countries

	US	**France**	**Germany**	**Finland**	**Chile**	**Brazil**	**Angola**	**Eritrea**
Participation	55	76	78	75	57	54	8	8
HDI, 1999	0.934	0.924	0.921	0.925	0.825	0.750	0.422	0.416
GDP per capita, 1999 (PPP US$)	31872	22897	23742	23096	8652	7037	3179	880
Military expenditures, as % govt. expenditures, 1999	15.7	5.9	4.7	4.5	12.3	5.5	41.1	51.1
Arms imports, as % of total imports, 1999	0.2	0.3	0.3	1.3	0.7	0.3	7.3	33.5
Population density (peope/km^2, 2000)	31	107	230	17	20	20	11	41

Malnutrition (% population), 1996-98	-	-	-	-	4	10	43	65
Corruption score, 2002	1.77	1.45	1.82	2.39	1.55	-0.05	-1.12	-
Government effectiveness, 2002	1.70	1.67	1.76	2.01	1.19	-0.22	-1.16	-
Contiguity	2	8	9	3	3	10	4	3
Foreign aid dependence (ODA/capita), US$, 1999	-	-	-	-	4.6	1.1	31.4	37.2
Number of memberships in environmental IGOs, 2003-2004	21	29	28	20	12	19	9	-
Local Agenda 21 initiatives (per million population), 2001	0.3	1.16	24.75	58.28	0.96	0.21	-	-
Mineral production value (US$ m), 2001	89400	11521	11803	424	2440	7171	2610	0.3
Economic freedom	1.9	2.5	2.3	2.25	2.15	-	-	-

Overall, the five models show that the determinants of state participation in IEAs can be conceptualized as being dichotomously influenced by a set of 'enablers' and a competing set of 'limitors.' Typical 'enablers' relate to economic and human development, high returns from mineral production, sensitization to environmental vulnerability, good domestic governance, openness to international acculturation of environmental norms and standards, and civic engagement. 'Limitors' are in the form of military objectives, corruption, and poverty. The integrative approach supported by Model V identifies three 'enablers', *viz.* human development, environmental vulnerability, and international environmental acculturation, and two 'limitors', namely, corruption and military design.

What do the above results imply for international environmental protection? How can policies be geared towards enhancing participation in IEAs? How can treaties be designed to

sustain high participation levels? The next section focuses briefly on the policy implications of the research findings.

6.2 Policy implications of research findings

An integrated understanding of participation, based on Model V and Model I, shows that participation can be understood in terms of the following four major determinants: (i) impact of domestic and international institutions (ii) human development; (iii) power motivations; and (iv) IEA design. Policies proposed to increase participation in IEAs therefore have to enhance any positive influence exerted by these parameters, and mitigate their negative influences, if any.

If we start with the impact of domestic and international institutions, policies meant to address government inefficiencies, its corruptive practices if known, and laxity in reform can play a positive role in strengthening the state's willingness to participate in IEAs. After all, the bureaucrats are the primary responders to international calls for participation in IEAs: they are the ones who prepare scientific and technical documents, and who steer the state in its policy response. Very rarely does the head of a state participate in international environmental negotiations, and more strange will be his or her participation in preparatory meetings and conferences in preparation for the final conference for adoption of a treaty text.

The heavy involvement of these bureaucrats and technocrats in churning out policy and technical papers with regard to a specific environmental issue suggests that a good starting point for enhancing IEC may be placing emphasis on these actors. Strategies for building IEC may have to start with programs to sensitize domestic bureaucrats and, whenever necessary, to educate them on the relevant themes being placed on the international agenda. This sensitization and involvement of domestic actors will likely entail disbursing funds for attracting actors from the developing nations to participate in international seminars and workshops for committing of

resources for capacity-building. Promoting state participation in environmental IGOs will also likely result in greater participation in IEAs. As discussed previously, such participation may make the state more open to accepting new international norms and standards, as codified in the IEAs, and to agree to implement them.

On the human development front, policies geared towards enhancing citizens' quality of life may empower the population as well allow political leaders the freedom to address concerns *other* than survival and development imperatives. A focus on human development will diminish the impact of limitors such as poverty and corruption, and will enhance enablers such as civic environmentalism. These issues are especially important for developing nations which are often mired deep in social challenges associated with poor sanitation, low levels of nutrition or high rates of infant mortality. As long as international environmental policies are developed in isolation from measures meant to address *human* development, it is likely that participation in IEAs will not only be less than optimal, but may also not be meaningful. The finding that trade openness and economic freedom tend to act as disincentives for high participation in IEAs shows perhaps that the principle of sustainable development is still not a cornerstone of international trading. Trade and the environment still sit on opposite ends of human development, and treaty negotiators and drafters need to find avenues for bringing trade provisions more in line with environmental sustainability. While IEAs may allow for market mechanisms in order to make participation more conducive to countries able and willing to effect such transactions, such mechanisms however need to be made operative with the ultimate goal of achieving sustainable development.

On the whole, international environmental protection needs to be addressed from a holistic perspective, whereby all aspects of human development are taken into account. To

secure wide participation in IEAs and strengthen IEC, policies will have to be devised to cater to the following: (i) integrate international endeavors for global environmental protection with measures to eradicate poverty, to improve the conditions of life in the developing world, and to promote human development; (ii) design strategies to make trade provisions environmentally sustainable; (iii) reduce foreign aid dependence of developing countries; (iv) empower local communities to be more involved in domestic environmental protection initiatives; (v) promote membership in international environmental institutions; and (vi) facilitate strong domestic governance.

In terms of IEA design, it seems that IEAs will have to be engineered such that they succeed in striking the right balance between flexibility and strength. One possible starting point is to build on the preference of states for the inclusion of transparency measures within IEA texts. Thus, strengthening reporting requirements and allowing non-state actors to act as observers within the treaty proceedings can potentially improve participation rates as well as promote IEA effectiveness. There has indeed been a definite trend towards the inclusion of such parameters in the most recent IEAs (e.g. the UNFCCC, the CBD, the CCD, the MP and the KP, *inter alia*). On the other hand, strength and flexibility need not be in competition with each other. IEAs can be built such that binding clauses are viewed separately from specific mechanisms allowing parties to implement the treaties in a flexible but effective approach. Flexibility in this sense may further empower participating states in their goals of abiding by the mandated targets and deadlines.

Treaty drafters also need to be sensitive to the reasonable needs and concerns of potential participants. On the one hand, developing countries' inherent logistical constraints (such as low levels of economic development, poverty, and low quality of life) will have to be met with

special provisions to allow them to benefit from much needed financial transfers and capacity-building. On the other hand, developed countries need to be allowed to conduct international market transactions without fear of losing their competitive advantage or of suffering from losses of funds transferred due to corruption in the recipient countries. Moreover, package for capacity-building may be made more enticing and more effective by incorporating results-oriented strategies and programs.

The case of the MP may shed some light on the delicate balance that needs to be achieved to sustain participation from both the developed and developing nations. While the success of the MP has been imputed to a host of factors by various researchers, it is certainly true that the design of the MP was geared towards achieving both strength and flexibility. While the MP established clear targets and deadlines for the control and phasing out of specific ODS, the treaty also allowed developing countries a grace period of ten years to implement the treaty provisions. Moreover, the treaty established the Ozone Fund to meet the incremental costs associated with developing countries' switching to new technology which was ODS-free, and also established trade restrictions for non-parties. These measures ensured that the needs of developing countries were met, while at the same time securing wide participation in a global phase-out and control of ODS.

As mentioned in Chapter One, the KP also includes several mechanisms to increase its flexibility as well as to entice both the developed and developing countries to participate. The KP includes three key measures, commonly termed as the "flexibility mechanisms," to lower overall costs of participation and to make participation attractive to both the developed and developing world. As detailed previously, these measures include the clean development mechanism (CDM), joint implementation (JI) and emissions trading. Moreover, the KP, in its Article 10, also

includes special provisions for developing nations, as well as the recognition of the principle of "common but differentiated responsibilities" and the "specific regional and development priorities" of countries. Further, the KP (through Article 11) requires that developed countries meet the full costs incurred by developing nations in implementing the protocol and that adequate financial and technological transfer take place for that purpose.

While the mechanisms of the MP and the KP need certainly to be replicated in other IEAs, provisions for technology transfer and financial assistance are unfortunately not tied to the recipients demonstrating a clean record free from corruptive practices. In view of the negative impact of ineffective control of corruption on participation, IEAs may wisely be tied to reducing corruption, at least in regard to environmental policies. Funds to be transferred may potentially be made subject to clean bills of record or clear implementation plans on the part of the recipient countries.

The statistical insignificance of the variable measuring democracy, coupled with the statistical significance of measures for corruption and poor quality of life (as indicated by undernutrition), reflect perhaps the fact that the 'empowering factors' required to make democracy work are not present in many societies. The finding that states which participate in more environmental IGOs tend to participate in a higher number of IEAs shows the impact of international acculturation to environmental norms that possibly ensues from the density of interaction occasioned by membership in these organizations. To secure a meaningful level of participation in IEAs, therefore, there need to be a focus on opening up international dialogue, while at the same time addressing the empowerment of local groups and communities to take part in their domestic policy-making processes. This empowerment will require the eradication of problems associated with basic survival issues. Addressing problems of poverty, poor

nutrition, and corruption, among others, has to be the first priority of international environmental policies. There is thus a very close link between the environment and human development.

The positive association between contiguity and participation suggests that there is much scope for regional set-ups to address and strengthen global environmental problems. Countries in a particular region may be encouraged to form coalitions to bear pressure on unwilling states to participate in IEAs. However, the most difficult perhaps remains the issue of military buildup, especially in those countries suffering from lack of resources for meeting even the bare necessities of life. The preponderance of military concerns, as inferred from Models II, III and IV, reflects the present international structure where military prowess equates to survival. In a structure where a nation can perpetually face military attacks from a stronger state, it cannot be expected that leaders will not ardently wish to strengthen their military power. Efforts to get leaders to use scarce resources for empowering their people rather than build their military arsenal have to tackle the root of the problem *viz.* the international structure as it currently stands. This links to the subject of IR theorizing, which I briefly discuss below.

In traditional IR literature, there is certainly a bifurcation between the Realist and Liberalist schools of thought, and between the domestic and the international. While the latter compartmentalization is being increasingly challenged by researchers, the dichotomizing of the two schools of thought remains as such. Based on the results of this research, the differentiation between the domestic and international cannot be substantiated, as also is the division between Realism and Liberalism. Model V, the integrative model, points towards the fact that the domestic and the international, as well as the Realist and Liberal concerns can be merged in a holistic template which provides a better understanding of IR than mere focus on either the Realist or Liberal thought.

This study has shown that participation in IEAs can be successfully explained by *both* the Realist and Liberal understanding of IR. Power considerations interact with institutional concerns, and the domestic parameters influence, and are in turn determined, by international factors. In a sense this study substantiates claims already made by several researchers that there cannot be a clean compartmentalization of the field of IR. It is obvious therefore that there is no *one* theory of IR. The existence of the various theories can be partially ascribed to the compartmentalized and unbalanced nature in which global politics is approached and analyzed. For example, while Realism focuses solely on the base side of human nature, with total discard of the 'good' part, Liberalism focuses solely on the 'good' part, while overlooking any evil tendencies in human nature. Such unbalanced view of human nature necessarily results in a framework which is not all-embracing and which is 'extreme' in its explanatory power.

One cannot therefore speak of *the* theory of IR, essentially because the subject is broached from various different angles, depending on the needs and interests of the researcher. While one theory may shed light on some aspects of IR, another contending theory cannot aspire to *replace* the previous one. Each theory can only aspire to enlighten those aspects cast off by another competing theory, without any one theory possibly aspiring to represent the whole gamut of strategic international interaction. Each approach and method of analysis provides only a snapshot of the whole picture of IEC, without any one single approach providing a wholesome understanding of all the processes and underpinnings of IEC. As stated by Ruggie (1998 p.882), "no approach [of IR] can sustain claims to monopoly on truth." Thus, Realism, Liberalism, and Constructivism (with all of the variants) all contribute something to our understanding of IEC, without any one theory being utterly irrelevant in enlightening international politics. In the words of Jervis (1998 pp.971-972):

> [E]ach school of thought enriches others as powerful research of one kind strengthens, not weakens, the alternatives. No one approach consistently maintains a leading position: each of them catches important elements of international politics, and many of our arguments are about the relative importance of and the interrelationships among various factors.

The current state of IR theorizing takes the structure as *given*. Realism posits that leaders are always concerned about security gains, a statement which is reflected in the influence of military expenditures and arms imports in Models II and II. However, the question of *how* the leaders get to that point is not asked. It is assumed that the evil side of human nature predominates. Also not asked are the following questions: If Realism is so predominant, is it because it reflects reality, or because we are *taught* to behave in a way which makes the assumptions of Realism become a reality? Under what conditions will Realism predominantly prevail over Liberalism, and *vice versa*? Is there a 'tipping point' or is it based on the nature of issue areas? In Model V above, under what conditions will military expenditures take overriding importance over participation in environmental IGOs?

Submitting without reservation to any one particular paradigm, with complete shunning of alternative explanations, is tantamount to being inside Plato's Cave. The importance of determining which theory informs political decision-making and why cannot be taken nonchalantly, in view of the wide repercussions on the quality of human life and what it means for humanity to progress. Going along this path opens the space for a constructivist contribution to understanding IR and to re-analyzing the basic assumptions of inter-state interaction. As pointed out by Wendt (1992 pp. 617, 628), Realism can be a "self-fulfilling prophecy" and anarchy may merely be "what states make of it." There is certainly much scope for integrating the theories and analyzing under what conditions one takes the upper hand, and why.

6.3 Suggestions for further research

This research has focused on the determinants of overall participation in global IEAs by focusing on specific treaty and state variables. One first scope for further research therefore relates to expanding the research template by (i) categorizing state participation through an analysis of states' participation in specific groups of treaties; (ii) expanding the set of IEAs considered in Model I; and (iii) including regional IEAs in the analysis.

It is likely that states may be participating more in one group of IEAs than another, or more in regional IEAs than global ones. Differentiating the analysis based on *types* of IEAs ratified may therefore promote greater understanding into the *patterns* of state participation in global and regional IEAs. Moreover, it is likely that states who take part in the international negotiations preceding the adoption of the treaty text may be more open to participation in the relevant treaty. The influence of having states take part in the treaty drafting phase can therefore be studied and the implications, either in terms of ratification times or implementation success, can be studied.

The number of IEAs in Model I can be increased, which would permit the analysis of a greater number of variables. For example, the individual influence of the various variables incorporating the variable 'strength' can be analyzed to delineate the influence of each component separately. Also promising is an analysis of the influence of various environmental norms and principles on state participation.

An undertaking which relates states' levels of participation in IEAs to their domestic environmental quality, assessed on those parameters which matter most for the specific IEAs, can enlighten us on the effectiveness of the IEAs. There is no clear link established yet in the literature on participation in IEAs and environmental quality.

Finally, the development of an integrated and coherent theory on IEC presents promise for intellectual development. There is no reason why the development of such a theory cannot occur within the current scope of IR theorizing. What is needed perhaps is a new outlook which brings the parts together to make a coherent whole. As suggested by this research, an integrated approach may present a more realistic understanding of what actually motivates national leaders.

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ANNEXES

Annex 1 – VCLT ARTICLES

Table 15: Articles of VCLT

ARTICLES	TEXT
2	1. For the purposes of the present Convention: (a) "treaty" means an international agreement concluded between States in written form and governed by international law, whether embodied in a single instrument or in two or more related instruments and whatever its particular designation; (b) "ratification", "acceptance", "approval" and "accession" mean in each case the international act so named whereby a State establishes on the international plane its consent to be bound by a treaty;
6	*Article 6: Capacity of States to conclude treaties* Every State possesses capacity to conclude treaties.
9	*Article 9: Adoption of the text* 1. The adoption of the text of a treaty takes place by the consent of all the States participating in its drawing up except as provided in paragraph 2. 2. The adoption of the text of a treaty at an international conference takes place by the vote of two-thirds of the States present and voting, unless by the same majority they shall decide to apply a different rule.
11	*Article 11: Means of expressing consent to be bound by a treaty* The consent of a State to be bound by a treaty may be expressed by signature, exchange of instruments constituting a treaty, ratification, acceptance, approval or accession, or by any other means if so agreed.
12	*Article 12: Consent to be bound by a treaty expressed by signature* 1. The consent of a State to be bound by a treaty is expressed by the signature of its representative when: (a) the treaty provides that signature shall have that effect; (b) it is otherwise established that the negotiating States were agreed that signature should have that effect; or (c) the intention of the State to give that effect to the signature appears from the full powers of its representative or was expressed during the negotiation. 2. For the purposes of paragraph 1: (a) the initialing of a text constitutes a signature of the treaty when it is established that the negotiating States so agreed; (b) the signature *ad referendum* of a treaty by a representative, if confirmed by his State, constitutes a full signature of the treaty.
13	*Article 13: Consent to be bound by a treaty expressed by an exchange of instruments constituting a treaty*

	The consent of States to be bound by a treaty constituted by instruments exchanged between them is expressed by that exchange when: (a) the instruments provide that their exchange shall have that effect; or (b) it is otherwise established that those States were agreed that the exchange of instruments should have that effect.
14	*Article 14: Consent to be bound by a treaty expressed by ratification, acceptance or approval* 1. The consent of a State to be bound by a treaty is expressed by ratification when: (a) the treaty provides for such consent to be expressed by means of ratification; (b) it is otherwise established that the negotiating States were agreed that ratification should be required; (c) the representative of the State has signed the treaty subject to ratification; or (d) the intention of the State to sign the treaty subject to ratification appears from the full powers of its representative or was expressed during the negotiation. 2. The consent of a State to be bound by a treaty is expressed by acceptance or approval under conditions similar to those which apply to ratification.
15	*Article 15: Consent to be bound by a treaty expressed by accession* The consent of a State to be bound by a treaty is expressed by accession when: (a) the treaty provides that such consent may be expressed by that State by means of accession; (b) it is otherwise established that the negotiating States were agreed that such consent may be expressed by that State by means of accession; or (c) all the parties have subsequently agreed that such consent may be expressed by that State by means of accession.
16	*Article 16: Exchange or deposit of instruments of ratification, acceptance, approval or accession* Unless the treaty otherwise provides, instruments of ratification, acceptance, approval or accession establish the consent of a State to be bound by a treaty upon: (a) their exchange between the contracting States; (b) their deposit with the depositary; or (c) their notification to the contracting States or to the depositary, if so agreed.
18	*Article 18: Obligation not to defeat the object and purpose of a treaty prior to its entry into force* A State is obliged to refrain from acts which would defeat the object and purpose of a treaty when: (a) it has signed the treaty or has exchanged instruments constituting the treaty subject to ratification, acceptance or approval, until it shall have made its intention clear not to become a party to the treaty; or (b) it has expressed its consent to be bound by the treaty, pending the entry into force of the treaty and provided that such entry into force is not unduly delayed.

24	*Article 24: Entry into force* 1. A treaty enters into force in such manner and upon such date as it may provide or as the negotiating States may agree. 2. Failing any such provision or agreement, a treaty enters into force as soon as consent to be bound by the treaty has been established for all the negotiating States. 3. When the consent of a State to be bound by a treaty is established on a date after the treaty has come into force, the treaty enters into force for that State on that date, unless the treaty otherwise provides. 4. The provisions of a treaty regulating the authentication of its text, the establishment of the consent of States to be bound by the treaty, the manner or date of its entry into force, reservations, the functions of the depositary and other matters arising necessarily before the entry into force of the treaty apply from the time of the adoption of its text.
25	*Article 25: Provisional application* 1. A treaty or a part of a treaty is applied provisionally pending its entry into force if: (a) the treaty itself so provides; or (b) the negotiating States have in some other manner so agreed. 2. Unless the treaty otherwise provides or the negotiating States have otherwise agreed, the provisional application of a treaty or a part of a treaty with respect to a State shall be terminated if that State notifies the other States between which the treaty is being applied provisionally of its intention not to become a party to the treaty.
26	*Article 26: Pacta sunt servanda* Every treaty in force is binding upon the parties to it and must be performed by them in good faith.
27	*Article 27: Internal law and observance of treaties* A party may not invoke the provisions of its internal law as justification for its failure to perform a treaty. This rule is without prejudice to article 46.
28	*Article 28: Non-retroactivity of treaties* Unless a different intention appears from the treaty or is otherwise established, its provisions do not bind a party in relation to any act or fact which took place or any situation which ceased to exist before the date of the entry into force of the treaty with respect to that party.
34	*Article 34: General rule regarding third States* A treaty does not create either obligations or rights for a third State without its consent.
35	*Article 35: Treaties providing for obligations for third States* An obligation arises for a third State from a provision of a treaty if the parties to the treaty intend the

	provision to be the means of establishing the obligation and the third State expressly accepts that obligation in writing.
36	*Article 36: Treaties providing for rights for third States* 1. A right arises for a third State from a provision of a treaty if the parties to the treaty intend the provision to accord that right either to the third State, or to a group of States to which it belongs, or to all States, and the third State assents thereto. Its assent shall be presumed so long as the contrary is not indicated, unless the treaty otherwise provides. 2. A State exercising a right in accordance with paragraph 1 shall comply with the conditions for its exercise provided for in the treaty or established in conformity with the treaty.
37	*Article 37: Revocation or modification of obligations or rights of third States* 1. When an obligation has arisen for a third State in conformity with article 35, the obligation may be revoked or modified only with the consent of the parties to the treaty and of the third State, unless it is established that they had otherwise agreed. 2. When a right has arisen for a third State in conformity with article 36, the right may not be revoked or modified by the parties if it is established that the right was intended not to be revocable or subject to modification without the consent of the third State.
39	*Article 39: General rule regarding the amendment of treaties* A treaty may be amended by agreement between the parties. The rules laid down in Part II apply to such an agreement except in so far as the treaty may otherwise provide.
48	*Article 48: Error* 1. A State may invoke an error in a treaty as invalidating its consent to be bound by the treaty if the error relates to a fact or situation which was assumed by that State to exist at the time when the treaty was concluded and formed an essential basis of its consent to be bound by the treaty. 2. Paragraph 1 shall not apply if the State in question contributed by its own conduct to the error or if the circumstances were such as to put that State on notice of a possible error. 3. An error relating only to the wording of the text of a treaty does not affect its validity; article 79 then applies.
49	*Article 49: Fraud* If a State has been induced to conclude a treaty by the fraudulent conduct of another negotiating State, the State may invoke the fraud as invalidating its consent to be bound by the treaty.
50	*Article 50: Corruption of a representative of a State* If the expression of a State's consent to be bound by a treaty has been procured through the corruption of its representative directly or indirectly by another negotiating State, the State may

	invoke such corruption as invalidating its consent to be bound by the treaty.
51	*Article 51: Coercion of a representative of a State* The expression of a State's consent to be bound by a treaty which has been procured by the coercion of its representative through acts or threats directed against him shall be without any legal effect.
52	*Article 52: Coercion of a State by the threat or use of force* A treaty is void if its conclusion has been procured by the threat or use of force in violation of the principles of international law embodied in the Charter of the United Nations.
53	*Article 53: Treaties conflicting with a peremptory norm of general international law (*jus cogens*)* A treaty is void if, at the time of its conclusion, it conflicts with a peremptory norm of general international law. For the purposes of the present Convention, a peremptory norm of general international law is a norm accepted and recognized by the international community of States as a whole as a norm from which no derogation is permitted and which can be modified only by a subsequent norm of general international law having the same character.
56	*Article 56: Denunciation of or withdrawal from a treaty containing no provision regarding termination, denunciation or withdrawal* 1. A treaty which contains no provision regarding its termination and which does not provide for denunciation or withdrawal is not subject to denunciation or withdrawal unless: (a) it is established that the parties intended to admit the possibility of denunciation or withdrawal; or (b) a right of denunciation or withdrawal may be implied by the nature of the treaty. 2. A party shall give not less than twelve months' notice of its intention to denounce or withdraw from a treaty under paragraph 1.
60	*Article 60: Termination or suspension of the operation of a treaty as a consequence of its breach* 1. A material breach of a bilateral treaty by one of the parties entitles the other to invoke the breach as a ground for terminating the treaty or suspending its operation in whole or in part. 2. A material breach of a multilateral treaty by one of the parties entitles: (a) the other parties by unanimous agreement to suspend the operation of the treaty in whole or in part or to terminate it either: (i) in the relations between themselves and the defaulting State, or (ii) as between all the parties; (b) a party specially affected by the breach to invoke it as a ground for suspending the operation of the treaty in whole or in part in the relations between itself and the defaulting State; (c) any party other than the defaulting State to invoke the breach as a ground for suspending the operation of the treaty in whole or in part with respect to itself if the treaty is of such a

	character that a material breach of its provisions by one party radically changes the position of every party with respect to the further performance of its obligations under the treaty. 3. A material breach of a treaty, for the purposes of this article, consists in: (a) a repudiation of the treaty not sanctioned by the present Convention; or (b) the violation of a provision essential to the accomplishment of the object or purpose of the treaty. 4. The foregoing paragraphs are without prejudice to any provision in the treaty applicable in the event of a breach. 5. Paragraphs 1 to 3 do not apply to provisions relating to the protection of the human person contained in treaties of a humanitarian character, in particular to provisions prohibiting any form of reprisals against persons protected by such treaties.
77	*Article 77: Functions of depositaries* 1. The functions of a depositary, unless otherwise provided in the treaty or agreed by the contracting States, comprise in particular: (a) keeping custody of the original text of the treaty and of any full powers delivered to the depositary; (b) preparing certified copies of the original text and preparing any further text of the treaty in such additional languages as may be required by the treaty and transmitting them to the parties and to the States entitled to become parties to the treaty; (c) receiving any signatures to the treaty and receiving and keeping custody of any instruments, notifications and communications relating to it; (d) examining whether the signature or any instrument, notification or communication relating to the treaty is in due and proper form and, if need be, bringing the matter to the attention of the State in question; (e) informing the parties and the States entitled to become parties to the treaty of acts, notifications and communications relating to the treaty; (f) informing the States entitled to become parties to the treaty when the number of signatures or of instruments of ratification, acceptance, approval or accession required for the entry into force of the treaty has been received or deposited; (g) registering the treaty with the Secretariat of the United Nations; (h) performing the functions specified in other provisions of the present Convention.

Annex 2 – List of IEAs (1921 – 1998)

1	Convention Concerning the Use of White Lead in Painting, 1921
2	International Convention for the Regulation of Whaling, Washington (as amended), 1946
3	General Fisheries Council for the Mediterranean, Rome, 1949
4	International Convention for the Protection of Birds, Paris, 1950
5	International Plant Protection convention, Rome, 1951
6	Protocol to the International Convention for the Regulation of Whaling, Washington, 1956
7	Convention on the Continental Shelf, Geneva, 1958
8	Convention on Fishing and Conservation of the Living Resources of the High Seas, Geneva, 1958
9	Convention on the High Seas, Geneva, 1958
10	Convention on Territorial Sea and the Contiguous Zone, Geneva, 1958
11	The Antarctic Treaty, Washington, 1959
12	Agreement concerning Co-operation in the Quarantine of Plants and their Protection against Pests and Diseases, Sofia, 1959
13	Protection of Workers Against Ionizing Radiations, Geneva, 1960
14	Convention on Third Party Liability in the Field of Nuclear Energy, Paris, 1960
15	International Convention for the Protection of New Varieties of Plants, Geneva, 1961
16	Convention on the African Migratory Locust, Kano, 1962
17	Convention Supplementary to the Paris Convention on Third Party Liability in the Field of Nuclear Energy (as amended in 1964 and 1982), Brussels, 1963
18	Convention on Civil Liability for Nuclear Damage, Vienna, 1963
19	Optional Protocol Concerning the Compulsory Settlement of Disputes, 1963
20	Treaty Banning Nuclear Weapons Tests in the Atmosphere, in Outer Space and Under Water, Washington, 1963
21	Agreement for the Establishment of a Commission for Controlling the Desert Locust in the Eastern Region of its Distribution Area in South-West Asia, Rome, 1963
22	Additional Protocol to the Convention Supplementary to the Paris Convention on Third Party Liability in the Field of Nuclear Energy as amended in 1963, Paris, 1964
23	Convention for the International Council for the Exploration of the Sea, Copenhagen, 1964
24	Agreed Measures for the Conservation of Antarctic Fauna and Flora, Brussels, 1964
25	Agreement for the Establishment of a Commission for Controlling the Desert Locust in the Near East, Rome, 1965
26	International Convention for the Conservation of Atlantic Tunas, Rio de Janeiro, 1966
27	Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space Including the Moon and Other Celestial Bodies, London, 1967
28	International Convention on Civil Liability for Oil Pollution Damage, Brussels, 1969
29	International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties, Brussels, 1969
30	Convention Relating to Civil Liability in the Field of Maritime Carriage of Nuclear Material, Brussels, 1971
31	Convention Concerning Protection against Hazards of Poisoning arising from Benzene (ILO No. 136), Geneva, 1971
32	Convention on Wetlands of International Importance especially as Waterfowl Habitat, Ramsar, 1971
33	Treaty on Prohibition of the Emplacement of Nuclear Weapons and other Weapons of Mass Destruction on the Sea-Bed and Ocean Floor and in the Subsoil thereof, Washington, 1971
34	Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, Washington, 1972

35	Convention on the Prohibition of the Development, Production, and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction, Washington, 1972
36	Convention on the International Regulations for Preventing Collisions at Sea, London, 1972
37	Convention on International Liability for Damage caused by Space Objects, Washington, 1972
38	Convention concerning the Protection of the World Cultural and Natural Heritage, Paris, 1972
39	Protocol Relating to Intervention on the High Seas in Cases of Marine Pollution by Substances other than Oil, London, 1973 (parent:1969)
40	Convention on International Trade in Endangered Species of Wild Fauna and Flora, Washington, 1973
41	International Convention for the Prevention of Pollution from Ships (MARPOL) - Annex V (Optional)=Garbage, London, 1973
42	Convention Concerning the Prevention and Control of Occupational Hazards Caused by Carcinogenic Substances and Agents(ILO No. 139), Geneva, 1974
43	International Convention for the Safety of Life at Sea (SOLAS), London, 1974
44	Convention on the Prohibition of Military or any other Hostile Use of Environmental Modification Techniques, Geneva, 1976
45	Protocol to the International Convention on the Establishment of an International Fund of Compensation for Oil Pollution Damage, London, 1976
46	Protocol to the International Convention on Civil Liability for Oil Pollution Damage, London, 1976
47	Convention concerning the Protection of Workers against Occupational Hazards in the Working Environment Due to Air Pollution, Geneva, 1977
48	International Convention for the Safety of Fishing Vessels, Torremolinos, 1977
49	International Convention for the Prevention of Pollution from Ships as modified by the Protocol of 1978, London, 1978
50	International Convention for the Prevention of Pollution from Ships: Annex III - Hazardous substances carried in packaged form, London, 1978
51	International Convention for the Prevention of Pollution from Ships (MARPOL) - Annex IV (Optional): Sewage, London, 1978
52	Amendment to Annexes to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and other Matter concerning Incineration at Sea, Torremolinos, 1978
53	Amendments to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter concerning Settlement of Disputes, Torremolinos, 1978
54	International Convention for the Protection of New Varieties of Plants as amended on 23.10.1978, Geneva, 1978
55	Protocol relating to the International Convention for the Safety of Life at Sea (SOLAS Protocol), London, 1978
56	Convention on the Conservation of Migratory Species of Wild Animals, Bonn, 1979
57	Convention on the Conservation of European Wildlife and Natural Habitats, Bern, 1979
58	Convention on the Physical Protection of Nuclear Material, Vienna, 1979
59	Amendment to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (Art. X1), Bonn, 1979
60	Agreement governing the Activities of States on the Moon and other Celestial Bodies, New York, 1979
61	International Plant Protection Convention (1979 Revised Text), Rome, 1979
62	Convention on the Conservation of Antarctic Marine Living Resources, Canberra, 1980
63	Amendments to the Annexes to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, Colombo, 1980
64	United Nations Convention on the Law of the Sea, Montego Bay, 1982
65	Protocol to Amend the Convention on Third Party Liability in the Field of Nuclear Energy of 1960 amended by Additional Protocol of 1964, Paris, 1982
66	Protocol to amend the Convention on Wetlands of International Importance especially as Waterfowl Habitat, Paris, 1982

67	International Tropical Timber Agreement, Geneva, 1983
68	Amendment to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (Art. XXI), Gaborone, 1983
69	Protocol to amend the International Convention on Civil Liability for Oil Pollution Damage, London, 1984
70	Protocol to amend the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage, London, 1984
71	Convention for the Protection of the Ozone Layer, Vienna, 1985
72	Convention Concerning Safety in the Use of Asbestos, Geneva, 1986
73	Convention on Early Notification of a Nuclear Accident, Vienna, 1986
74	Convention on Assistance in Case of a Nuclear Accident or Radiological Emergency, Vienna, 1986
75	Protocol amending the Convention for the Prevention of Marine Pollution from land-based sources, Paris, 1986
76	Montreal Protocol on Substances that Deplete the Ozone Layer, Montreal, 1987
77	Amendments to Article 6 & 7 of the Convention on Wetlands of International Importance especially as Waterfowl Habitat, Regina - Canada, 1987
78	Joint Protocol Relating to the Application of the Vienna Convention and The Paris Convention, Vienna, 1988
79	Protocol relating to the International Convention for the Safety of Life at Sea (SOLAS Protocol 1988), London, 1988
80	Basel Convention On the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, Basel, 1989
81	International Convention on Salvage, London, 1989
82	London Amendment to the Montreal Protocol on Substances That Deplete the Ozone Layer, London, 1990
83	International Convention on Oil Pollution Preparedness, Response and Cooperation, London, 1990
84	Protocol to the Antarctic Treaty on Environmental Protection, Madrid, 1991
85	International Convention for the Protection of New Varieties of Plants (consolidated version), Geneva, 1991
86	Protocol to amend the International Convention on Civil Liability for Oil Pollution Damage, London, 1992
87	Protocol to amend the International Convention on the Establishment of an international Fund for compensation for Oil Pollution Damage, London, 1992
88	Amendment to Montreal Protocol on Substances that Deplete the Ozone Layer, Copenhagen, 1992
89	United Nations Framework Convention on Climate Change, New York, 1992
90	Convention on Biological Diversity, Rio de Janeiro, 1992
91	Protocol to the International Convention for the Safety of Fishing Vessels, Torremolinos, 1993
92	Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas, London, 1993
93	Convention on Nuclear Safety, Vienna, 1994
94	International Convention to Combat Desertification in those Countries Experiencing Serious Drought and or Desertification, Paris, 1994
95	International Tropical Timber Agreement, Geneva, 1994
96	Agreement relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea of 1982, New York, 1994
97	Agreement on Co-operative Enforcement Operations directed at Illegal Trade in Wild Fauna and Flora, Lusaka, 1994
98	Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, New York, 1995
99	Agreement on the Conservation of African-Eurasian Migratory Waterbirds, Hague, 1995
100	Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, London, 1996

101	International Convention on the Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea, London, 1996
102	Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer, Montreal, 1997
103	Convention on Supplementary Compensation for Nuclear Damage, Vienna, 1997
104	Convention on the Law of the Non-Navigational Uses of International Watercourses, New York, 1997
105	International Plant Protection Convention (1997 Revised Text), Rome, 1997
106	Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, Vienna, 1997
107	Protocol to amend the Vienna Convention on Civil Liability for Nuclear Damage, Vienna, 1997
108	Kyoto Protocol to the United Nations Framework Convention on Climate Change, Kyoto, 1997
109	Convention on Access to Information Public Participation in Decision-Making and Access to Justice in Environmental Matter, Aarhus, 1998
110	Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, Rotterdam, 1998

Annex 3 – List of IEAs for Model I

	Acronym	IEAs
1	CBD	Convention on Biological Diversity, Rio de Janeiro, 1992
2	UNFCCC	United Nations Framework Convention on Climate Change, Rio de Janeiro, 1992
3	KP	Kyoto Protocol to the United Nations Framework Convention on Climate Change, Kyoto, 1997
4	VIENCON	Convention for the Protection of the Ozone Layer, Vienna, 1985
5	MP	Montreal Protocol on Substances that Deplete the Ozone Layer, Montreal, 1987
6	MP-LON	London Amendment to the Montreal Protocol on Substances That Deplete the Ozone Layer, London, 1990
7	MP-COPHG	Amendment to Montreal Protocol on Substances that Deplete the Ozone Layer, Copenhagen, 1992
8	MP-MREAL	Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer, Montreal, 1997
9	ITTA	International Tropical Timber Agreement, Geneva, 1994
10	CCD	International Convention to Combat Desertification in those Countries Experiencing Serious Drought and or Desertification, Paris, 1994
11	BASEL	Basel Convention On the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, Basel, 1989
12	WHALING	International Convention for the Regulation of Whaling, Washington (as amended), 1946
13	BIRDS	International Convention for the Protection of Birds, Paris, 1950
14	CONTSHLF	Convention on the Continental Shelf, Geneva, 1958
15	CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora, Washington, 1973
16	RAMSAR	Convention on Wetlands of International Importance especially as Waterfowl Habitat, Ramsar, 1971
17	SALVAGE	International Convention on Salvage, London, 1989
18	ERLYNOT	Convention on Early Notification of a Nuclear Accident, Vienna, 1986
19	ASSITNUC	Convention on Assistance in Case of a Nuclear Accident or Radiological Emergency, Vienna, 1986
20	CIVLIABNU	Convention on Civil Liability for Nuclear Damage, Vienna, 1963
21	UNCLOS	United Nations Convention on the Law of the Sea, Montego Bay, 1982
22	ENVMOD	Convention on the Prohibition of Military or any other Hostile Use of Environmental Modification Techniques, Geneva, 1976
23	CMS	Convention on the Conservation of Migratory Species of Wild Animals, Bonn, 1979
24	ANTMRINE	Convention on the Conservation of Antarctic Marine Living Resources, Canberra, 1980
25	ANTARCTC	The Antarctic Treaty, Washington, 1959
26	QUARTINE	Agreement concerning Co-operation in the Quarantine of Plants and their Protection against Pests and Diseases, Sofia, 1959
27	LOCUSTAF	Convention on the African Migratory Locust, Kano, 1962
28	WSTEDUMP	Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, Washington, 1972
29	IPPA	International Plant Protection Convention (1997 Revised Text), Rome, 1997
30	NUCWEAP	Treaty on Prohibition of the Emplacement of Nuclear Weapons and other Weapons of Mass Destruction on the Sea-Bed and Ocean Floor and in the Subsoil thereof, Washington, 1971

31	MARPOL	International Convention for the Prevention of Pollution from Ships as modified by the Protocol of 1978, London, 1978

Annex 4 – Full Dataset for Model I

Table 16: Full Dataset for Model I

TREATIES	% Total	% dvg	% dd	Strength	Transparency	Threshold	dispneg	amenddpty	fintransfers	Capacity
CBD	89.29	91.45	81.82	0	3	30	1	1	1	2
UNFCCC	93.72	92.11	88.64	0	3	50	1	1	1	2
KP	7.33	7.89	4.55	4	3	55	1	1	1	3
VIENCON	87.24	88.16	84.09	0	3	20	1	1	0	1
MP	86.73	87.50	84.09	3	4	11	1	1	0	3
MP-LON	66.33	62.50	79.55	2	4	20	1	1	1	3
MP-COPHG	48.47	41.45	72.73	1	4	20	0	1	0	3
MP-MREAL	8.67	5.26	20.45	1	4	20	0	1	0	3
ITTA	17.86	13.82	31.82	2	4	28	0	1	1	2
CCD	81.68	81.58	72.73	0	2	50	1	1	1	2
BASEL	66.84	63.16	79.55	2	4	20	1	1	0	2
WHALING	19.39	13.16	40.91	2	2	6	0	0	0	0
BIRDS	5.10	1.32	18.18	1	0	6	0	0	0	0
CONTSHLF	29.84	25.66	40.91	0	0	22	0	0	0	0
CITES	75.51	76.32	72.73	1	5	10	1	1	0	0
RAMSAR	60.73	55.92	70.45	0	0	10	0	1	0	0
SALVAGE	13.27	8.55	29.55	0	0	15	0	0	0	0
ERLYNOT	40.82	32.89	68.18	0	0	3	1	1	0	0
ASSITNUC	37.76	32.24	56.82	0	0	3	1	1	0	0
CIVLIABNU	15.71	19.08	2.27	0	0	5	0	1	0	0
UNCLOS	65.82	65.13	68.18	2	3	60	1	0	1	3
ENVMOD	33.67	28.95	50.00	0	0	20	0	1	0	1
CMS	30.10	25.66	45.45	0	2	15	1	1	0	1
ANTMRINE	14.29	7.24	38.64	2	3	8	1	1	0	1
ANTARCTC	22.51	15.13	45.45	2	1	12	1	0	0	1
QUARTINE	4.08	5.26	0.00	0	0	5	0	0	0	1
LOCUSTAF	7.14	9.21	0.00	2	1	6	0	1	0	0
WSTEDUMP	39.29	31.58	65.91	0	1	15	0	0	0	1
IPPA	3.57	3.29	4.55	1	0	3	1	1	0	1
NUCWEAP	63.27	61.84	68.18	1	0	3	0	1	0	0
MARPOL	48.98	42.76	70.45	2	2	15	1	1	0	3

Annex 5 – Descriptives for Variables for Model I

Table 17: Descriptives for Variables for Model I

Variables	Mean	Standard deviation	Minimum	Maximum
Model I				
Strength	1	1.095	0	4
Transparency	1.87	1.688	0	5
Threshold	18.26	15.792	3	60
Dispneg	0.55	0.506	0	1
Amendpty	0.74	0.445	0	1
Fintransfers	0.23	0.425	0	1
Capacity	1.26	1.18	0	3

Annex 6 – Descriptives for Dependent and Independent Variables for Models II - V

Table 18: Descriptives of Variables for Model II - V

Variables	Mean	Standard deviation	Minimum	Maximum
Dependent Variables				
Models II-V				
Total participation, P	29.88	18.09	0	81
Independent Variables				
Model II				
Gdpcap1	7903.67	8256.049	448	42769
Indgth	2.0952	5.22026	-16.65	13.97
Mineral_t	5.1307	3.10922	-2.30	11.40
Contiguity	3.13	2.643	0	14
Popdens_t	4.0983	1.43910	0.69	9.71
Milexp	10.8863	9.42320	0.90	51.10
Milcoup	0.35	0.478	0	1
Model III				
HDI	0.6835	0.18181	0.26	0.94
Eionum	10.05	5.669	0	29
Ecofree	2.5584	0.41111	1.30	3.20
Goveff	-0.0810	0.99776	-1.78	2.26
Tgoods	67.9839	41.45934	14.72	295.30
Polity	3.1516	6.41911	-10.00	10.70
Agenda21_t	-0.4030	2.02491	-0.461	4.87
Model IV				
Graft	-0.4870	0.61859	-1.70	1.55
Sanitation	67.31	27.651	8	100
Undernutrition_t	2.8423	0.84958	1.10	4.32
IMortality	82.71	68.389	5	316
Odacap_t	2.9975	1.23761	-0.92	5.76

Arms	1.9150	4.87090	0	33.50
Tgoods	64.2476	32.92279	14.72	201.26

Annex 7 – Corelation Matrices for Models I - V

Table 19: Correlation Matrix for Model I Variables

	Strength	*Dispneg*	*Amendpty*	*Fintransfers*	*Transparency*	*Threshold*	*Capacity*
Strength	1						
Dispneg	0.241	1					
Amendpty	0.068	0.353	1				
Fintransfers	0.215	0.335	0.142	1			
Transparency	0.487	0.398	0.354	0.414	1		
Threshold	0.191	0.311	0.024	0.821	0.426	1	
Capacity	0.489	0.368	0.258	0.544	0.685	0.616	1

Table 20: Correlation Matrix for Model II Variables

	GDPCAP1	*INDGTH*	*MILCOUP*	*MINERAL_T*	*FORPERC_T*	*POPDENS_T*	*CONTIG*	*MILGEXP*
GDPCAP1	1							
INDGTH	0.018	1						
MILCOUP	-0.386	0.131	1					
MINERAL_T	0.387	-0.075	-0.080	1				
FORPERC_T	0.056	0.087	-0.116	0.024	1			
POPDENS_T	0.127	0.105	-0.169	-0.188	-0.021	1		
CONTIG	-0.162	-0.084	0.178	0.328	0.011	-0.268	1	
MILGEXP	-0.154	0.131	0.202	-0.001	-0.324	-0.072	0.181	1

Table 21: Correlation Matrix for Model III Variables

	POLITY	*GOVEFF*	*HDI*	*ECOFREE*	*EIONUM*	*TGOODS*	*AGENDA21_T*
POLITY	1						
GOVEFF	0.544	1					
HDI	0.474	0.736	1				
ECOFREE	-0.263	-0.743	-0640	1			
EIONUM	0.347	0.495	0.370	-0.378	1		
TGOODS	0.056	0.217	0.273	-0.313	-0.170	1	
AGENDA21_T	0.486	0.686	0.611	-0.492	0.128	0.348	1

Table 22: Correlation Matrix for Model IV Variables

	GRAFT	*SANTN*	*POPUNDR_T*	*MORT*	*ODACAP_T*	*DEMRANK*	*AMTDIMP*	*TGOODS*	*AGENDA21_T*	*GDPCAP1*
GRAFT	1									0.635
SANTN	0.270	1								0.562
POPUNDR_T	-0.376	-0.544	1							-0.667
MORT	-0.400	-0.652	0.617	1						-0.659
ODACAP_T	0.077	-0.088	0.237	0.115	1					-0.212
DEMRANK	-0.320	-0.191	0.084	0.322	-0.099	1				-0.337
AMTDIMP	-0.001	-0.262	0.049	0.157	-0.164	0.258	1			
TGOODS	0.273	0.284	-0.207	-0.261	0.231	-0.085	-0.140	1		0.296
AGENDA21_T	0.418	0.260	-0.146	-0.336	0.585	-0.295	-0.205	0.484	1	0.312
GDPCAP1	0.635	0.562	-0.667	-0.659	-0.212	-0.337	-0.065	0.296	0.312	

Table 23: Correlation Matrix for Model V Variables

	Contiguity	Milexp	Graft	Polity	Eionum	Mineral_t	Odacap_t	Agenda21_t	Popdens_t	HDI	tgoods
Contiguity	1										
Milexp	0.1766	1									
Graft	-0.0964	0.1694	1								
Polity	-0.1243	-0.6008	0.0925	1							
Eionum	0.1852	-0.0698	-0.1783	-0.0151	1						
Mineral_t	0.2003	0.1400	0.2877	-0.1029	0.3310	1					
Odacap_t	-0.1984	-0.2523	-0.0186	0.1270	-0.3762	-0.5570	1				
Agenda21_t	-0.2682	-0.2216	0.4081	0.2242	-0.4294	-0.1551	0.5060	1			
Popdens_t	-0.2282	-0.0971	-0.0915	0.1706	-0.0910	-0.1800	-0.0704	-0.1334	1		
HDI	-0.0441	-0.0452	0.6041	0.2655	0.0167	0.6291	-0.2076	0.3446	0.0632	1	
Tgoods	-0.3307	-0.1358	0.4334	0.0997	-0.2482	0.1790	0.1350	0.4829	0.0464	0.4133	1

Annex 8 – Variance Inflation Factors for all Models

Table 24: Variance Inflation Factors for Models I - V[74]

Model I	Model II	Model III	Model IV	Model V
3.93	1.71	5.83	5.40	4.19
3.25	1.44	3.57	2.76	3.79
2.79	1.39	2.65	2.64	2.76
2.22	1.30	2.26	2.64	2.10
1.50	1.18	1.70	2.41	2.06
1.37	1.17	1.54	2.07	2.02
1.35	1.12	1.29	1.68	1.98
	1.08		1.61	1.74
			1.56	1.50
			1.51	1.45
				1.28

[74] The VIF are for variables presented in the same order as they appear in the models.