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State Cooperation on Regulatory Policies for Transboundary Environmental Issues

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THESIS APPROVAL

The abstract and thesis of Jennifer Lyn Pennell for the Master of Science in Political Science were presented July 6, 1995, and accepted by the thesis committee and the department.

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ABSTRACT

An abstract of the thesis of Jennifer Lyn Pennell for the Master of Science in Political Science, presented July 6th, 1995.

Title: State Cooperation on Regulatory Policies for Transboundary Environmental Issues

This research analyzes three contributing factors, *perception, knowledge,* and *affordability,* in order to estimate the likelihood of state cooperation on effective regulatory policies for transboundary environmental problems. The correlative hypothesis in this research postulates that states are more likely to support environmental regulatory policies when the issue is *perceived* by policymakers as serious, substantiated by a high level of *knowledge,* and *affordable* for the state. Regulatory policies for transboundary environmental issues require policymakers to act in foresight, employ precautionary measures, and cooperate. Cooperation implies that states will coordinate their policies and eschew their dominant strategy of independent decision making. However, this research contends that states decide to cooperate because they perceive the strategic interaction to be beneficial. Thus, the theory of cooperation in this research is consistent with realist assumptions of rational egoism.

STATE COOPERATION ON REGULATORY POLICIES

FOR TRANSBOUNDARY ENVIRONMENTAL ISSUES

by

JENNIFER LYN PENNELL

A thesis submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE
in
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Chapter One: Research Project Overview

Abstract

This research analyzes three contributing factors, *perception*, *knowledge*, and *affordability*, in order to estimate the likelihood of state cooperation on effective regulatory policies for transboundary environmental problems. The correlative hypothesis in this research postulates that states are more likely to support environmental regulatory policies when the issue is *perceived* by policymakers as serious, substantiated by a high level of *knowledge*, and *affordable* for the state. Regulatory policies for transboundary environmental issues require policymakers to act in foresight, employ precautionary measures, and cooperate. Cooperation implies that states will coordinate their policies and eschew their dominant strategy of independent decision making. However, this research contends that states decide to cooperate because they perceive the strategic interaction to be beneficial. Thus, the theory of cooperation in this research is consistent with realist assumptions of rational egoism.

Introduction

> The world is on history's most rapid growth track. A sudden acceleration of events on several interrelated fronts - the economic, the ecological, and the political - has combined to compel profound changes both in the relationships between peoples, nations, and governments, and in the way we view and think about the management of the planet as a whole.[1]

The end of the century ushers in a new era of ecological awareness and environmental correctness. Although environmental issues predate this "heightened consciousness" considerably, only recently have they begun to be treated seriously by policymakers and international relations scholars. Today, many governments acknowledge the grave prospects of a degraded environment, while still others continue to subordinate environmental concerns to political and economic interests. Either way, governments no longer have the luxury of ignoring environmental issues

altogether; issues ranging from transboundary air pollution to a depleted ozone layer, acid rain, and global warming are commanding the attention of states.

The Research Method

The intent of this research is to deepen the understanding of state cooperation on transboundary environmental issues. This research examines two anthropogenically caused environmental problems, ozone depletion resulting from the global production of clorofluorocarbons ("CFCs"), and nuclear accident spills that occur as a result of human mismanagement. Using these two environmental issues as case studies, this research looks at the following contributing conditions: *perception*, *knowledge*, and *affordability*, and makes the correlative hypothesis[2] that states are more likely to support environmental regulatory policies to decelerate practices that deplete the ozone, and protect against and prepare for nuclear spills, when:

(1) policymakers' *cognition* of the problem is keen (i.e. there is a *perception* of threat);

(2) policymakers possess a high degree of *knowledge* on the issue (mostly provided to them from the scientific community); and,

(3) the state can *afford* the enactment of environmental regulations to the extent that other economic and political issues can be subordinated to address the environmental problem.

The Research Questions

Given the many states' poor record regarding environmental issues, and many other states' still delinquent practices, this research asks the questions: Why do certain states actively support environmental protection policy for the stratospheric ozone? Why do certain states actively submit to International Atomic Energy Agency ("IAEA") regulations for the peaceful use of nuclear energy? The central question is *why* participating states decided it was important to enact regulatory policies regarding the ozone and nuclear energy. Did certain conditions, such as the *perception* of a crisis, present themselves? Was there a high degree of *knowledge* generated by the scientific community and provided to policymakers? Were certain enticements involved, or accommodations offered, to states that influenced the affordability factor?

The Cases for Analysis and Comparability

Two case studies will be used for analysis: (1) The environmental problem of stratospheric ozone depletion and the treaty, *The Montreal Protocol on Substances That Deplete the Ozone,*[3] produced to decelerate this process by limiting the global production of CFCs, (2) The threat to the environment and human health resulting from nuclear energy disasters and the *Convention on Early Notification of a Nuclear Accident* ("Notification Convention") and the *Convention on Assistance in the Case of a Nuclear Accident* ("Assistance Convention") under the auspices of the International

Atomic Energy Agency ("IAEA") that have the purpose of minimizing the "transboundary environmental health and economic consequences of a nuclear disaster."[4] The issues are similar in that neither ultraviolet radiation nor nuclear radiation can be seen, and both types of radiation are potentially disastrous to human health and to the environment. Beyond these fundamental similarities, the issues are distinct. These two case studies have been chosen for this research precisely because the *perception* of threat, degree of *knowledge*, and *affordability* factor manifest themselves at different levels for these two diverse issues. To intimate at the research to follow, below is a brief discussion, of the two case studies in reference to the three contributing factors, *perception*, *knowledge*, and *affordability*, that may have the effect of either motivating states to, or discouraging states from, enacting regulatory policy.

Perception and Knowledge

Acting as surrogates for the state, policymakers are required to negotiate policy in many different realms. Concerns regarding the degradation and conservation of the environment pose new challenges to them because in effect they are being asked to make decisions in areas of inexpertise. *Knowledge* is valuable in discussing environmental problems and many issues like ozone depletion, biodiversity, and global warming depend largely on scientific data to "validate" their existence. Moreover, in the absence of a crisis, perception of threat is negligible. Seldom has the existence of a crisis been manifest in environmental issues that

exhibit a more progressive, evolutionary character. Therefore, *information* becomes very important as scientists from around the world, as well as agencies like the United Nations Environmental Programme (UNEP), the National Aeronautics and Space Administration (NASA), and the Environmental Protection Agency (EPA) substantiate data. Today, owing to the *knowledge* generated by the scientific community, the majority of societies around the world agree ozone depletion is harmful. **Thus, the *perceived* seriousness of ozone depletion is *derived* from the information generated on the issue.**

Perception and *knowledge*, as structural variants, are manifest differently in an analysis of nuclear energy regulatory policy. Nuclear energy provides a duel perception. Fear of a major nuclear accident leads to the perception of peril, whereas nuclear energy as a viable energy source carries the perception of promise. As perilous, the perception of a nuclear disaster is unmatched by any other environmental problem; a nuclear accident presents a certifiable and imminent crisis perceivable by all individuals, not just those with a high level of scientific knowledge. Nuclear energy also carries the perception of promise. The number of states working to produce nuclear programs is proliferating at great speed. Because *perceptions* surrounding the nuclear energy issue are so strong, *knowledge*, a structural variant, may not have to be as high as in the case of the ozone. Verifiable scientific data on nuclear disasters may not be *necessary* to persuade policymakers to enact regulatory policy because the *perception* of threat is sufficient to this end. Thus, while the perception that nuclear accidents are serious is not enough to keep states

from exploiting nuclear power as a viable energy source, it may be enough to induce states to submit to regulatory measures, such as the inspection, reporting, notification, and information provisions required under the IAEA regulations. Thus, while many states are willing to "take the risk," so to speak, in using nuclear energy, they are also willing to comply with safeguards that aim to protect their own citizenry as well as neighboring states. At present, 82 states are party to the Notification and Assistance Conventions ranging from the regions of Africa, Latin America, the Middle East, Asia and Pacific, and North America. Table I illustrates the levels of *perception* and *knowledge* manifest in the environmental issues ozone depletion and nuclear energy use.

Table I
Perceived Threat and Knowledge

/////////////////	Ozone	Nuclear Energy
Knowledge	HIGH	Perceived seriousness is already derived (possibly from fear) and therefore the value of knowledge is minimized.
Perception	Perceived seriousness depends on a HIGH level of knowledge.	HIGH

Affordability Factor Amidst Competing Interests.

The third factor, *affordability*, refers to the states' ability to bear the cost of certain regulations. *Wealth* refers to a state's abundance of resources, possessions,

and capabilities: any capital that can be turned into money. To *afford* something, on the other hand, refers to the *ability* to bear the cost without a serious detriment. Thus, the affordability factor is similar to the "opportunity cost" (a term widely used in economics) that is the cost of making an investment that is the difference between the return on one investment and the return on the alternative. Thus, to afford something is to make a choice between competing interests in a justifiable manner.

For less-developed states, the choices begin with economic growth (and related concerns: unemployment, trade deficit, cost of living/inflation, cost of borrowing/interest rates, recession/depression, and budgetary issues). Moreover, a developing state struggles against issues of dependency on the first world, as well as deals with precarious and erratic internal politics. Ultimately, developing states have more pressing interests which they desire to cultivate before (or more than) environmental protection. In short, they want to develop, and efforts aimed at protecting the environment offer very little to the achievement of this goal. For industrialized countries, there are many competing political and economic interests prevalent in a democratic, market economy. Faced with imminent issues such as drugs, crime, education, poverty, and of course, the economy, policies for the environment are often overlooked. Thus, while industrial states may have the *wealth* to enact regulatory policy, they may not be able to bear the cost.

Many states (developing and industrial) decided that they could afford to enact regulatory policy to ameliorate the ozone depletion problem. Once committed,

the industrial states provided incentive for the developing states, such as allowing for a ten year grace period for the implementation of control measures, for special financing to assist the developing countries, and for the transfer of technology to developing countries "under fair and most favourable conditions."[5]

States also justified the cost of signing the Notification and Assistance Conventions for peaceful use of nuclear energy perhaps for a few different reasons. First, submitting to inspections, agreeing to report information, and notifying an agency when an accident occurs, does not "cost" a state a great deal. Clearly, these provisions are not analogous to the costs associated with some environmental problems that require states to forego economic gains in favor of protecting the environment. Second, there is no such thing as a nuclear "accident-prone" state. Nuclear accidents can happen anywhere, in any state. Three Mile Island reminds us that mismanagement can occur even in the most advanced states. The Conventions thus resemble an "insurance policy."[6] The insurance policy description is apt because states do not know how a severe nuclear accident would effect them. As Young points out, participants to the Conventions are in a contractarian position similar to Rawls's original position.[7] (The original position illustrates a situation where actors are assigned the task of devising civil society ignorant of the attributes they will possess. The result, therefore, is a society based on equal treatment to all individuals.) Similarly, in the nuclear accident situation, states have general knowledge that a disaster would be widespread and long-lasting, severe, and quite possibly transboundary. They however, do not know which state will be the source,

when or where an accident will occur. Many states, therefore, have chosen to bear the cost associated with submitting to safeguards to avoid this potentially devastating fate. Table II serves as a visual analysis of the three contributing factors *perception*, *knowledge*, and *affordability* in reference to ozone depletion and nuclear energy use.

Table II
Perceived Threat, Knowledge, and Affordability

/////////////////	Ozone	Nuclear Energy
Knowledge	HIGH - Based largely on scientific data	Perceived seriousness is already derived (possibly from fear) and therefore the value of knowledge is minimized.
Perception	Perceived seriousness <u>depends</u> on a HIGH level of knowledge.	HIGH - Based largely on memories of Chernobyl
Affordability	HIGH degree of affordability based on available substitutes, financial and technical assistance, and equitable accommodations.	HIGH degree of affordability based on states' rational calculation that submission to safeguards was a reasonable expense compared to the devastating effects resulting from a major nuclear accident.

Conclusion - The Direction of the Paper

The intent of this paper is to deepen the understanding of state cooperation on transboundary environmental issues. The first part of the paper is general in that the analysis is not specifically concentrated on environmental issues. However, the research conducted in this part of the paper is necessary in studying environmental issues because it provides a theoretical framework that is essential to a

issues because it provides a theoretical framework that is essential to a comprehensive analysis. Moreover, because there are varying theoretical frameworks to choose from, it is necessary to make clear which one is utilized in this research. Thus, for reasons that will be made clear below, Chapter Two situates the analysis in a realist paradigm, explains what is meant by political realism, and argues that realism is the most effective theoretical model for studying international environmental issues.

Because there are also competing views about *how* state cooperation comes about, Chapter III discusses two conditions, *future relations* and *common interest*, as explanatory elements for policy coordination that are *consistent* with a realist paradigm. Thus, Cooperation becomes more likely when states perceive themselves as having future relations, or shared interests, with some other state(s). Chapter Three sets forth the key elements of cooperation theory and emphasizes regime formation and reciprocity as important mechanisms for cooperation when states perceive future relationships and shared interests with some other states(s). The reader will be keen to notice that *reciprocity* is most effective for bi-lateral, short-term exchanges whereas *regime formation* is particularly useful in confronting issues that are long-term and involve multiple states. As transboundary environmental issues are often of this variety, this research employs a specific version of regime theory that is consistent with realism to explain why states coordinate their policies to confront a shared environmental threat. Regime theory is also a useful context within which to analyze the structural variants, *perception*, *knowledge*, and

affordability.

In Part Two of this research, specific environmental issues are introduced. In Chapter Four, the issue of ozone depletion and *The Montreal Protocol on Substances That Deplete the Ozone* is submitted into the analysis. The Protocol is examined in reference to the three contributing factors that may enhance an environmental issue's likelihood of gaining regulatory policy. That is, the research examines whether states' policymakers perceived a high degree of cognition (*perception* of threat), *knowledge*, and *affordability* in making policy decisions for the protection of the ozone. In Chapter Five, the issue of peaceful uses of nuclear energy is discussed in reference to the *Convention on Early Notification of a Nuclear Accident* ("Notification Convention") and the *Convention on Assistance in the Case of a Nuclear Accident* ("Assistance Convention") implemented under the intergovernmental organization the International Atomic Energy Agency ("IAEA"). The three contributing factors, *perception, knowledge* and *affordability*, are applied to this issue as well.

Chapter Two:
Sovereign States, Transboundary Issues, and Political Realism

SECTION I - ENVIRONMENTAL POLICIES, PAST AND PRESENT

Introduction

For most governments, the prevailing approach for environmental issues has been reactive rather than proactive,[9] perhaps attributable to two causes. First, the uncertainty surrounding so many environmental issues contributes to the complacency on behalf of policymakers. Policymakers are reluctant to act based on speculation, skepticism, and unsubstantiated data. Moreover, their willingness to advocate policy in areas of inexpertise is negligible. McCormick explains that policymakers are slow to act due to "... a simple lack of understanding about the causes and consequences of environmental problems and their long-term cost."[10] As such, the information generated by scientific communities is of fundamental importance to environmental solutions, especially when scientists around the world corroborate findings on the same issue and report them to the policymakers. An increase in knowledge lessens uncertainty. The salience of the issue, as well as its evidential gravity, become manifest in light of verified data.

Second, as policymakers are often myopically focused on short-term goals, they seldom look beyond their immediate milieu to take seriously the deleterious effects endemic to a neglected environment. It is antithetical to a policymaker's position to adopt a long-term perspective and act in a preventive manner when there

is a wealth of issues demanding immediate attention. The probability that policymakers will risk their reputation, as well as dip into the state's budget, to guard against, for example, global warming - an issue heretofore not clearly understood - is negligible.[11] As such, environmental protection policy is subordinated to short-term economic and political interests. Thus, a state's, *via* its policymakers', *perception* of the problem is of fundamental significance to its solution.

Change in Perception

Some states' "reactive" environmental practices of the past are changing. For example, the United States has spearheaded many environmental regimes and its efforts have been paramount to enacting significant environmental protection policy.[12] This behavioral change may be attributed to three factors. First, the reconfigured Post Cold-War state system may be conducive to cooperative efforts that heretofore were futile in a bi-polar system. Some argue Cold War policymakers viewed world politics in zero-sum terms; what was believed to be good for the United States was bad for the Soviet Union, and *vice versa*. Deutsch explains:

> Any step toward moderation, mutual accommodation, or compromise between the United States and the Soviet Union, or between the United States and Communist China, on any subject matter, so the 'true believers' in the Cold War on both sides think, is nothing but the futile appeasement of an insatiable enemy, and a treasonable sacrifice of the interest of one's own nation[13]

Second, some contemporary scholars writing on the international system suggest that the sense of stability following World War II is eroding, and that purely

"power-seeking" techniques are ineffectual.[14] As such, these scholars argue, a larger emphasis should be placed on mechanisms for keeping order. Examples of mechanisms for keeping order may include the utilization of international (and non-governmental) organizations, international law, and the participation in regimes. (A regime, thus defined, is not a material entity like an organization or agency, but rather an institutionalized arrangement used to structure state interaction.) Scholars who subscribe to this belief argue that order seeking mechanisms produce a better outcome for egoists, in situations where a desired result can be better achieved through the pursuit of order rather than power. Thus, these non-state instruments are channels for policy coordination, and while they do not, in and of themselves, promote cooperation, may facilitate it. As such, environmental issues may be more likely to capture the attention of states, and governments may be more willing to protect the environment, in an international system structure amenable to order.

Third, and related to the second, is the proliferation of non-state actors, ranging from international organizations (IGO's) to non-governmental organizations (NGO's), social movements/interest groups, and regimes, that facilitate cooperative efforts of the environmental variety by making the issue known and increasing communication and information amongst states. Members of the international scientific community, for example, share information, support and/or reject findings, and act as advisors to the state. An increase in knowledge on a particular issue may influence states to advocate environmental protection policy. As Deutsch explains:

Men want 'cognitive consonance' in what they know, as well as in what

they want. They wish their world to make sense, to add up to something meaningful and manageable, or at least tolerable, whole. In this desire for cognitive consonance they suppress or reject items of information that do not fit into their image of the world; or they may seek, consciously or unconsciously, for some simplified image of the world that will seem clear, understandable, and consonant to them, and that will relieve their feelings of disorientation, frustration, alienation, and anxiety.[15]

If "Men" are the policymakers who desire cognitive consonance then non-state actors may be important, especially when these non-state actors are able to explain an issue to policymakers in a manner which "fits into their image of the world." Thus, *knowledge* and *perception* as structural variants are significant to policymaking.

Sovereign States, Transboundary Issues

International environmental protection policy is a fascinating phenomenon to study for several reasons. First, environmental issues are generally transboundary in nature. (Some practices more than others. Nuclear testing, for example, is transboundary *par excellence*, while polluting a local lake remains an isolated problem only for its territory.) Nonetheless, there are many practices that degrade the environment in one state and affect other states (mostly its neighboring state), through the inevitability of air and water flow. As Wenner explains, "pollutants recognize no national boundaries."[16] Thus, policies that restrict the degrading action are weak (if not futile) when adhered to only by certain states.

Second, environmental protection requires policymakers to act in foresight because the deleterious effects of certain activities cannot always be seen

immediately. For example, ozone depletion may not seem as serious as it is because it does not directly affect our everyday life in ways that can be easily perceived. Conversely, issues that are visibly and tangibly manifest, such as poverty, crime, and homelessness, ethnic conflict, trade barriers, and political unrest, command obvious attention from policymakers. Thus, environmental problems are intractably *political* as states are asked to act before the problem reaches crisis status. Accordingly, environmental policymaking is not as simple and straightforward as would be implied by leaders making decisions with complete information on the basis of a rational choice.[17] Instead, decision making is burdened by uncertainty and a multitude of variables. State A may have to pay the short-term opportunity cost of economic gain if it decides to enact long-term environmental protection policy on a certain issue-area. As such, State A runs a risk of receiving a sub-optimal outcome. Such a strategy is antithetical to a policymaker's position as the most rational strategy for a state is the one most likely to produce the winning outcome, and avoid the losing one.[18]

Third, because environmental degradation is ofttimes irreversible, policymakers must adopt an intergenerational perspective and act in a precautionary manner, before the damaging action reaches a "crisis" level. An environmental crisis can be defined as a situation in which a previously tolerable set of circumstances is suddenly, by the addition of another factor, rendered wholly intolerable. Undoubtedly, an environmental crisis has the effect of catalyzing environmental regulation, as in the case of Chernobyl that led to the nuclear accident regime under

the auspices of the International Atomic Energy Agency.[19] However, every crisis has its beginnings long before the actual onset. This is true of most environmental problems, where a catastrophic outcome may be the result of what seem historically to be benign practices that are, in reality, progressively destructive to the environment. Ultimately, "[m]an's activities affect the whole Earth and bad unintended consequences can stem from actions deemed harmless at the time they were begun."[20] Most environmental problems are not analogous to Chernobyl and thus the "apparent importance of crises...bodes poorly for problems of a more gradual and cumulative nature."[21] For example, the loss of global biodiversity, the destruction of the Amazonia rainforest, and global warming are three areas of the environment that are being irreversibly degraded at a rapid pace, yet have not attracted the attention of governments sufficiently to enact regulatory policy.

Lastly, because states are sovereign, the probability of creating a "global" solution to the environmental crisis is negligible. Philosophical reasoning tells us that the atmosphere, for example, is part of the global commons or heritage of humankind. In order to avoid a tragedy of the commons[22] an international approach that calls for the governing of the atmosphere is needed. As Hurrell and Kingsbury explain:

> Collective environmental management poses a severe, and therefore politically sensitive, challenge because it involves the creation of rules and institutions that embody notions of shared responsibilities and shared duties,... and that seek to embody some notion of common good for the planet as a whole.[23]

Thus a contradiction exists as sovereign states are called upon to enact policies that

may have the effect of undermining their primacy in international affairs. This incongruity is probably most poignantly reflected in Principle 21 of the Stockholm Declaration of the 1972 United Nations Conference on the Human Environment that declares:

> States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental policies and the responsibility to ensure that environmental activities within their jurisdiction or control do not cause damage to the environment of other states or of areas beyond the limits of national jurisdiction.[24]

The first part of the principle pronounces the right of sovereign states to exploit their resources while the second part assigns environmental responsibility, resulting in a contradictory position for the state. As such, a state's political agenda, and economic goals based on exploitation of their natural resources, often seek to fulfill interests opposed to global environmental concerns. The problem is exacerbated by the fact that some states will accede to certain regulations, yet others will not. (Not all, but some issues require several states to change their behavior in order for regulatory policy to be effective. In these situations, non-participating states can significantly hinder the effectiveness of cooperative environmental policy.[25]) Thus, the problem is compounded when not only one, but many sovereign states, are required to forego economic and political goals to protect the environment. The issue of state sovereignty and transboundary environmental issues is addressed in theoretical form in Section II - Political Realism, below.

SECTION II - POLITICAL REALISM

Environmental Issues in a Realist Paradigm

In an international system of sovereign states that has a propensity for conflict over cooperation, how do transboundary environmental issues attract policymaking attention? Not only do the issues require states to possibly forego other economic and political concerns, but they also call for the *coordinated* effort of many states. Denying economic growth and eschewing its dominant strategy of independent decision-making argues against the nature of the state. Writing on this topic in the early 1970's Richard Falk commented:

> A world of sovereign states is unable to cope with endangered-planet problems. Each government is mainly concerned with the pursuit of national goals. These goals are defined in relation to economic growth, political stability, and international prestige. The political logic of nationalism generates a system of international relations that is dominated by conflict and competition. Such a system exhibits only a modest capacity for international co-operation and co-ordination. The distribution of power and authority, as well as the organization of human effort, is overwhelmingly guided by the selfish drives of nations.[26]

An analysis sympathetic to Falk's comment bodes poorly for environmental protection efforts, and consequently, a formidable contradiction exists between a state's sovereign right to pursue socio-economic affluence and ecological interdependence. In Hurrell and Kingbury's words, cooperation is impeded because of:

> the striking dichotomy between the seamless web of ecological interdependence on the one hand and the fragmentation of the

international political system on the other. A single, complex and highly integrated ecosystem has to be managed within the constraints of a political system made up of over 170 states, each claiming sovereign authority within its territory.[27]

Although a "striking dichotomy" exists between national sovereignty and the global nature of environmental issues, the state system has not proven to be as rigid as described by Falk more than twenty years ago; the ominous prophecy on the ill-fate of the environment has only partially been fulfilled, with much cooperative progress being made. As such, many scholars who once viewed the state system in a purely realist paradigm have altered their thinking to remark on the significance of non-state actors as instruments of the state system that have the purpose of maintaining order and managing states' many interdependencies.[28] Correspondingly, these authors argue, with a minimum of posturing, that cooperation is not only possible in such a state configuration, but also desirable because often the use of non-state actors leads to a better outcome than unilateral action. This Section examines the origins of the realist school and its tenets, then looks to modified versions of realism as the supersession of the classical doctrine. The resultant sub-paradigm used in this research remains consistent with tenets of realism, while allowing for cooperative efforts for the environment. Environmental issues often need to be confronted by multiple states, calling for a concerted effort. However, because it is in *each* state's best interest to submit to the coordinate policy, the tenets of realism are not violated. Moreover, the sub-paradigm utilized in this research is amenable to testing the correlative hypothesis using the three contributing factors,

perception, *knowledge*, and *affordability*.

Classical Realism

Classical Realism tracing back through Hobbes and Machiavelli to Thucydides, asserts that states are the primary actors in the international system. These primary actors are rational and therefore employ a cost/benefit calculation in decision making. Moreover, states seek power as a means to achieving an end (or as an end in itself). The Hobbesian state of nature is one in which a state's actions must be based on the capabilities of themselves and other states. Thus, states "must begin from the assumption that other states' capabilities may someday be used against them."[29] The Hobbesian realist holds that the state must protect its citizenry from external aggression and thus must assume a perpetual state of war.[30]

Waltz, following Morganthau, reinforces these principles of realism delineating concepts of security, rationality, and balance of power. However, Waltz's *neorealism* is distinguished from Morganthau's classical realism in that Morganthau defined rational behavior as the accumulation of power as an end in itself, whereas Waltz believes that power is a political means for attaining other ends.[31] Waltz contends that a state's most crucial concern is for *security*.[32] Thus, states have an innate motivation to ensure the security of their citizenry, not an innate lust for power. Consequently, anarchy stems more from the drive for security than the drive for power. However, as Axelrod points out, in protecting their own security, states may challenge other states' security.[33] Waltz explains that states in anarchy cannot all

be secure at the same time; the same force that ensures security for one state may endanger others.[34]

Moreover, Waltz's neorealism is different from classical realism in that classical realism attributes the unidirectional nature of the causes that individuals and states produce to the outcomes of their actions while neorealism looks to the structure of the system and its interacting units to explain international politics. Thus, by focusing on systemic levels of analysis that emphasize structural laws in the state system, neorealism rejects the belief that the individual is motivated only by power and that such motivation is sufficient cause for all actions, including war. Accordingly, the structural (or neo) realism of Waltz looks at unit-level and structural-level causes that make up the international system. For example, in a bipolar world as between the United States and the former Soviet Union, each side focused on the fears of the other and acted according to their perceptions.[35] *Perception*, as a structural variant used in this research, is important for understanding the reasons behind policy decisions. This research accepts the structural-level analysis of Waltz, however, there are others in the current literature that suggests that neither Classical Realism nor Waltz's Neorealism are sufficient for analyzing the world system, and "that it is necessary to find some means of reconciling the hermeneutic and the structuralist traditions."[36] Because it is important that the reader be familiar with competing theoretical frameworks, three frequently used paradigms to analyze state behavior, *liberalism, idealism,* and *post-Waltz realism*, are described below.

Liberalism

The realist makes the assumption that order is the result of state competition because conflict is pervasive and omnipresent.[37] In contrast, liberals perceive cooperation as the overarching norm of the state system. The liberal agrees that the international system lacks a common authority and that states are sovereign. However, the liberal refrains from the "anarchy" metaphor because the term connotes chaos and conflict.[38] Instead, "unregulated" more accurately depicts the nature of the state system.[39] Moreover, the liberal's assumption of a cooperative environment is not premised on benevolent, altruistic, or naive reasons; rather, the liberal perceives the state system as analogous to a market economy based on notions of laissez faire and rational goals of mutually-rewarding exchange. The liberal believes that cooperative relations are a natural consequence resulting from self-interested rationality. However, for the realist, the laissez faire analogy does not focus on the most important aspect of cooperation which is state interaction. Stein for example, disagrees with the market analogy arguing that "if the international environment were like a marketplace, nation-states would confront generalized contexts (market conditions) but not other leaders or other states."[40]

The *idealist* espouses a more utopian vision of the international system than the liberal or the realist. Idealism is normatively based on how the world *should* be rather than how the world is. This is the underlying and fundamental distinction that separates realism and liberalism from idealism. The idealist advocates authoritative rules for all states; the eradication of the state is advocated by either creating a world

government or through the promotion of grassroots approaches to interest representation. However, the idealist approach finds hardship in a realist state system, as there is little feasibility in settling disputes authoritatively. Theories lose efficacy that require nations to surrender sovereignty. Ultimately, the goals of idealism are sometimes inconsistent with the reality of the international system. Environmentalists often err on the side of idealism; they often advocate policies that are benevolent and generous but also not feasible. A simple test to prove this point would be to analyze the three structural factors, *perception*, *knowledge*, and *affordability*, under the theoretic framework of idealistic environmentalism. The analyst examining the three factors under this framework would have to ignore or adjust the findings to fit into his hypothesis. Environmentalists often ignore the *affordability* factor by advocating policies that place the earth's sustainability above other competing economic and political issues. Hopeful of striking an emotional chord in listeners, environmental advocates often use hyperbolic rhetoric in place of substantiated *knowledge*. Moreover, *perception* of threat, is often exaggerated by environmentalists. Some environmental advocates believe that "conservation" efforts are not enough and that the "preservation" of all environmental resources is called for. In advocating extreme view such as these, and ignoring competing approaches to problem solving, the environmentalists' plea often loses efficacy. That is, environmentalists who fail to exercise objectivity in choosing their issues, and operate from the assumption that the "sky is falling," will ultimately lack effect in advocating an issue in which the sky is *really* falling. Thus, to "cry wolf" too many times will

ultimately be detrimental to the environmentalists' cause. Hence, by using the three factors, it is clear that not all issues provide the same level of salience to policymakers. For these reasons, idealism does not provide a viable theoretical model for analyzing environmental issues.

Post-Waltz Realism

Presently, the preponderance of literature shies from the extremities of steadfast realism and utopian idealism. Most scholars today take a middle road, acknowledging the presence, as well as the significance, of non-state actors. These authors vary in perspective - some claim that non-state actors have *transcended* state sovereignty, while others claim that non-state actors supplement the state and thus co-exist in the state system.

Keohane's position is illustrative of this middle road. Keohane maintains that cooperation, as an active policy pursuit, requires *institutions* to reduce uncertainty and facilitate in information communication. Arguably, Keohane's assertion that institutions are significant, challenges the classical realism doctrine based on the primacy of the state. However, Keohane argues that his conception of institutions remain within the bounds of realism. He professes:

> My 'outside-in' perspective is therefore similar to that of systemic forms of Realist theory, or 'structural realism.' What distinguishes my argument from structural Realism is my emphasis on the effects of international institutions and practices of state behavior.[41]

Keohane emphasizes non-state actors, intergovernmental organizations, and transnational and transgovernmental relations as mechanisms that facilitate the flow

and access of information amongst states, and thus criticizes Waltz's structural analysis as inadequate for accommodating change.[42] Keohane believes Waltz's structural *neo*realism refers to "its intellectual affinity with the classical realism of Morgenthau and Herz and its elements of originality and distinctiveness."[43] The originality refers to Waltz's focus on systemic levels of analysis that emphasize structural laws in the state system. Ultimately, Keohane argues, Waltz's systemic theory is inflexible to change because it treats "internal attributes of actors as given by assumption rather than treated as variables."[44]

Thus, Waltz's realism asserts that states must rely on "the means they can generate and the arrangements they can make for themselves."[45] But, Keohane observes that if the world system was really a state of war as described by Waltz, there would be no institutionalized forms of cooperation based on shared interests, except as a further means to enhance power. Therefore, Keohane's theory (originating from the Institutionalist tradition) argues that cooperation "can under some conditions develop on the basis of complementary interests, and that institutions, broadly defined, affect the patterns of cooperation that emerge."[46]

Hence, Keohane situates his theory in a realist foundation of rational egoism, emphasizes rationality,[47] and asserts that cooperation can be fostered by institutional arrangements. Keohane argues that institutions facilitate cooperation not because they impose authoritative rules, but because they make possible a context amenable to cooperation. Keohane argues that Realist egoism (the implication that actors in world politics are self-seeking and act in their own welfare)

is consistent with forming institutional forms of cooperation. Thus Keohane finds structural realism insufficient in that it predicts behavior based on power and self-interest alone. He believes that institutions are helpful to analyze not only power, but "shared interests, and prevailing expectations and practices."[48] Thus Keohane supplements, rather than rejects structural realism of Waltz, by emphasizing the "effects of international institutions and practices on state behavior."[49] In sum, international institutions and practices are needed to facilitate cooperation. Ultimately, Keohane's theory offers a middle ground that softens realism without erring on the side of idealism.

Similar to Keohane's position on institutions is Rosenau's perspective. Rosenau employs the term *bifurcation of world politics* to describe the phenomenon of the traditionally state-centric system now co-existing with "... an equally powerful, though more decentralized, multi-centric system," dominated by nongovernmental organizations (NGOs) and other transnational actors. Rosenau argues:

> scientists and social movements have instigated virtually all existing international environmental agreements, and in many cases were key actors in their negotiation, implementation, and monitoring. Moreover, these non state actors are infusing new rules, processes, and norms into both new and existing social structures.[50]

However, like Keohane, Rosenau does not believe that the existence of non-state actors implies the surrender of the state. Rosenau says: "It would be imprudent, however, to predict the withering away of the state; nation-states remain key actors, even if their interest, identities, and power are rendered problematic by growing importance of non-state actors." Like Keohane, Rosenau's position could be

criticized as being in contravention of realism, especially when applied to environmental issues that present a "structural contradiction between Earth as an integrated system and the nation-state system based upon the principles of sovereignty and territorial exclusivity."[51]   However, Rosenau argues that the "multicentric world of non-state actors can coexist with the state-centric world." Thus, the sub-paradigm used in this research is one that accepts Rosenau's assertion that non-state actors can co-exist with sovereign states, and Keohane's contention that institutions facilitate cooperation, *without* rejecting Waltz's analysis based on structural variants.   Thus, the theoretical framework employed in this research examines structural variants such as *perception*, *knowledge*, and *affordability* while accepting that there are institutionalized forms of cooperation based on shared interests.   Structural realism is therefore supplemented by an analysis that takes seriously institutions adhered to, and practiced by, states.

SECTION III - CONCLUSION

Currently, there has been a great deal written about the international system, suggesting that the sense of stability following World War II is eroding. Furthermore, with the end of the Cold-War, foreign policy is not made solely by power seeking. Correspondingly, many scholars suggest a larger emphasis should be placed on order seeking, concentrating on non-state instruments of the state system

such as international organizations and regimes. The argument has two major premises. First is the belief that states that seek order are less likely to engage in war. As Deutsch explains, "... the hope that by delegating more and more common tasks to such specific functional organizations, the world's nations will gradually become integrated into a single community within which war will be impossible."[52] The idea is premised on the belief that the more states need and know each other, the less likely they will be to harm one another.

Second, and more striking, is the premise that interdependent states are more likely to achieve their most desired outcome in an orderly states system. Because order provides predictability, states are in a better position to devise strategies based on the information they know of other states. Thus, states' perceptions are closer to reality and misperceptions are minimized in light of predictable information.[53]

Many scholars of realism have altered their positions in order to adjust for the dichotomy between the manifest interdependence in the state system and the reality of national sovereignty. Especially regarding certain issues that are inexorably transboundary, such as nuclear non-proliferation, nuclear energy safeguards, ozone depletion, international trade, and collective security issues, states have invested their energies in the maintenance of order rather than the exercise of power. Thus, the world politics traditionally typified by a predilection for conflict over cooperation is identifying an increasingly vast arena of issues that call for policy coordination. In these situations, power politics, while perpetually necessary, is not sufficient for issues that require order. In this research, a neorealist perspective is employed and

operates from the assumption that coordinate policies can occur between self-interested states when it is beneficial for them to engage in such a cooperative venture.

In sum, the preceding discussion on realism is important to this research because it establishes a theoretical framework that can be used to test the hypothesis that states are more likely to support regulatory policies for the environment when the issue is *perceived* as serious, substantiated by a high degree of *knowledge*, and *affordable*.   Because environmental issues are seldom resolved through non-cooperative measures and since states remain the central actors in international politics, it is significant to reconcile matters of coordinated behavior and issues of realism.

Chapter Three: Cooperation Under Realism

SECTION I - COOPERATIVE INTERACTION PATTERNS

Introduction

Regulatory policies for transboundary environmental issues pose unique obstacles to the nation-state. Chapter Two, Section One explicated four reasons why this is so. Most evidently, *trans*boundary issues inevitably straddle borders calling for international attention rather than unilateral state policy. Second, environmental protection requires policymakers to act in foresight because the deleterious effects of certain activities cannot always been seen immediately. Third, because environmental degradation is ofttimes irreversible, policymakers must adopt an intergenerational perspective and act in a precautionary manner, before the damaging action reaches a "crisis" level. Fourth, competing economic and political issues may hinder cooperative efforts for the environment. For instance, the United States and Russia have eased into a period of *detente*, shifting away from issues of security. Still, this shift does not necessarily imply that environmental issues will gain policymakers' newly available attention. Russia, for example, is an industrialized nation with an inability and unwillingness to bring environmental concerns to the fore. The United States, while interested in addressing issues of manifest concern,

remains skeptical of many others. Strictly from a classically realist perspective, the prospects for effective policy for transboundary environmental problems remain slim.

There is "realistic" hope, however. Realistic hope can be differentiated from "utopian" hope in that the former does not err on the side of naivete as does the latter. In this chapter, cooperative strategies for state-centric interaction are explored. Cooperation, it is argued, is a strategy sought by self-interested states, for the same reasons conflict is pursued. Based on rational decision making, states oftentimes find reason to coordinate their policies with those of another, based on the perception that joint, rather than independent, decision making will yield a preferable outcome. Cooperation does not undermine the primacy of the sovereign state in international affairs when it is viewed as a beneficial strategy.

Cooperation Defined

Both cooperation and conflict are strategies for interaction that all states employ as rational actors. Thus, cooperation, in this research, is defined as a type of strategic interaction states choose because it is in their interest to do so. Cooperation involves choice and a rational estimate of the payoff involved.[54] As a strategy for reaching a desired goal, cooperation is also a policy-approach. Keohane defines cooperation as *active* policy coordination on behalf of states to "adjust their behavior to the actual or anticipated preference of others."[55] More exactly, Keohane explicates:

Intergovernmental cooperation takes place when the policies actually followed

by one government are regarded by its partners as facilitating realization of their own objectives, as the result of a process of policy coordination.[56]

Similarly, Charles Lindblom contends: "A set of decisions is coordinated if adjustments have been made in them, such that the adverse consequences of any one decision for other decisions are to a degree and in some frequency avoided, reduced, or counterbalanced or overweighed."[57] Milner too, explains cooperation as "goal directed behavior that entails mutual policy adjustments so that all sides end up better off than they would otherwise be."[58] Consequently, cooperation presupposes that states will act rationally in expectation of eventuating a mutually-beneficial exchange and it is "... the anticipation of bettering one's own situation that leads to the adjustment in one's policies."[59] For example, many states made mutual adjustments in their policies regarding CFC production based on the shared belief that cooperative efforts to decelerate ozone depletion leads to a better outcome than non-action.

Strategic Interaction

Both cooperation and conflict are strategies for interaction that all states employ as rational actors. However, according to the doctrine of Realism, cooperation, i.e. policy coordination, occurs only rarely in the international system. Further, according to Stein, when cooperation does occur, it is spurred from conflict, and is done to confront a common threat. Thus, cooperation is ephemeral and infrequent. States value sovereignty foremost and, to guard against its encroachment,

states secure their borders from external aggression.[60]   To pursue this security

agenda, states seek power. To seek power, as a means to protecting security, is a

state's dominant strategy for maintaining sovereignty. As power seekers, states must

assume a "state of war," which results in a competition. According to realism, the

competition which results from the drive for power is the only order that *should*

emerge in international anarchy.[61] Thus, the competition that results from the state

of war assumption is perpetual.

History, however, has proven that the state system is not quite a rigid as this

Hobbesian state of nature; states are not strictly war-mongers and frequently find

reason to coordinate their policies for reasons other than to deal with a common

threat. Consequently, realism has traditionally found hardship in explaining the

existence of order amid anarchy. Order often requires rules and institutionalized

arrangements. For the realist, rules and institutions that are coincident with state

interest are unnecessary, and "... any that deviate from those concerns would not be

efficacious, for the states would merely pursue their interests."[62] Thus, for the

realist (and other self-centric philosophies such as liberalism), the question remains

the same: given the self-interested nature of sovereign states, and the uncertainty

prevalent in a state system absent authority, what motivates states to cooperate?

This research suggests that states may base their decision to cooperate, in a state

system absent a centralized authority, on two factors. First, states consider their

perception of future interactions - what Robert Axelrod calls "the shadow of the

future."[63] Section II of this chapter looks at this factor, and examines *perception of*

future interactions in reference to *reciprocity*, premised on the idea that states that regard other states as future partners are more likely to engage in repeated exchanges. Thus, the perception of future relations may be *why* states choose cooperation as a strategic interaction, and reciprocity may be *how* states cooperate.

Second, upon choosing cooperation over conflict, states estimate the *purpose* for this type of interaction. *Purpose* for cooperation, is discussed in the third section of this chapter in the language of "regime" analysis premised on the idea that states may form regimes when they share a common interest and common goal. Thus, commonality may be the reason why states cooperate, and regime formation may be the method for cooperative interaction.

Cooperation thus, indicates that states as rational actors are goal-minded and partake in cooperation with the expectation of receiving rewards and gains. When one state benefits from a certain action and another state does not, the potential for conflict arises. However, when both states share the perception that the interaction can be mutually beneficial, a common interest is generated, and cooperation becomes logical.[64] Therefore, in situations where a common interest is engendered and mutual gains can be acquired, cooperation is derived from calculated and purposive behavior between *interdependent* states.[65]

Interdependence

Most contemporary international relations scholars claim that states are becoming increasingly interdependent.[66] Interdependence refers to the probability

that the change in one component of a system will produce a predictable change in another component.[67] Keohane asserts that in protecting their citizenry's economic interests, that have increasingly come to straddle boundaries, states have become economically interdependent.[68] Gilpen, most notably, has commented on this phenomenon and defined the term *political economy* to describe the "reciprocal and dynamic interaction" in international economic relations.[69] Interdependence is not exclusive to the economic realm, however. From environmental matters to military, telecommunications, technology, science, international travel, mail, radio frequencies, and atmospheric testing of weaponry, states are becoming more interdependent. States, while culturally, linguistically, and geographically diverse, are "... also inescapably interdependent; and in some respects this interdependence has increased in this day of the shrinking world."[70] In rare situations, states may be indifferent to another states. As metaphorically depicted in a single round of Prisoner's Dilemma, actors are indifferent to the moves of the other. However, this description is not representative of the state system, "... this is a deficient image of reality. Relationships among states are ongoing and persistent."[71]

Keohane distinguishes three varieties of interdependence. The first type of interdependence is *instrumental* to describe situations where states (as egoists) do not care about the welfare of the other state but fear the adversary may retaliate against its own defection.[72] Second, states may be *situationally* interdependent. State A may be concerned about the interests of State B because State B could improve the situation of State A.[73] For example, a decline in economic prosperity in Japan

and/or Europe would reduce the demand for U.S. goods. Similarly, a bankrupt third world country that borrowed from the U.S. would be unable to repay its debts. Lastly, Keohane uses *empathetic* interdependence to describe a situation in which one state is interested in the welfare of another state for its own sake.

Scholars such as Keohane believe that interdependence is fostered by non-state actors.[74] Beliefs such as this have their origins in the theory of *functionalism* premised on the hope that "... by delegating more and more common tasks to such specific functional organizations, the world's nations will gradually become integrated into a single community within which war will be impossible."[75] Others reject the assertion and argue that interdependence is world politics as usual; interdependence is the result of rational action based on a cost/benefit analysis of policy coordination. Succinctly, states remain sovereign entities and will not surrender any decision-making power to non-state actors unless it is in their interest to do so. Stein addresses this issue well. He argues against the conclusion that interdependence restricts a state's decision making capacity. If this were the case, the international system could indeed be described in terms similar to domestic society. However, the international arena is still one in which everything goes. Moreover, it is a system where the use of force remains thinkable.[76] Thus, for Stein, interdependence occurs as the result of a state's rational choice to eschew its dominant strategy of independent decision making, in favor of joint decision making, when better results can be gained. In Chapter Five of this paper, the IAEA is discussed as a non-state actor *used by* states because it is useful.

Clearly though, Stein does not suggest that interdependence does not exist, as he explicitly says how the advancements in technology, communication, and science, have worn away isolationist policies of the past. Thus, his argument against interdependence is not to deny the myriad interactions states have in today's world, but to suggest that even within these interactions states have decisions to make based on rational choice. Many states choose to manage their interdependencies by selecting policies that contribute to the orderliness of the state system. Based on the idea that order lessens uncertainty and enhances predictability which augments the decision making process and ultimately leads to better outcomes, states choose policies which contribute to orderliness.

<u>Maintaining Order</u>

Interdependence implies that the decisions of one state will affect some other state(s). Given interdependence, an *orderly* state system is desirable. Order is desirable for many reasons, not all of which will be addressed in this paper. However, one reason order is desirable is because it decreases uncertainty by increasing predictability. States chart their strategies according to their perception of other states which is based on the information available to them. Thus, a perception is a guess based on imperfect and/or incomplete information. Consequently, states often possess *mis*perceptions. As Stein points out, misperceptions only matter in situations of interdependence.[77] Misperceptions are irrelevant to states independent of one another because a change in one's behavior does not affect the other state. Hence, the maintenance of order is significant given

the multitude of realms in which states are interdependent. And, given states' interest in these realms, the perpetuation of order is a priority in their agenda. As such, states find efficacy in investing in a certain level of regulation and rules to maintain order. In the environmental realm, regulated production of CFCs and safeguards against nuclear accidents are examples of rules and regulations adhered to that contribute to the orderliness of the state system.

Furthermore, some scholars argue that the maintenance of order is more effective today than during the Cold War. During the time of the Cold War, policymakers viewed the state system in zero-sum terms.[78] It is argued that methods for maintaining order were less than effective in a zero-sum foreign policy. Correspondingly, in this post Cold-War era, order may be more prevalent as the state system may be more amenable to variable-sum, rather than zero-sum outcomes. Policymakers believe the maintenance of order will benefit the state by facilitating their realization of a desired outcome based on the idea that minimizing uncertainty and increasing predictability enables states to act more rationally.

Ultimately, international relations scholars have the task of explaining why states choose the strategies they do: why did State A choose cooperative-strategy X which contributed to the order of the system, while State B threatened force with strategy Y? Theories about cooperation among nation-states in the post World-War II era have emerged as a particularly interesting topic to international relations scholars, economists, and diplomats, especially since realism - the dominant approach to international relations - finds difficulty explaining the existence of order

amid anarchy.[79] States continually develop "institutionalized arrangements for structuring international relationships in various domains."[80] And, while realism contends that such institutional arrangements are not pertinent to world politics, states continue to create and maintain them. Ultimately, the realist analysis has only the choice to conclude that institutionalized arrangements, which facilitate order in the state system, correspond with states' interests and are efficacious to attaining a desired goal.[81]

The preponderance of cooperation literature in the last 20+ years aimed to explain state behavior has focused on the systemic level of analysis.[82] The systemic level of analysis focuses "on the sources of and constraints on cooperative behavior among states as a function of the international system."[83] System level theories have manifested themselves in systemic and game theoretic models, used metaphorically to discuss the different types of cooperation and the conditions under which cooperation is most likely to be successful. Especially the literature on game theory has been effective to the extent that it has elucidated certain conditions under which cooperative interaction is likely to emerge. It is important for this research that the reader understand the fundamental concepts of systemic level theory in order to evaluate the effectiveness in using the structural variants, *perception*, *knowledge*, and *affordability*, as tools for explaining cooperative interaction patterns. Therefore, game theory will be used to this end. While certain scenarios may not apply to transboundary environmental issues, such as a single round of Prisoner's Dilemma, all the games discussed are illustrative in that they show policy outcomes

are limited by the actions of other players. This point is important for all issues ranging from Cold-War security issues to environmental policy making.

Game Theory

According to game theory, states aim to maximize their wins and to minimize their losses.[84] Further, states are concerned not only with their wins, but also with how their wins fare compared to other states.[85] Game theory is useful in explaining how states go about achieving these optimal goals by interpreting state behavior.[86] Games metaphorically illustrate the dilemma states face in choosing one move over another by showing the extent to which the actions of one state depend on the actions of another. As Bram explains, "what distinguishes game-theoretic models from other models of rational choice is that the outcome is assumed to be contingent on the choices of more than one player."[87] Or, in Waltz's words, "... the freedom of choice of any one state is limited by the actions of all others."[88]

However, shortcomings abound in game theoretical models because they are ill-equipped to adjust to the many structural variants endemic to world politics. Perception, rules, norms, traditions, incomplete information, and miscommunication, are examples of these variants. *Perception*, as a structural variant, is exemplary in this regard. As rational actors, states devise their strategies based on what they want, the information they know, and the information they do not know.[89] As world politics is characterized by rampant uncertainty, states possess incomplete knowledge of other states' capabilities and intentions. As such, states' perceptions are often

*mis*perceptions in that they do not always represent the reality of another state's capabilities and/or intentions.

Nonetheless, (mis)perceptions are the foundation upon which decisions are based. And, states often will choose one choice over the other based on this perception. Furthermore, perceptions are a two-way street. Even if State A possesses full information of State B's capabilities and intentions, State B may not have full knowledge of State A's goal. Thus, State B may behave in a way that obstructs State A's strategy. In short, there are many factors over which states have no control that inexorably affect their endeavor to reach a desired outcome. For example, State A can only reach desired outcome X if State B does Y. However, State A cannot be certain State B will do Y, making State A's reward contingent on a factor outside of its control.

Moreover, game theoretical models are complicated by the number of players involved and whether or not the states plan on meeting again. Of course in environmental issues, because of the enduring nature of their problems, there is a high probability that multiple players and multiple plays (iterated games) will be involved. Therefore, game theoretical models cannot describe world politics exactly, but they can "profitably" describe state behavior.[90] As Waltz explains, "the reference to game theory does not imply that there is available a technique by which international politics can be approached mathematically."[91] However, games are useful in that they represent a situation where the moves of one state largely depend on the moves of its adversary. As Snidal elucidates: "The ultimate promise of game

theory lies in expanding the realm of rational-actor models beyond the restrictive confines of the traditional Realist perspective to a more complex world where concern is less exclusively with problems of conflict and as much with problems of cooperation."[92]

Some games are referred to as zero-sum (or fixed sum) games, in which the sum of all payoffs to all players equals zero, so that anything one player wins, some other player or players must lose.[93] Two-player fixed-sum games of this type occur when one player wins and one player loses. Cold-War thinking described a two-player fixed-sum game; what was believed to be good for the United States was bad for the Soviet Union, and *vice versa*. In world politics, more games are variable-sum games, "... in which the players not only win something competitively from one another, but also collectively stand to gain or lose something from an additional (or secondary) player...."[94] Two variable-sum games readily used in world politics are "chicken" and the "prisoner's dilemma."

Some situations in world politics are typified by states that share a common threat. The game of "chicken" is used to describe this situation as it metaphorically depicts head-on confrontations in situations where the state that yields to pressure is deemed the chicken.[95] Teen-age gangs used to play the game of chicken, where on an open road, one member from each group would drive their respective cars toward each other at high speed. The driver to swerve is named the chicken and the driver who perseveres praised a hero. Of course, two other options are mutual cooperation in which case no one wins, and mutual defection which leads to a crash.

Thus, for both players to cooperate (and swerve, so to speak) is a suboptimal move. However, the player who cooperates (and swerves), as its adversary defects (and perseveres), is disgraced. Similarly, to defect (and not swerve) is only optimal if the adversary swerves. If the adversary also defects, the demise of both players is the result. An environmental example may be a situation where two neighboring states both participate in an environmentally degrading activity such as the polluting of a river which contaminates the fish. State A may decide to cease this activity (and "swerve"). However, State B may continue to pollute the river and fish, thus attaining "hero status" for persevering by achieving the economic advantage derived from the activity. State A and State B also derive the benefit of a partially effective environmental control, the metaphorical equivalent to neither being involved in a head-on collision.

Prisoner's Dilemma is another game used metaphorically to depict international conflict and analyze state behavior. Prisoner's Dilemma differs from chicken in that the element of "promises" is introduced. As the story goes, two suspects are apprehended. The governor of the prison needs a confession from at least one of the prisoners. The governor offers one prisoner his freedom and a sum of money to confess before the other prisoner does; if he confesses his counterpart will be hanged. The other prisoner is given the exact option as the first. Both are told absent a confession from either, i.e. if they both keep quiet, they will be set free but without the reward. And, if both of them confess on the same day, they will receive a ten-year sentence but not be hanged. Thus, each player achieves the best

outcome by defecting, i.e. confessing and receiving the reward and no prison time, if the other player cooperates. Consequently, each player takes the risk and cheats trying for the optimal outcome, and ultimately, achieves the least optimal outcome for both (assuming both take the risk). Therefore, to cheat and get ahead is the most compelling choice, cooperation is not, even though players are better-off to cooperate than to defect.[96] In the environmental realm, an LDC for example, may *promise* to adhere to certain regulations in exchange for financial and technical assistance. Once the assistance is received however, the LDC may defect, gaining not only the benefit derived from the promise but also profiting from the economic advantage associated with the defection.

Applied to world politics, the highest benefits are gained when State A unilaterally defects and State B cooperates (DC), mutual cooperation (CC) is the second best outcome, mutual defection (DD) is the third most optimal outcome, and lastly, unrequited cooperation (CD) is least favored (i.e. State A cooperates, State B defects, and therefore State A receives the least favored outcome).[97] In Stein's words, "states are thus coercive institutions that... eschew their dominant strategies, as a matter of self-interest in order to ensure an optimal rather than a pareto-deficient equilibrium outcome."[98] The payoff for the prisoner's dilemma therefore is different than the game of chicken. In the prisoner's dilemma mutual defection is the third most favored outcome whereas in chicken it is the least desired. Ultimately, cooperation is a strategy based on the situation the state finds itself in and the choices available to it. As this is true, cooperation is not necessarily good

from a moral point of view. Cooperation is ridden neither with normative value nor with a positive connotation in the international state system, and this is as it should be. Cooperation refers to policy coordination, a strategy for reaching a certain goal. As a strategy, i.e. a sequence of moves, cooperation serves a purpose: to achieve the most desired outcome. Thus, cooperation does not deny the existence of conflict; to the contrary, without conflict or the threat of conflict, there is no need to coordinate policy.[99] Accordingly, policy coordination (or cooperation) is distinguishable from *harmony* which is an *automatic* absence of discord.[100]

Cooperation does not inherently imply that states (or people) like each other. The liberal makes this mistake. The liberal tends to believe that peace is fostered when leaders come together to communicate their interests. Cooperation, the liberal contends, comes from the communication and realization of shared interests of leaders around the world. The liberal's belief that bringing leaders together to communicate their interests will facilitate peace is prevalent. One reason the United Nations was created is to encourage communication among leaders. However, there is no reason to believe "knowledge and familiarity either generate common interests or reduce conflict of interest."[101] As Stein keenly observes:

> If familiarity and knowledge were at the heart of cooperation, families would not feud, couples would not divorce, and war would not be most common among states that share borders. Just as actors who do not interact cannot cooperate, so they cannot fight. Knowledge of others' needs is the basis both for empathy and for extortion and exploitation.[102]

Moreover, familiarity can also breed contempt, e.g. for one leader to come to know another neither implies that the former will like the latter nor will the former

necessarily understand and empathize with the latter.[103] For State A to understand

State B's interest does not mean that State A will empathize with State B. In fact,

State A may become acutely aware (more so than if the states' leaders never met)

of how diametrically opposite the two states' positions are.

An acute example of cooperation as a strategy is the forming of pacts. A pact

is a negotiated compromise, based on interdependence, in which competing actors

can "neither do without each other nor unilaterally impose their preferred solution

on each other if they are to satisfy their respective divergent interests."[104]

Oftentimes states form *pacts* to achieve their most desired outcome. Thus, the

negotiated compromise is a *mutually-beneficial* "... agreement among a select set of

actors which seeks to define (or, better, to redefine) rules governing the exercise of

power on the basis of mutual guarantees for the 'vital interests' of those entering into

it.[105] A pact, as a form of policy coordination, quintessentially illustrates its

strategic character. Moreover, pacts demonstrate that cooperation is a form of policy

coordination that neither implies the absence of conflict or the eradication of state

sovereignty. Ultimately, the wealth of literature on "cooperation under anarchy"

reflects the fact that states, while perpetually sovereign, have an interest in

cooperation.

Section Conclusion

To briefly reiterate, the intent of this Section in Chapter II - Cooperative

Interaction Patterns, was to introduce the complexity involved in addressing

environmental issues in a state system of self-interested sovereign states. The transboundary and often global nature of environmental problems pose obstacles for the heretofore dominant theory of realism based on power politics. Power politics fails to explain cooperative efforts states have demonstrated in addressing environmental issues. However, this Section has discussed the notion that cooperation does not imply the withering away of the sovereign state. Cooperation, as a strategic interaction, can often yield the best outcome for egoists, particularly in environmental issues which do not readily lend themselves to power politics. Moreover, because of the *interdependent* nature of states, cooperation occurs when a state chooses to eschew its dominant strategy of independent decision making, to join a collective effort, based on the belief that preferred gains can be reached. Further, order was discussed as a desirable quality of the international system for states that desire to manage their many interdependencies. Order enhances predictability and therefore facilitates coordinated behavior. Discussing these various terms is important to developing this research's analytic framework. This chapter has the purpose of examining why cooperation occurs, and what methods are used. This is of fundamental significance to this research project precisely because environmental issues cannot be analyzed simply in terms of unilateral state action. Environmental issues require the concerted effort of many states. Because transboundary environmental problems cannot be addressed unilaterally, and seldom are ameliorated through the use of force, a clear understanding of cooperation is of seminal importance to this research. This next section discusses the perception of

future relations as a reason *why* states choose to cooperate and reciprocity as the method for *how* states cooperate.

SECTION II - PERCEPTION OF FUTURE RELATIONS AND RECIPROCITY

According to the logic of games, such as Prisoners' Dilemma and Chicken, states are better off to cooperate than to defect. But, in a single play they usually do not because of the distrust and uncertainty each state perceives of the other. Defection is encouraged because, absent a common authority, it cannot be punished and compliance cannot be enforced. As Jervis puts it:

> Because there are no institutions or authorities that can make and enforce international laws, the policies of co-operation that will bring mutual rewards if others co-operate may bring disaster if they do not. Because states are aware of this, anarchy encourages behavior that leaves all concerned worse off than they could be.[106]

However, if states have the expectation of future relations, "cooperation becomes more rational and desirable.[107] Axelrod asserts that iterated relations improve the likelihood of cooperation.[108] The perception that the game will be iterated lends viability to tacit cooperative agreements. That is, present cooperation is increased based on the likelihood of future situations. An iterated situation presupposes that states expect to deal with each other in the future, which is a sound assumption. In Oye's words, "international politics is characterized by the expectation of future interaction."[109] Therefore, states may be rational to employ strategies which encourage cooperation based on the belief that they will experience continued interaction. Reciprocity is one strategy for fostering cooperation in iterated

situations.

Reciprocity is described in a variety of ways and therefore does not offer a singular definition.[110] Keohane defines reciprocity as "exchanges of roughly equivalent values in which the actions of each party are contingent on the prior actions of the others in such a way that good is returned for good, and bad for bad."[111] Reciprocity therefore involves action coordination. Axelrod explains "strategies of reciprocity have the effect of promoting cooperation by establishing a direct connection between an actor's present behavior and anticipated future benefits." However, reciprocity involves more than just matching behavior; two applications for reciprocity can be identified as a norm, and as a strategy. The usages are not mutually-exclusive, however, the division is effective for the sake of analysis.[112]

Reciprocity as a Strategy. Keohane's identification of specific reciprocity refers to a strategy in which "... specific partners exchange items of equivalent value in a strictly delimited sequence."[113] Therefore, specific reciprocity refers most commonly to a method of contingent exchange. Readily employed in game theory, Axelrod's notion of Tit-for-Tat is illustrative of specific reciprocity. States that use the strategy Tit-for-Tat cooperate on the first move and thereafter mirror the move of the other. It is the idea that "reciprocity refers to a balanced exchange premised on threats and promises.... A promise to respond to present cooperation with future cooperation and a threat to respond to present defection with future defection...."[114]

Specific reciprocity does not invoke obligations and occurs as a simultaneous

exchange, operating on a *quid pro quo* basis, one project at a time. States may usefully employ specific reciprocity when they do not trust, or fear being exploited, because "everything is on the table" - the terms, actors, rewards, and thus vulnerability is decreased and the chance for exploitation is reduced. The parties of this relationship need not be obligated to one another - only to trust enough in the situation to believe that the cooperative effort will be seen to fruition. The relationship is based on proximate goals rather than a long term commitment to stable and cooperative relations. States that Specific reciprocity is a good way *to* cooperate in anarchy but does not *promote* cooperation.

Reciprocity as a Norm. Reciprocity as a *norm*, on the other hand, refers to policy coordination that does not follow the stringent patterning of Tit-for-Tat. As a norm, reciprocity pursues a path based on established relations and traditional norms. This is not necessarily to say that behavior will not be matched, rather, it is to suggest that sometimes it will not. Some states' relationships may be so strong and established as to forego the exacting contingencies of Tit-for-Tat. States may engage in reciprocal exchange simply because it is customary, routine, or habitual for them to do so.

Reciprocity as a norm subscribes to certain standards for behavior, emphasizing a state's relationships and commitments. States that engage in reciprocity as a norm cultivate a spirit of legitimate behavior and reinforce the prospect for cooperation into the future. This position suggests that some states

constitutive of the international environment engender a sense of sociality. However, sociality does not co-opt self-interest. Rather, states' voluntary behavior is attributed to more than just self-interest. The sociality that accompanies voluntary action lends more to a standard of behavior, norms, or general practice based on shared interests. This description implies that states that employ reciprocity as a norm may do so because it is routine, traditional, and because it is beneficial.

Sharing similar characteristics, but not synonymous to reciprocity as a norm, is Keohane's classification of "diffuse reciprocity."[115] Diffuse reciprocity refers to the tacit cooperation between states that can "occur without communication or explicit agreement."[116] Tacit cooperation does not require an explicit agreement, instead, cooperation is based on the perception of future action and reaction.[117] States' perceptions greatly influence the strategy choices they make. Perception thus, is a "forecast."[118] based on a probabilistic assessment of an uncertain and unknown future."[119] Stein elucidates:

> If actors behave purposely given the information available to them, perception - the information that actors possess about others - can be a critical determinant of behavior. At times, therefore, perception, and hence misperception, can provide the foundation for the particular choice between cooperation and conflict.[120]

As such, a state's strategies are largely crafted around its opponents intentions. In foreign policy, for example, actual military resources are less an issue than that state's *intention* to either use or supplement its current buildup. State A's ability to predict the intentions of its opponent B, based on A's perception of B's capabilities leads to one strategic choice over another. Hence, the choice to cooperate is largely

dependent upon whether a state views itself as interacting with another state long into the future. Axelrod's theory of cooperation, which is highly attuned to reciprocity, finds that "the shadow of the future" significantly influences the agent's decision to cooperate.[121] Therefore, future expectations weigh heavily on the success of cooperation.

Diffuse reciprocity is typified by debt-owing which "imposes obligations."[122] The obligations occur in a sequential nature of contingent action and reaction, unlike specific reciprocity where the balanced exchange is simultaneous. Therefore, the relationship between states continues on-going, sometimes indefinitely. The debt-credit relationship is important to diffuse reciprocity because it involves "mutual concessions within the context of shared commitments and value."[123] Diffuse reciprocity is based on standards of behavior and established patterns. For example, for a state to repay a loan over a period of time is more significant than a simultaneous exchange. The former illustrates commitment and obligation to the relationship, establishing patterns of compliance and cooperation.

By definition, reciprocity implies a relationship of mutual exchange. This merely means that a party gives one thing to receive something else. Applied to the international state system, typified by negotiations, bargaining, strategies, and norms, it seems evident that states engage in all types of exchanges. A few examples may be situations where tangible items are exchanged (such as resources in trade), promissory notes appropriated (as in financial loans), or advantages and privileges granted (as in diplomatic relations). Reciprocity also may involve action on one side,

and inaction on the other. An example of this type of exchange may be a negotiated settlement, such as the abandoning of a nuclear program in exchange for financial assistance. Moreover, reciprocity may also embody agreement by all parties not to do something. For example, an agreement to stop producing clorofluorocarbons because they deplete the ozone. In other words, reciprocity involves many different variations of exchange, from resources to promises.

All types of reciprocity are defined in terms of contingency and equivalence. Contingency in that reciprocity "implies actions that are contingent on rewarding reactions from others that cease when those expected reactions are not forthcoming."[124] Reciprocity is equivalent in the sense that it is never an exact exchange but is usually mutually-beneficial. The exchange is "mutually valued but non-comparable [in terms of the] goods and services."[125] Relationships in the state system will always be asymmetric. However, asymmetry is tangential so long as the exchange is mutually beneficial. Therefore, "rough" equivalence in value is a better characterization than "exact." In Keohane's words, "reciprocity refers to exchanges of roughly equivalent values in which the actions of each party are contingent on the prior actions of the others in such a way that good is returned for good, and bad for bad."[126] Each state's action is contingent on the preceding actions of the other participating state's action. Self-interest can lead to abuse of reciprocity because measuring equivalence is arbitrary and the potential for exploitation is real. Thus, reciprocity involves the *perception* of equitable exchange. The lack of trust inherent in the state system often times exploits the notion of equitable exchange.

For example, reciprocity during detente was tenuous because the competitive nature of the U.S.-Soviet relationship led to disagreement regarding what was equivalent. Neither state "was willing to make substantial unrequited concessions in the hope of eventually achieving reciprocity."[127] Both sides were suspicious of the other; both feared being the "sucker" in the Prisoners' Dilemma (i.e. being recipient to unrequited cooperation). The distrustful relationship allows neither side to envision a future of Detente. As a consequence long-term visions of cooperation were overshadowed by the proximate concerns of being cheated.

Played serially, reciprocity in the Prisoners' Dilemma is an effective strategy for cooperation.[128] Reciprocity as a strategy that promotes iterated relations can lengthen the shadow of the future and improve the prospects for cooperation. This position, however, is diminished as the numbers of players increase. The increase in players affects the probability of defection, the unlikelihood of sanctioning, and the ability to coordinate policy. The chance for cooperation decreases as the number of participants increase because defection escalates and is usually unsanctioned.[129] Furthermore, Oye says that as the number of players increases, "the recognition of opportunities for the advancement of mutual interests, as well as policy coordination once these opportunities have been identified, decreases."[130] The most pervasive problem states face in multi-lateral relationships is the free-rider problem. The free-rider state reaps the benefit of the public (i.e. collective) good through the provision of others without having to contribute. As Keohane explains "public goods are indivisible and cannot be denied to any member of a group, regardless of whether

that member contributed to their provision."[131] In certain circumstances states as rational actors deduce that free-riding is the best option. Some states view the free-rider option as desirable because defection usually does not lead to punishment. That is, the powerful and more dominant states do not benefit significantly from enforcing non-compliance. Therefore, the defecting state seldom fears retaliation, or is not concerned by the severity of it (which is usually not severe). Indeed, in certain circumstances free-riding is the most rational option.

There are ways to mitigate the problems associated with free-riding. Keohane recommends specific reciprocity as a method for avoiding free-riding. Decomposition may also mitigate the complexity of multi-lateral circumstances. When multi-lateral relationships are partitioned into smaller groups there is a greater ability for the group's participants to ensure compliant behavior. Oye reinforces this view by saying that "strategies to reduce the number of players in a game generally diminish the gains from cooperation while they increase the likelihood and robustness of cooperation."[132] Keohane asserts that the participants can more effectively monitor behavior and maintain control in small arrangements. The small groupings avoid the free-rider (public goods) problem by making the goods somewhat privatized.[133] Furthermore, regimes may be useful for improving the prospects for cooperation in multi-lateral situations because the institutional arrangements established by the regime structures state behavior. The next section discusses regime formation. Regime formation is an effective state cooperative interaction for confronting transboundary environmental issues.

SECTION III - COMMONALITY AND REGIME FORMATION

Relationships which require interaction beyond specific reciprocity are risky because states fear being cheated (as they too, are compelled to cheat). Thus, specific reciprocity presents itself as a safe and effective method of exchange because vulnerability is lessened in this type of *quid pro quo* transaction. However, to say that the predominant method of interaction among states in world politics is typified by specific reciprocal relationships would be false. Many scholars have been quick to point out that a single round of prisoner's dilemma does not accurately depict the state system. In reality, the international system is riddled with structural variants such as norms, tradition, history, rules, regulations, and the perception of meeting again, which inhibit a state's capacity to conduct their relationships on a *quid pro quo* basis. Seldom, can a transnational issue be effectively addressed by a simultaneous one-time exchange. Certainly, issues such as arms control, environmental protection, international trade, etc., involve continued relations between participating states. Moreover, these types of matters cannot always be dealt with bi-laterally. In order to be effectively confronted, these issues require the participation of many states. Ultimately, specific reciprocity is an effective and necessary strategy for some situations, but not sufficient to deal with all international issues. Situations which require the participation of many states, and which require continued attention, call for a different type of strategic interaction. *Regime formation* is one strategy which

is effective for confronting a common interest, and reaching a common goal, in multi-lateral and long-term problems.

Although defined in various ways, the term "regime," in this research, refers to the development of an institutionalized arrangement used to structure state interaction.[134] This arrangement is generated when states share a common goal, based on a common interest, which can only be effectively achieved through a joint, rather than independent, effort.[135] This definition accords with the realist assumption of interest-based international politics as "relations between sovereign entities dedicated to their own self-preservation, ultimately able to depend only on themselves, and prepared to resort to force."[136] In other words, self-sufficient and sovereign states, "develop their own strategies, chart their own courses, make their own decisions."[137]

The term regime has been overused, misused, ill-defined, and interpreted in a myriad ways, to the extent that it has lost explanatory value. For example, John Ruggie first introduced the concept in international politics literature in 1975, alluding to "a set of mutual expectations, rules an regulations, plans, organizational energies and financial commitments, which have been accepted by a group of states."[138] At the most general level, a regime is merely patterned behavior which exists in all areas of international relations. Regularity in behavior, thus, must be accompanied by principles, norms or rules to account for it. Krasner, more specifically, offers a normative account of a regimes as:

> sets of implicit or explicit principles, norms, rules and decision-making

procedures around which actors' expectations converge in a given area of international relations. Principles are beliefs of fact, causation, and rectitude. Norms are standards of behavior defined in terms of rights and obligations. Rules are specific prescriptions or proscriptions for action. Decision-making procedures are prevailing practices for making and implementing collective choice."[139]

Krasner's definition of regimes, while most widely used, is problematic because it lacks precision and as Young points out, "does not allow us to separate regimes easily from the rest of international relations."[140] Young assets that regimes come into existence as a response to collective-action problems, in situations where individual self-interest leads to undesirable outcomes.[141] Moreover, Oye, Keohane and Axelrod, believe regimes are mechanisms for institutionalizing behavior, which have the effect of reducing uncertainty.[142] Milner too, points out that the information provision function of regimes is significant in that it promotes cooperation by lessening uncertainty in negotiation situations.

To say the least, the literature on regimes is voluminous and often imprecise.[143] With the countless definitions of the term "regime," it is no wonder scholars disagree about the concept's effectiveness for analyzing state interactions in world politics. Consequently, some find regime analysis illuminating for understanding international politics, while other scholars find the concept of international regimes as "yet one more woolly concept that is a fertile source of discussion simply because people mean different things when they use it."[144] Concurring, Stein says, "... many scholars define 'international regimes' so broadly as to constitute either all international interactions within a given issue area."[145] To

define a regime too broadly, is to make "no conceptual advance" in using the term.[146]

Nonetheless, regime analysis is useful if done with specificity. For the purpose of this research, a regime is an institutionalized arrangement generated to structure state interaction in situations where states share a common goal, based on a common interest, which can only be effectively achieved through a joint, rather than independent, effort.[147] These types of situations inspire states to eschew their dominant strategy of independent decision making based on rational choice which "leads them to prefer joint decision making because independent self-interested behavior can result in undesirable or suboptimal outcomes."[148] If these conditions are not demonstrated, states will not form regimes. States base their strategies and decisions on interests and preferences, which can be conflict, cooperation, or some variant thereof (which is world politics as usual, not regime formation); "as long as international state behavior results from unconstrained and independent decision making, there is no international regime."[149] A regime differs because it involves "interaction between parties [that] is not unconstrained or is not based on independent decision making."[150] In this view, regimes will only be formed as a consequence of states' preferences and interests. A regime will not develop if states are able to obtain their most preferred outcome independently.

Some situations preclude a state from obtaining its most favored outcome unilaterally. Stein has identified these situations as "dilemmas of common interests" and "dilemmas of common aversions." Dilemmas of common interests refer to

situations where "all actors prefer another given outcome to the equilibrium outcome."[151]   The Prisoner's Dilemma where the dominant strategy equals the equilibrium outcome that is sub-optimal is illuminating in this sense.   Situations representative of dilemmas of common interests are collective goods problems, such as collective security and international trade. Regimes may be formed to deal with collective goods issues in situations where the good's "optimal provision can only be assured if states eschew their independent decision making that would ... ultimately result in either the suboptimal provision or the nonprovision of the collective good."[152] For example, states are faced with a security dilemma as they most prefer disarmament to mutual armament. Nonetheless, states which sign onto arms control agreements maintain their dominant strategy which is to cheat. Thus, arms control agreements, such as the SALT agreements, are replete with provisions for compliance and policing.[153]

Dilemmas of common aversion avoid a particular outcome. States may have different primary interests, but do agree that "there is at least one outcome they all want to avoid."[154]   Thus, a regime formed to combat a dilemma of common aversion is significant in promoting order in the international system because participation may occur at the expense of other interests. Thus, situations characterized in this manner provide incentive for states to eschew their independent decision making and form a regime.[155] For example, all states have an interest in avoiding air disasters. As a safeguard, states adhere to rules under the International Civil Aviation Organization. Included in these rules is the guarantee that the pilots

and control center operators are able to communicate. English, has been recognized as the international language of air control to avert the chance that communication cannot occur. "Tragedy of the commons," refers to the unrestricted individual use of the environmental commons and is another example of regime participation. It may seem evident that environmental problems acutely illustrate a dilemma of common aversion. However, this may not always be the case. Predominantly, states' least preferred outcome is not the exhausting of a resource, Stein elucidates:

> ... each actor most prefers to be the only user of a common resource, next prefers joint restraint in the mutual use of the good, then prefers joint unrestrained use even if it leads to depletion, and least prefers a situation in which its own restraint is met by the others lack of restraint.[156]

In other words, the highest benefits are gained when State A uses the resource and State B does not (DC, i.e. Defect/Cooperate), mutual restraint (CC) is the second best outcome, unrestricted use (DD) is the third most optimal outcome, and lastly, unrequited restraint (CD) is least favored (i.e. State A restrains its use and State B does not, and therefore State A receives the least favored outcome).[157] Therefore, to be the only user of the resource is the optimal outcome, joint restraint is not. But, if both parties use the resource unrestrained, they both receive unfavorable outcomes. The goal for environmental regime formation is usually the suboptimal outcome of mutual restraint (CC).

Most likely, environmental issues are both dilemmas of common interests, and dilemmas of common aversion. Admittedly, states usually will not agree to restrain their use of a resource unless a substitute method is available. However,

environmental problems are not always a Prisoners' Dilemma. The realization that some states are taking unilateral action, or receiving less than sub-optimal outcomes from their environmental protection policies, demonstrates a commitment to averting a problem even if an optimal or sub-optimal gain is not received.

Dilemmas of common interests and common aversions demonstrate situations where states may forego their dominant strategy of independent decision making, while still operating within a self-interest based realist paradigm. The idea is premised on the belief that a preferable outcome can be gained collectively, rather (or more easily) than independently. State's interests and preferences, and the subsequent interactions taken on their behalf, determine whether or not that state will find it advantageous to join a regime. In certain situations, interests and preferences can only be satisfied if the state enters into a collaborative arrangement. In Stein's language, autonomous and self-interested states may create regimes "when confronting common dilemmas."[158] Therefore, dilemmas of common interests and dilemmas of common aversions prompt states to join regimes and forego their independent decision making.

SECTION IV - CONCLUSION

This chapter has discussed the strategic interactions between and among states. States, as self-seeking maximizers, seek power as their primary strategy for protecting security and ensuring sovereignty. For these egoists, the use of force

remains a viable method for gaining power. However, states also find it a beneficial strategy to coordinate their policies. However, to be effective, the transboundary nature of environmental issues require states to coordinate their policies. Thus, some states believe preferred gains can be achieved when they choose to manage their environmental interdependencies by eschewing their independent strategies and coordinating their policies.

Upon choosing a cooperative strategy, states consider long and short term goals. Depending upon whether the state considers itself dealing with its partner in the future will affect whether or not the former state will adjust its policies around the latter's. Contingent on this perception, the state may choose specific reciprocity or diffuse reciprocity as methods for strategic interaction. In situations where reciprocity is ineffectual, states may choose to form a regime. Regime formation is useful in situations where many states' participation is required in order for a goal to be reached. Further, regime formation is useful for confronting long-term, evolutionary problems, as opposed to short-term, delimited issues. Environmental problems require a concerted, long-term effort, and therefore are responsive to the cooperative strategy of regime formation. In summary, states may choose to participate in a regime to confront an environmental problem when they *perceive* the seriousness of the issue, possess a high degree of *knowledge*, and can *afford* to eschew their primary strategy of independent decision making.

Chapter Four: Stratospheric Ozone Depletion

Introduction

Faced with a common interest and a common goal states may choose to forego their dominant strategy of independent decision making, based on the belief that a collective venture will more effectively facilitate the realization of their end than a unilateral effort.[159] Often joint efforts are required for effective management of long-term, continuous issues - situations which cannot be addressed by a one-time negotiation. Arms control, international trade, and environmental protection, are issues which demand an on-going strategy. Transboundary environmental protection is especially distinctive because policies must not only be on-going, they must also be adhered to by many states in order to be effective. Efforts taken to slow the depletion of the stratosphere ozone layer are exemplary of this type of situation. Ozone depletion is transboundary and therefore requires the attention of many states. Further, policies for the protection of the ozone require policymakers to act in foresight because the damage from ozone depletion is not seen immediately. Moreover, policymakers must act in a precautionary manner because ozone depletion is irreversible; waiting for a crisis to develop will be too late. Consequently, states chose to join together their decision making capacities to reach their common goal of protecting the ozone layer from further depletion.

Beginning with the Vienna Convention for the Protection of the Ozone Layer ("Vienna Convention") with the objective "to protect human health and the environment against adverse effects resulting or likely to result from human activities which modify or are likely to modify the ozone layer" and leading to the 1987 Montreal Protocol on Substances That Deplete the Ozone Layer ("Montreal Protocol") with the purpose "to protect the ozone layer by taking precautionary measures to control equitably total global emissions of substances that deplete it, with the ultimate objective of their elimination on the basis of developments in scientific knowledge, taking into account technical and economic considerations and bearing in mind the developmental needs of developing countries,"[160] the use of ozone-depleting substances is successfully being regulated. The Protocol includes regulation of five CFCs and two halons leading to a 50 percent total reduction in production from 1986 levels.[161] The 1990 London Amendments tightened regulations, and states agreed to a total phase-out of fifteen CFCs, three halons, carbon tetrachloride, and methyl chloroform during the next ten to fifteen years. As of January 1992, 81 states (49 developing) were Parties to the Vienna Convention and 75 states (43 developing) were Parties to the Montreal Protocol. In March of 1993, over 100 nations participated in the Fourth Meeting of the Montreal Protocol in Copenhagen, Denmark, and decided to reset the year 2000 deadline to January 1996.

Consequently, the Montreal Protocol has gained considerable attention in the environmental literature - frequently touted as a success and, furthermore, as a

model for future environmental agreements.[162]   However, the success of the Montreal Protocol may be an inimitable situation. Simply, the effectiveness of the Protocol's regulatory policy may be attributed to a variety of *unique* factors which are not evident in all environmental problems.

First, the effort was spearheaded by a super-power (U.S.) which was instrumental to its success in terms of funding and publicity.[163]   Chief U.S. negotiator of the Montreal Protocol believes that U.S. leadership was instrumental in gaining the support of reluctant and skeptical states to regulate CFC emissions.[164]   Second, the fact that a substitute for the regulated chemicals was readily available was a fortunate factor. One author comments, "... an agreement to phase out a single family of chemicals, for which substitutes are increasingly available, is a weak test at best."[165]   Third, the fact that DuPont, the leading producer of CFCs, made the decision to switch to non-depleting ozone substitutes, was essential to the process. Fourth, a depleted ozone implied a "human linkage" associated with an increase in cancer, cataracts, and immune-response deficiencies. Conceivably, if a depleted ozone did not presume an increase of potentially terminal risks, it would not have generated the level of concern that it did.   Finally, accommodations were granted to less-developed countries based on principles of economic and political equity.

The Montreal Protocol is owing to all of these unique factors for its achievement. Thus, it may be inappropriate to look to the Montreal Protocol as a model to be replicated for all future environmental issues. Identifying the degree of

cognition, *knowledge*, and *affordability*, as structural variants that contributed to its success is a more fruitful endeavor. In the language of this research, states supported the environmental regulatory policies to protect the ozone, by signing the Montreal Protocol, because the policymaker's cognition of the problem was keen, i.e. there was a perception of threat, the policymakers possessed a wealth of information on the problem which convincingly persuaded them of its seriousness, and the policymakers estimated that their states could afford the enactment of the policies to the extent that other economic and political issues did not override the cause. The *ozone regime* is discussed below in terms of perception, knowledge, and affordability.

The "Ozone Regime"

The term "regime" has been defined in this research as the development of an institutionalized arrangement used to structure state interaction.[166] This arrangement is generated when states share a common goal, based on a common interest, which can only be effectively achieved through a joint, rather than independent, effort.[167] The "ozone regime," then, consists of participating states that interact with each other based on the shared goal of protecting the ozone from further depletion and which share the perception that this goal cannot be reached unilaterally and can only be reached collectively. This conception of the term "regime" has explanatory value because it enables the analyst to interpret state behavior. However, the term "regime" also has practical utility in that physical

entities are needed to fulfil the mission of the regime. First, the ozone regime consists of individuals within their respective states who support the cause of ozone depletion deceleration. These individuals include policymakers, scientists, advocates, environmentalists, advisors, translators, interest groups, financial donors, etc. Second, the ozone regime is replete with resources which are necessary to bring about the desired regulatory policy. Resources include individuals, organizations, money, buildings, grants for research, telecommunications, etc. For example, the U.S. spearheaded the effort, contributing $100 million to NASA's budget and employing the preponderance of researchers and scientists. Individuals from the United Nations Environmental Programme (UNEP), U.S. Environmental Protection Agency (EPA), the U.S. State Department's Bureau of Oceans, and International Environmental and Scientific Affairs (OES), and atmospheric scientists in the international community all participated in the process.[168] Third, the ozone regime possesses guidelines governing its "prescription." That is, the regime is charged with a certain task, to regulate CFC emissions to decelerate the depletion of the ozone. Ultimately, these practical aspects of a regime remind us: "Only the state has the human and financial resources to mount the large-scale scientific and technical projects for detecting, monitoring, and preserving the global environment."[169]

The *practical* (or, perhaps, "physical") aspects of a regime only materialize *subsequent* to the development of the theoretical conception. States, via its policymakers, cannot do in practice what they do not first perceive of in theory. Thus, first comes the cognition that there is a problem - perception of threat.

Knowledge supplements this perception by either encouraging or discouraging state action. If states decide that the problem is in need of attention, the state then judges whether it can afford such a policy. Subsequently, an agreement (in the case of the ozone, a treaty) is signed and the ozone regime is charged with a task. The steps of the creation of the ozone regime are traced in the following discussion.

History of the Problem

In 1974 atmospheric researchers at the University of California at Irvine called attention to the possible damage to the ozone layer from chlorine and bromine bearing chemical compounds - chlorofluorocarbons (CFCs) and halons in particular.[170] Called by the name the Rowland-Molina hypothesis, the 1974 study showed that the chlorine in CFC emissions deplete the natural stratospheric ozone by disintegrating ozone molecules, and, that a depleted ozone layer does not effectively shield harmful ultraviolet rays from reaching the earth.[171] The stratospheric ozone layer shields ultraviolet rays from penetrating too deeply into the atmosphere. CFCs and halons have been identified as the leading culprits to depleting the ozone layer. CFCs are the key element in aerosol propellants, refrigerants, cleaning agents, and sterilants. Halons are used primarily as fire extinguishing agents in the aviation and marine industry owing to their fire suppressing ability.[172] It is believed that when CFCs and halons are released into the atmosphere they float to high altitudes and react with the ozone. The reaction causes a depletion and allows more ultraviolet-B radiation to reach the earth. In

short, "man-made chlorine chemicals deplete the stratospheric ozone layer."[173] The deleterious effects to humans are an increased risk of skin cancer, cataracts, and adverse impacts on the immune response system. Agricultural productivity is reduced as well and animal life (marine food chain) is vulnerable to the ultra-violet rays.[174] Additionally, CFCs, as a greenhouse gas, accounts for 1/4 of the "greenhouse effect" from global warming.[175] The "greenhouse effect" occurs as a result of infrared-absorbing gases in the lower atmosphere that create a warm insulating blanket by allowing the shortwave portion of the radiation spectrum from the sun to penetrate to the earth but not to radiate back as they normally would if unobstructed. Trapped in the lower atmosphere a warming effect occurs, analogous to the way glass traps heat in a greenhouse allowing temperatures to build, the chemicals trap radiation enabling warming.[176]

Perception

After twelve years of active debate, the Montreal Protocol was signed by thirty-one countries based on the shared perception that the ozone was being depleted and that it was harmful. The policymakers and atmospheric scientists who supported the regulatory policy of the Montreal Protocol all embraced the Rowland-Molina hypothesis that the chlorine in CFC emissions deplete the natural stratospheric atmosphere. Moreover, they subscribed to the scientific method that employed a "common set of values, which stressed preserving the quality of the environment, and accepted causal analysis."[177] Some groups were concerned

primarily with pollution and/or health risks, while others worried about global warming, while still, other focused strictly on the depletion of the ozone as an environmental tragedy itself. Thus, while advocates of the regulatory policy had different motivations for their support, they all agreed that the depletion of the ozone was harmful.[178] Similarly, all members showed a common interest in protecting the environment.

The perception that the problem is grave, even in the absence of a crisis and in light of uncertainty, is tantamount to the enactment of effective regulatory policy. Policymakers faced a dilemma as they needed to decide if the available data and research on ozone depletion merited sufficient consideration to take regulative measures. While a perception of threat was shared, uncertainty remained. Consequently, policymakers contemplated applying the precautionary principle to the ozone treaty. The principle had been employed formerly in declarations on sea pollution and hazardous wastes.[179] It states "... [that] action must be taken to ensure that the loading capacity of the environment is not exhausted, and it also requires action if risks are not yet certain but only probable, or, even less, not excluded."[180] The Montreal Protocol, building on the pledge of the Vienna Convention, decided to embrace the precautionary principle. In doing so, it affirmed the position that environmental law may act in foresight when there is a shared perception of a problem in need of attention and when the information amongst states is shared and corroborated based on "relevant scientific knowledge, taking into account technical and economic considerations."[181] The difference between the

Vienna Convention and the Montreal Protocol illustrates this point well. The Vienna Convention for the Protection of the Ozone Layer, signed by twenty countries on March 22, 1985, did not accomplish much more than signatory states agreeing to continue collaborating on research:

> "[to] protect human health and environment from adverse effects resulting or likely to result from human activities which modify or are likely to modify the ozone layer.... [agree to] co-operate by means of systematic observations, research and information exchange in order to better understand and assess the effects of human activities on the ozone layer and the effects on human health...."[182]

The vague language of the Vienna Convention lacked specific regulations. The European Community and Japan were not convinced that restrictions were merited unless definitive data regarding the depletion of ozone could unequivocally be attributed to anthropogenic chemicals.[183] In contrast, the U.S. and the Toronto Group[184] advocated precautionary action, arguing that "the margin of error between complacency and catastrophe is too small for comfort."[185]

However, scientific evidence on ozone depletion "matured," as did the perception of threat. Information on the depletion of the ozone grew in terms of volume, accuracy, and believability. More states became convinced of the gravity of the issue when the scientists substantiated the existing data by proving that the ozone was being depleted even more than the models predicted.[186] Support grew, and only then did the framework of the Vienna Convention develop into the first step for regulatory measures.[187] Believability of the depletion increased exponentially in 1985 when a hole in the ozone was discovered over the antarctic. Estimated to be

the size of the continent, the "anomaly" was never predicted and could not be explained. Thus, "the discovery of the ozone hole, combined with the unexpected increases in CFC use, alarmed the public and added a sense of urgency to the international discussions."[188] At this point, states possessed more information than ever about the problem. Their perceptions grew immensely regarding the grave nature of the problem.

The Montreal Protocol on Substances That Deplete the Ozone Layer was signed in September of 1987. The preamble states: "Determined to protect the ozone layer by taking precautionary measures to control equitably global emissions of the substances that deplete it."[189] The signing of the Protocol was a unique occurrence of international cooperation because at the time, definitive data was not available to validate the hypothesis that CFCs deplete the stratospheric ozone.[190] Scientists and industry representatives agreed in 1987 that "there was not enough data to provide definitive answers about the cause of the decreases."[191] Moreover, the Montreal Protocol was signed during the years of the Reagan administration. The administration's environmental policies opposed the Protocol because regulation hindered U.S. economic interests. President Reagan's environmental policies abroad were largely focused around U.S. competitive advantage, which meant focusing on market mechanisms perhaps at the expense of the environment. The Protocol was signed and stringent regulatory measures were imposed on the global use of CFCs nonetheless, based on the ozone regime's belief "[that] even in the face of the scientific uncertainties... we nevertheless believe that the nature and extent of the

long-term risks require a prudent insurance policy in the form on international controls."[192]

The Montreal Protocol is frequently cited for the "cohesive" effort responsible for its success. Haas has labeled the "community of shared knowledge" an *epistemic community* to reflect this unity. However, to date, many critics of the Rowland-Molina hypothesis assert that ozone depletion is wrongly attributed to anthropogenic causes. These critics argue that CFCs are not the blame, *nature* is to blame. The "blaming nature" argument asserts that natural sources of chlorine in the stratosphere, such as seawater, volcanos, and biomass account for more ozone depletion than man made chemicals and therefore discount the theory that CFCs break down the ozone. However, the critics who use this argument use non-scientific data and employ propaganda more than substantiated research. Linwood Callis, of the National Aeronautics and Space Administration Langley Research Center, points out that this argument is false because chlorine from natural sources is soluble and so it is rained out of the lower atmosphere. CFCs are insoluble and inert and rise to the stratosphere to release their chlorine. Thus, while the critics' argument is *prima facie* false, it is also widely believed. The thousands who listen to Rush Limbaugh, for example, hear him say "Mount Pinatubo spewed forth more than a thousand times the amount of ozone-depleting chemicals... than all the fluorocarbons manufactured by wicked, diabolical, and insensitive corporations in history."[193] Amid competing perceptions such as this one based on blaming nature, *knowledge* is increasingly valuable. While Limbaugh, for example, may be able to convince his

listeners based on propaganda, fortunately, policymakers look to the scientific community.

Knowledge

Acting as surrogates for the state, policymakers are required to negotiate policy in many different realms. Concerns regarding the degradation and conservation of the environment pose new challenges to them because in effect they are being asked to make decisions in areas of inexpertise. In Keohane words, "the complexities of security in a nuclear age, and of economic viability in an era of interdependence and rapid technological change, have created demands by policymakers for expertise on a myriad of international political issues." Environmental problems implicate an entire spectrum of disciplines, ranging from physics to biology, meteorology, and atmospheric chemistry. Rosenau comments "... environmental issues are perhaps more fully pervaded by technical and complicated dimensions than any other type of issues on the global agenda." Moreover, many environmental problems are transnational. Issues ranging from acid rain, global warming, and ozone depletion must be addressed internationally.[194] Thus, information discovered in one state is not enough; in order for many governments to perceive the threat of environmental degradation, knowledge must be shared by many states. Accordingly, policymakers from governments around the world look not only to their own, but to an *international* scientific community of knowledgeable specialists which can effectively explain, translate, and interpret the overwhelmingly

technical and scientific information.

Information technology has changed the world as we know it. Industrialized states have access to unlimited information and the capacity to communicate it globally. Some scholars believe when information is readily available, states are more inclined to participate in regimes.[195] Stein explains, "new knowledge thus changes state preferences and provides the basis for international cooperation."[196] Similarly, Haas says the proliferation of knowledge derived from a community of shared knowledge may motivate states to form a regime of joint decision making, if the information derived from the community is perceived by policymakers to be believable, reliable, and accurate. Haas employs the term "epistemic community" to describe these specialists. Haas defines:

> [an epistemic community as]... a network of professionals with recognized expertise and competence in a particular domain and an authoritative claim to policy-relevant knowledge within that domain or issue-area." [The network shares]: (1) normative and principled beliefs, which provide a value-based rationale for the socialization of community members; (2) causal beliefs, which are derived from their analysis of practice leading or contributing to central set of problems in their domain and which then serve as a basis for elucidating the multiple linkages between possible policy actions and desired outcome; (3) notions of validity; (4) common policy enterprise.[197]

Haas believes that the Montreal Protocol was signed largely because the "epistemic community" influenced the state to forego its primary economic interests and join the regulatory regime.[198] He assumes that governments (via the scientific community) perceived the danger identified with a depleted ozone as severe and therefore forfeited the economic gains associated with exploiting the resource.[199]

Haas claims that government looked to the epistemic community to explain the ecological dangers associated with the depletion and contends the shared effort of the epistemic community successfully fulfilled this task by proving to be accurate, reliable, and competent, so much that their findings "alerted governments to the urgent need for collective action."[200] Furthermore, Haas claims that the Montreal Protocol's success (mainly with regard to terms and stringency) is largely attributable to the ecological epistemic community. He explains:

> In the absence of a group of professionals with the ability to interpret the technical and scientific evidence, there would have been little incentive for the U.S. or other countries to try to move beyond the weak 1985 Vienna Convention. Without U.S. leadership, traditional interest based negotiations among equals would have yielded at most an international protocol reflecting the lowest common denominator.[201]

This position holds that the information produced by the epistemic community was a powerful force in directing attention to the protection of the ozone. The increase in knowledge attracted policymaking attention, and eventually led to the formation of the ozone regime.

However, Haas' use of the *epistemic community* to explain the success of the Montreal Protocol is a narrow one because it fails to take into consideration other structural variants such as *perception* and *affordability*. *Perception* was influenced by the human link and scare of cancer. The *affordability* factor was largely swayed by U.S. and DuPont involvement, and the availability of substitutes. If other factors were irrelevant, environmental policy decisions would be based solely on the findings

of the epistemic community. If this were the case, the epistemic community would divide and compete for policymakers' attention. Consequently, the epistemic community with the most power, i.e. money, prestige, ability to persuade, exposure, would dictate policy. In short, the process for making policy would be analogous to a political campaign.

Though Haas' monistic explanation is narrow, it is nonetheless important because it focuses attention on the significance that *knowledge*, as a structural variant, has on the policymaking process. It is meaningful that scientists who composed the transnational regime communicated around the globe regularly, sharing and dispersing information. UNEP's coordinating committee on the Ozone Layer provided a vehicle for frequent correspondence between U.S. scientists and their counterparts around the world.[202] Ultimately, knowledge is directly pertinent to the policymaking process, but, other factors are equally significant.

Affordability - Industrialized Developed States and LDCs

In this research's introduction, *wealth* was distinguished from *affordability*. Wealth refers to a state's resources, possessions, and capabilities; any capital that can be turned into money contributes to a state's wealth. States' wealth, therefore, are vastly different. However, all states are similar in that they all are faced with making decisions regarding affordability. To *afford* something is to bear the cost without a serious detriment. Thus, to afford something is to make a choice between competing interests in a justifiable manner. Environmental issues are predominantly linked to other economic and political interests and therefore to afford environmental policy

often means to subordinate competing economic and political issues. CFCs may be replaceable and therefore the burden of using substitutes is small. Issues of a more complex nature, such as the reduction of fossil fuels, is more problematic. Fossil fuels are regarded as a major economic commodity because they are the most common source of energy, which obviously, most states expend. Most states have developed their economy, infrastructure, and lifestyle around the belief that convenient energy sources will continue to be abundant and exploitable. In this case, policymakers are faced with having to answer "whether [society] is willing to risk the added carbon dioxide in the atmosphere for the present benefits of burning fossil fuels"[203] Fortunately unburdened by a complex issue such as fossil fuel reduction, many states (developing and industrial) decided that they could afford to enact regulatory policy to ameliorate the ozone depletion problem. Even so, many complex issues remained and "...there were still issues of North/South equity that needed to be reconciled politically."[204]

LDCs goals begin with economic growth and political stability; efforts aimed at protecting the environment offer very little to the realization of these goals. First, LDCs argued that they should not be required to be party to an agreement that regulates CFC use considering the industrial states are mainly responsible for the mass production and consumption that depletes the ozone. Industrialized states consume 84% of all compounds of CFCs whereas LDCs consume 16%. Second, LDCs claimed that regulation would threaten their economic development in the areas of refrigeration, electronics, and automobile manufacturing. Development in

these industries require the use and expansion of CFC production. Lastly, LDCs asserted that technology to find replacements for CFCs is not readily available to them as it is to the industrial states. Industrialized countries do not struggle with the same issues as developing states, however, they must contend with the many competing political and economic interests prevalent in a democratic, market economy. Historically, environmental protection policy has not been a high priority for industrial states. Thus, while industrial states may have the *wealth* to enact regulatory policy, they may not be able or willing to bear the cost. Hence, the affordability factor affects industrial and developing states differently. Ultimately, any policy action to combat environmentally degrading acts will dislocate present economic standards because competitiveness will be affected for industrial states and development impaired for developing states.[205]

Because of these factors, many accommodations were made. Industrial states realized if accommodations were not made, non-participating LDCs would increase domestic production. This would have two negative effects. Most obviously, non-participating LDCs could capture the CFC production market and gain a competitive advantage economically. Second, their increased domestic production would negate the effort of the industrial states' compliance. The framers of the Protocol believed that fairness through accommodation was the most effective method for inducing LDC's submission. UNEP's executive director Mostafa Tolba, as an Egyptian, represented "the interest of the less developed countries as well as those of UNEP." Under Tolba's leadership, UNEP provided funds for about ten LDCs to send

delegates to the ozone negotiations in February 1987.[206] Argentina, Brazil, Egypt, Kenya, Mexico, and Venezuela articulated LDC's position to not "... retard their economic growth or face impeded access to air conditioning and refrigeration as they industrialized and their populations' demands grew."[207] Thus, "the treaty had to be designed in a manner that would satisfy LDC demands for exemptions yet prevent the LDCs from undermining the treaty's effects by attracting CFC producers to their countries."[208]

The Protocol aimed to persuade LDCs to join the ozone regime and refrain from ozone-depleting practices, while addressing concerns of equity, in two ways. First, the industrial states made ample accommodations for the LDCs. Second, the industrial states attached economic incentives and contingencies to compliance and defection respectively. These accommodations were mutually-beneficial for LDCs and industrialized states; "... for a number of developing countries, this meant that cooperating and bargaining for special consideration carried more benefit than staying outside the agreement. For the coalition of states committed to the Protocol's objectives, it was worth giving developing countries [accommodations]."[209]

Equitable Accommodation. One of the goals of the Montreal Protocol was to be fair to the LDCs and to respect their different needs and timelines for acceding to the regulations. The Vienna Convention, on discussing cooperation in research and development, takes "... into account in particular the needs of the developing

countries."[210] Moreover, Article Five of the Montreal Protocol allows for a 10 year grace period for the implementation of control measures, for special financing to assist the developing countries in Article 10, and for the transfer of technology to developing countries "under fair and most favourable conditions."[211] LDCs in Article V of the Protocol are legally distinguished from industrial states as "any Party that is a developing country and whose annual calculated level of consumption of the controlled substances is less that .3 kilograms per capita on the date of the entry into force of the Protocol...." Given this accommodationist provision, Mexico, Egypt, and Ghana, signed on.[212] Article V states were granted exemptions so that their economies could continue developing. They were also offered incentives to discourage the building of their own CFC production plants. The accommodationist content of the Protocol included an extra ten years to meet production and consumption limits, and access to information and advice on the technologies developing states were using for recycling and conserving CFCs. Further, LDCs were granted technical assistance on developing substitutes for CFCs. Moreover, in 1990 at the second Meeting of Parties, a balanced voting procedure amendment was adopted which requires a two-thirds majority of parties among industrial and less-developed states. Furthermore, accommodations were not only made to LDCs. The Protocol aimed to accommodate all signatory states, for example, instead of specifically regulating each CFC element, it regulated the total percentage of cuts. Consequently, Japan was able to concentrate its production on CFC-133 which is used for computer manufacturing.

Economic Incentives. Economic incentives provide a veritable consequence for LDCs if they do not comply. Trade bans are one way of circumventing the possibility of an environmental policy being undermined by non-participating LDCs. The Montreal Protocol needed to avoid the increased domestic production of CFCs in developing states as industrial states as net exports began regulating their own production. Therefore, the Montreal Protocol attached contingencies to non-compliance, stringent enough that non-participating states would decide cooperating is a better choice than defecting (and the short term incentive associated with that). In the language of game theory, LDCs needed to view the sub-optimal outcome of cooperation as a better outcome than defection (CC > DC). One author believes that trade bans were critical in the engineering of the Montreal Protocol to limit defection and exploitation of a regulating policy; "Production restriction on participating states without a corollary trade ban could simply displace production to the part of the world not participating in the regulation, rendering the policy completely ineffective in terms of the objective to reduce commodity production."[213]

A consumption tax is another method for inducing compliance. If the participating states as net exporters, attach a consumption tax on the non-participating state's production, demand in both participating and non-participating states will decrease. Therefore, price drops. As price continues to decline, the non-participating states can no longer afford to produce because they are net importers. In this way, the participating states have induced compliance with the policy.

Conclusion

Collectively, states have confronted the environmentally degrading activity of producing chemicals which deplete the stratospheric ozone layer. Characteristically unique, ozone depletion has generated a perception of threat in policymakers. These officials' cognition of the problem was keen, as their *perception* was substantiated by a wealth of scientific *knowledge*, corroborated by many scientific communities around the world. Based on their shared perception, states judged whether they could afford to address this environmental issue even though other economic interests and political concerns may be effected. The *affordability* factor for some states was easier to estimate than others. These states found it rational to bear the cost of addressing an the environmental issue because they believe their interests will be risked if they do not. Discussed in the language of "victim states"[214] or "ecological vulnerability"[215] it is obvious that "... countries are most likely to speak out when they believe that their vital interests are at risk...."[216] Sweden and Canada, for example, are aware that they will be effected by the acid rain.[217] For the ozone, Australia's representative commented on the high incidence of skin cancer in Australia as the reason his state is supporting regulatory policy.[218] Other states signed on because in doing so they were put in a better position economically than if they were not to. LDCs which received financial and technical assistance, and that would have faced sanctions associated with non-compliance, were rational to join the collective effort. The remainder of the states evaluated the reward of participation in terms of the threat to human health and to the environment that would occur

should they not participate.

Ultimately, the environment won in the case of ozone depletion policy. Many environmental issues are not as fortunate as ozone depletion. Global warming, for example, will have an extremely difficult time passing policymaking scrutiny because of the uncertainty associated with the problems. Committing time and resources to confront global warming, a problem that cannot be verified unequivocally provides a number of obstacles. Moreover, the active debate among scientists who believe in the gravity of the issue, and those who do not, discounts any sort of united front needed to convince policymakers to act. *If* the greenhouse effect is proportionately linked to anthropogenic sources (e.g. consumption of fossil fuels; production of CFCs), it seems rational (and evident) to implement regulatory restrictions in the form of production and consumption limits. For now, faced with uncertainty and conflicting data, states will err on the side of caution. The issue of ozone depletion has been successful and the "ozone regime" has gained policymaking attention because of a level of *perception*, *knowledge*, and *affordability* to its support. Chapter Five introduces this research's second case study: Nuclear Energy Accidents, and intimates that the structural variants manifest themselves differently in this issue than they did with regard to the ozone depletion case study. As will be made clear below, regulatory policies for nuclear accidents are enacted largely due to the *perception* of threat derived from their devastating nature. *Knowledge* as a contributing factor is minimized in light of the exaggerated perception. And finally, the *affordability* factor is largely owing to the fact that nuclear accidents can occur in any state; "victim

states" simply do not exist as no state is immune to the possibility of a nuclear disaster.

Chapter V: Nuclear Energy Accidents

<u>Introduction</u>

In Chapter Four the transboundary environmental issue of ozone depletion was examined in reference to the contributing factors *perception*, *knowledge*, and *affordability*. Faced with a common interest and a common goal, states chose to forego their dominant strategy of independent decision making to join a collective effort based on the belief that a preferred outcome could only be reached jointly. Ozone depletion, a long-term, continuous issue, required states to act in foresight and in a precautionary manner and therefore was the type of issue prime for a collective effort. This collective effort, or "regime," was efficacious in the development of an institutionalized arrangement used to structure state interaction. Ultimately, the analysis in Chapter Four showed that states chose to participate in the ozone regime because their cognition of the problem was acute and consequently policymakers perceived the threat involved with a depleted ozone. Policymakers' perception of the problem was largely influenced by the scientific community which generated a wealth of information on the environmental problem. The believability of the information was owing to the international scientific community which corroborated, substantiated, and presented the data to, policymakers. Moreover, the analysis on ozone depletion examined the affordability factor. It was said that both

industrial and developing states found that they could afford to enact regulatory policies to protect the ozone. For industrial states the decision was largely influenced by the fact that the U.S. spearheaded the effort and there were readily available substitutes. For developing states, many agreed to regulations because they were offered incentives which made submission a more rational choice than non-compliance. Further, developing states were aware that informal sanctions would follow their defiance. Lastly, developing states were offered accommodations such as a ten-year grace period and financial and technological assistance which greatly contributed to their decisions to join the structural arrangement of the regime.

Efforts taken to guard against, and prepare for, nuclear accidents are also of the variety which call for joint, rather than independent, decision making. Nuclear spills have the capacity to severely affect neighboring states and are therefore transboundary in nature. Collective efforts will invariably be more effective than unilateral ones. Further, policies that guard against, and prepare for, nuclear accidents require policymakers to act in foresight because once the damage occurs it will inexorably be wide-spread and long-lasting. Policymakers must also act in a precautionary manner because once a "crisis" develops, after-the-fact policies will be of little value to the dead, destroyed, and injured. Consequently, states find efficacy in joining together their decision making capacities to reach their common goal of guarding against, and preparing for, nuclear energy accidents. Beginning with the 1968 *Nuclear Non-Proliferation Treaty*[219] there have been several other agreements associated with the safe use of nuclear energy. There are regional agreements such

as *The Application of Safeguards Pursuant to the Tlatelolco Treaty, the Non-Proliferation Treaty and the US-IAEA Safeguards Agreement of November 18, 1977* signed September 27, 1983 between the United States and Venezuela[220] and *The Arrangement Between the United States and Switzerland on the Technical Information Exchange and Cooperation in Nuclear Safety Matters* signed July 20 and August 10, 1982. Most recently, *The International Convention on Nuclear Safety* was opened for signature on September 20, 1994 and already has 38 State Party signatures based on their collective goal to maintain a high level of nuclear safety around the world.

In 1986, the Chernobyl nuclear energy plant experienced an unprecedented disaster, to date, leading to over 125,000 fatalities. Clearly, the disaster at Chernobyl unearthed fear in the hearts of millions of individuals around the world; damage resulting from this ordeal will undoubtedly be felt for centuries as 1995 commemorates the ninth anniversary of the horrendous disastrous. As a response to the fear evoked by Chernobyl, two Conventions were signed. First, the *Convention on Early Notification of a Nuclear Accident* ("Notification Convention"), and second, the *Convention on Assistance in the Case of a Nuclear Accident* ("Assistance Convention"). The Conventions, designed under the auspices of the International Atomic Energy Agency ("IAEA"), are to ensure that nuclear facilities and materials are used only for peaceful purposes and not for military service. All five nuclear weapon states (China, France, the former Soviet Union, the United Kingdom, and the United States) have signed the Conventions and combined, 82 states are parties to these two conventions.

A "nuclear accident" is defined as involving facilities or activities of a State, persons, or legal entities under its jurisdiction, "from which a release of radioactive material occurs or is likely to occur and which has resulted or may result in an international transboundary release that could be of radiological safety significance for another State."[221] In the event of an accident, the Notification Convention provides the State Party to directly notify the IAEA of those states which may be physically affected as to the accident's nature, time, and exact location. The Convention further provides that State Parties are required to provide the IAEA "with such available information relevant to minimizing the radiological consequences in those States...." The Convention's purpose is therefore to provide information about a nuclear accident with the intent of minimizing the transboundary radiological consequences to the environment, health and economy. Closely related to the Notification Convention, the Assistance Convention provides for "prompt assistant in the event of a nuclear accident or radiological emergency to minimize it consequences and to protect life, property and the environment from the effects of radioactive releases."[222]

The IAEA was recognized in Article III of the *Nuclear Non-Proliferation Treaty* as the authority over safeguards for the peaceful use of nuclear activities by State Parties. Almost a decade later, the IAEA was the guiding force for the Notification and Assistance Conventions. Created in 1957 as an independent IGO within the United Nations system and located in Vienna, Austria, over 100 sovereign states participate in its program. Stated in its Statute, the IAEA's main purpose is:

"To accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world and to ensure so far as it is able that assistance provided by it or at its request or under its supervision or control, is not used in such a way as to further any military purpose.[223] With the objective of promoting peaceful use of nuclear energy, the IAEA works to establish on-site inspections and verification system, monitoring and control measures, and scientific operation programs. The Statute states the IAEA to:

> encourage and assist research on, and development and practical application of atomic energy; make provisions... for materials, services, equipment and facilities to meet the needs of research on, and development and practical application of atomic energy; foster and exchange of scientific and technical information; encourage and administer safeguards; and establish and adopt standards of safety for protection of health and minimization of danger to life and property.[224]

The Agency has many functions with regard to the Notification and Assistance Conventions. The Agency collects and disseminates information to State Parties. The Agency also assists State Parties with the preparing of emergency plans in the case of a nuclear accident, in the development of training programs, developing monitoring programs, and conducting investigations into the feasibility of establishing appropriate radiation monitoring systems. Moreover, the Agency makes available resources for the purpose of conducting an initial assessment of the accident or emergency.

Perception

Nuclear energy technology offers both the perception of "promise" and "peril." Two sides of the same coin, the dual nature of atomic energy yields a contradictory attitude in the public and policymakers alike. On the one hand, nuclear energy offers a viable source of energy used for peaceful purposes. As early as 1945, the majority of Americans (57 percent) agreed that "the splitting of the atom will prove the greatest invention in over a thousand years and will change many ways of living."[225] In December of 1949 a Gallup poll found only 20% of Americans were skeptical that in "fifty years from now trains and airplanes will be run by atomic power."[226] High hopes for nuclear energy persist. In a 1991 poll, nuclear energy was the overwhelming response to the question "what is our primary source of electricity 10 years from now?"[227] On the other hand, nuclear energy is associated with the mass destruction of the bomb and with plant accidents. The escalation of nuclear arms in the early 1980's and the Chernobyl disaster where a population of 17 million were exposed to radioactive fallout and 8 million acres of agricultural land were contaminated, elicited an inimitable public fear in societies as a whole around the world. The frightening memory of Chernobyl remains close to all individuals; April, 1995 commemorates the ninth anniversary of the horrendous disaster, tallying the death toll to 125,000. Clearly, the disaster at Chernobyl unearthed fear in the hearts of millions of individuals around the world. Thus, although clearly a sufficient and economic use of energy, there remains a "public anxiety."[228]

Ultimately, in terms of "perception of peril" no issue compares to nuclear

accidents. Environmental problems such as ozone depletion and acid rain may cause effects equally damaging to that of a severe nuclear accident, however, the perception of danger associated with a nuclear accident far exceeds these other issues. Not even the discovery of a hole in the ozone the size of the entire continent over the antarctic compares to a nuclear accident in terms of perceived danger. In Young's words, "... it is much harder to project an air of certifiable crisis surrounding the ozone depletion or the carbon dioxide problem than it is with regard to the nuclear-accident problem. These problems simply do not have the prominence or salience in the public imagination that problems associated with nuclear energy have."[229] Further, "[the] nuclear accident problem involves a clear and present danger that can be grasped without specialized training."[230] Especially, as Americans inculcated to the scare of nuclear weapons during the rise and zenith of the Cold War, nuclear energy remains a fearful subject.

On the whole, analysis of public opinion on nuclear energy leads to contradictory conclusions. Some polls conclude that society is disenchanted with nuclear energy,[231] based on their knowledge of incidents such as Three Mile Island and Chernobyl. Consequently, perception of peril has the capacity to paralyze policy which otherwise would have gained success had its "bad reputation" not imbued its meritorious qualities. Nuclear scientist Rothstein argues that the "blanket condemnation"[232] of nuclear energy has deleterious effects. He explains:

> We cannot afford to be blinded by ideologies, no matter how seductive, if we are unable thereby to benefit from actions not harmful when done properly. We must base our decisions on good science, do

more research if current knowledge is insufficient, and reverse course if new dependable knowledge discloses bad effects of an accepted *modus operandi*. When we press the limits of what the planet can provide we cannot afford the luxuries of stupidity of self-inflicted blindness.[233]

Proponents of nuclear energy, as well as advocates for its disuse, carry the burden of convincing policymakers of their respective views. Nuclear technology, as both promising and perilous, has the capacity to proliferate or diminish based on policymakers' perceptions.

Knowledge

Perceptions are formed based on the information one has about a certain issue. The perception of nuclear energy as promising is based on data available and believed by certain individuals; the perception of nuclear energy as perilous, in contrast, is derived from different sources of knowledge. As perceptions are based on incomplete information, they are often misperceptions. For the proponents of nuclear energy, knowledge, as a structural variant, can be significant to alleviate the public fear of nuclear energy. If knowledge is substantial, believable, and convincing enough, to form the perception of promise, rather than peril, it becomes a very valuable factor.

Three reasons why nuclear energy is feared are because it is believed to be environmentally incompatible, costly, and unsafe.[234] Thus, the task for supporters of nuclear energy is to address the issues of environmental incompatibility, costliness, and safety, in such a way that yields conclusions which bode well for the future of

nuclear energy. Proponents argue, nuclear energy can be a viable, effective, and environmentally safe source of energy. Nuclear energy generates no greenhouse gases, emits no harmful substances which cause cancer, or attack eyes, lungs or other organs. Further, atomic energy harms neither flora nor fauna, nor does it produce acid rain. Except for the possibility of a spill, nuclear energy is safe. Thus, while it is impossible to deliver a certifiable guarantee of safety, nuclear energy is a *comparatively* safe choice. The nuclear energy industry argues that "[n]uclear power can... make better arguments about environmental compatibility and a true containment of direct costs compared with alternatives - than it appears to have been made in the eyes of public opinion."[235] The comparable safety of nuclear energy "needs to be made believable to the public in a transparent form - whether causal or detailed - and openly embedded in both the philosophy and implementation of future nuclear plant construction and operation."[236]

Knowledge, as a structural variant, is also significant in identifying the degree of salience an environmental issue has to each state. For example, the acid rain problem is very different than the issue of a nuclear disaster. Scandinavian states are quite aware that they are victims of sulphur dioxide coming from the British Isles and East Canada, and New England knows that the midwestern rain will effect them. States that *know* they are victims will negotiate policy very differently than states that are unable to estimate the effects of the environmental problem. As Litfin explains:

> Environmental destruction is particularly apt to galvanize national concern when the resources at stake have important cultural or symbolic value, like the Muskoka Lakes-Haliburton Highlands Region

of Ontario, Canada and the Black Forest of Germany, both of which were casualties of acid rain. Obviously, countries are most likely to speak out when they believe that their vital interests are at risk, lending support to interest-based explanations of regime formation.[237]

The regime created under the auspices of the IAEA, which provides for early warning signals, emergency processes for accidents, and voluntary checks of safety standards, resembles an "insurance policy"[238] because participants do not possess *a priori* knowledge of how they will be damaged by a nuclear spill. Behind the veil of ignorance in the original position,[239] regime members only know a severe disaster would be widespread, long-lasting, and possibly transboundary. As such, states cannot always negotiate policy for accidents based on self-interest. Chernobyl type accidents are not exclusive to Post-Soviet or less-developed states; accidents can happen anywhere. Three Mile Island reminds us that horrendous accidents resulting from mismanagement can occur in even the most industrialized states.

The knowledge policymakers' possess, influences their perception of nuclear energy as either promising or perilous, and identifies the salience of the issue, a state estimates. The current analysis renders the conclusion that the perceived seriousness of nuclear accidents has not been enough to stop states from using nuclear energy. The perception of "promise" has led to the proliferation of a number of states working to produce nuclear programs. For example, currently Japan, China, South Korea and Taiwan are developing nuclear energy plants to boost their economic and political status. Japan is looking to become an exporter of nuclear technology while

South Korea is adding seven more plants to its program. With ambitions such as these, how do states afford regulatory policy?

Affordability

Perceived for its promise, many states of the world have now harnessed nuclear energy and believe it to be a viable energy source. Currently, many Asian, East-European, and Post-Soviet states are looking to develop nuclear energy programs to enhance their economic position.[240] Japan is currently building six nuclear facilities and has aspirations of exporting nuclear technology. Thus, despite its history of "atomic victimization,"[241] Japan is expanding its military and developing plutonium-breeder power generation. In China, the government is appealing to foreign companies for money to develop a nuclear energy plant. Chinese Prime Minister Li Peng has aspirations of developing this plant in Daya Bay. However, residents around this area are weary of the plant as small accidents have already occurred during its construction.[242] South Korea already has seven nuclear plants and is constructing seven more. Indonesia and Pakistan have plans to develop facilities as well. In Mochove, the French are building a nuclear energy plant 100 kilometers northwest of Bratislave despite claims from environmentalists who claim the plant is unsafe.

Iran too, wants to develop nuclear energy plants. With a worried Israel, the United States and Russia have negotiated a deal whereby Russia has agreed not to give Iran a gas centrifuge. Even so, Russia is building two nuclear reactors in Iran.

Israel claims that Iran does not need this source of energy since it has abundant oil resources and oil fired power stations which produce cheap energy. Moreover, China and the United States are embroiled in controversy over China's plan to sell two nuclear reactors to Iran. However, China traditionally has looked to the West to provide components and services it could not supply. The U.S., obviously, will have nothing to do with Iran's nuclear plans. Secretary of State Warren Christopher said: "Our position is one that Iran... is simply too dangerous with its intentions and its motives and its designs to justify nuclear cooperation of any allegedly peaceful character."

Most notably, on the nuclear energy front, is the situation in North Korea.[243] Party to the *Nuclear Non-Proliferation Treaty*, North Korea is obliged to submit to the standards set by the IAEA. However, North Korea has withdrawn its membership from the IAEA as of June 13, 1994. In October of 1994, the U.S. and North Korea made a landmark deal to keep Pyongyang from making nuclear weapons. In this landmark accord, the U.S. agreed to finance 4.5 billion to North Korea for the development of nuclear technology and interim energy supplies if North Korea agreed to cease operations at Pyongyang, a nuclear plant that produces plutonium. As part of the agreement, U.S. has already sent to North Korea 50,000 tons of oil. However, some of the oil was diverted and not used as an energy source. As diverting the oil violates the agreement, the U.S. has insisted that monitoring be put in place before any further shipments are made.

Obviously, many states aspire to generate nuclear energy to boost their

economic position. The *perception* of peril, however, compels most of them to submit to standards of regulation (North Korea being the major exception). The *affordability* factor is very interesting applied to the issue of nuclear energy. It evidences, more than anything, the *realist* nature of the state system. On the one hand, many states are willing to conform to standards set by the IAEA. In doing so, states submit to inspections and information provisions of the Notification and Assistance Conventions. On the other hand, however, the IAEA is powerless in situations of non-compliance. North Korea provides a perfect example of a sovereign state exercising its primacy over its own affairs. Ultimately, the IAEA can do little to decrease nuclear arms proliferation. North Korea's decision to withdraw its membership from the IAEA will not destroy the IAEA in this case because many other states do submit to the standards. And although the IAEA does not have the authority to punish North Korea for its defiance, other states which believe in the IAEA's function will, through sanctions and other methods, have the capacity to hurt North Korea's relative position.

Conclusion

With combined efforts, many states have submitted to regulatory policies to guard against, and prepare for, the potentially devastating outcome of nuclear energy accidents. The perception of nuclear energy is twofold. On one hand, nuclear technology presents itself as a viable source of energy, full of promise, and

environmentally safe compared to other sources. On the other hand, nuclear energy is associated with perilous notions of the bomb and nuclear spills. Perceptions of promise and peril coexist, and one has not been effective in eradicating the other. However, based on the perception of threat, most states' policymakers have submitted to regulatory policy to guard against, and prepare for, nuclear accidents. Based on the perception of peril, most states have agreed that it is in their best interest to submit to safeguards. The issue of safeguards for nuclear energy programs has been successful and the "nuclear energy regime" has gained policymaking attention because of an extremely high level of perception, knowledge, and a low level of competing issues to its support.

Chapter VI: Concluding Analysis

This research was conducted to deepen the understanding of state cooperation on regulatory policies for transboundary environmental issues. It examined two environmental policies. The first issue involved regulatory policies to limit the global production of CFCs in order to decelerate the rate of ozone depletion. The second issue examined policies to guard against, and prepare for, nuclear accidents. Using a case studies method, this research employed three contributing factors, *perception*, *knowledge*, and *affordability* to examine the two environmental issues. Based on these structural variants, the research postulated the correlative hypothesis that regulatory policies for transboundary environmental issues are more likely to be enacted and effective when (1) policymakers' level of perceived seriousness of the issue is keen, (2) policymakers possess a high level of believable and substantiated information on the environmental issue, and (3) the state can afford to enact regulatory policies. The affordability factor measured the states' ability to bear the cost associated with enacting the regulatory policy. Thus, the affordability factor alluded to the state's justifiable decision to choose an environmental issue over other economic and political concerns.

Succinctly, the research questions employed in this research method were: Did policymakers perceive a high level of threat? Was there a high degree of substantiated information? Were there elements influential in states' decision to bear the cost of enacting regulatory policy? If so, were the elements positive, as in

the form of financial and technical assistance, or negative, as in the form of sanctions?

THE RESEARCH FOUND that the issue of enacting regulatory policy to decelerate anthropogenically caused ozone depletion was successful because policymakers perceived the issue to be serious. The issue of ozone depletion produced a perception of threat based largely on the scientific information which substantiated it. Without the corroborated scientific information, the issue would not have gained the policymaking attention it did. The issue of ozone depletion, minus the wealth of validated scientific data, would resemble the issue of global warming. The contributing factor of *knowledge* was therefore extremely important in this issue. Thus, knowledge as a structural variant was largely responsible for forming the perception of threat.

The issue of nuclear energy accidents is different. Nuclear energy's perception of *peril* is powerful in and of itself. Therefore, knowledge, while important (especially to the proponents of nuclear energy arguing for its safe use), was not as significant as it was for the ozone issue because the perception of threat already existed at a level which demanded regulatory measures.

Affordability, for both issues, was extremely important. For the ozone issue, the fact that substitutes were readily available was a major factor in the enactment of regulatory policy. Further, the fact that industrial states offered concessions and accommodations to LDCs, such as financial and technical assistance, made the policy affordable for LDCs. For the nuclear energy issue, the decision to submit to

safeguards did not *cost* the participants a significant amount because the policy is
mostly administrative and does not require the giving up of certain practices. Table
III serves as a visual aid to illustrate the weight given to the three contributing
factors, *perception*, *knowledge*, and *affordability* in the analysis of the two case studies.

Table III
Analytic Conclusions based on Comparability of Two Issues
Comparison of Structural Variants

///////////////////////// //////////	Ozone Depletion	Nuclear Energy Disaster
Perception	- "Radical Environmentalist" advocate a complete freeze on all ozone-depleting substances. - "Conservative" groups claim that CFCs are not the source of ozone depletion and the international scientific community which makes this claim is part of a conspiratorial plot designed to perpetuate their needless funding. - Somewhere "in the middle" is the majority of society (as well as policymakers) who believe ozone depletion poses a threat to human health and the environment.	- Perception of peril is unmatched by any other environmental problem as it presents a certifiable and imminent crisis. Memories of Chernobyl invoke a public fear in the hearts of all persons. - Perception of promise overwhelms the fear as many states aspire to develop nuclear energy programs to boost their economic and political position.
Knowledge	- Requires a high level of scientific understanding. The issue of ozone depletion depends largely on scientific data to "validate" its existence. As ozone depletion is not visible it can easily be ignored. Further, ozone depletion does not produce a "crisis" and therefore the perception of threat does not prompt policymaking attention; therefore, knowledge must be convincing enough to draw policymaking attention.	- Verifiable scientific data on nuclear disasters may not be *necessary* to persuade policymakers to enact regulatory policy because the *perception* of threat is sufficient to this end. The issue can be grasped without any special/scientific training.
Affordability	- Industrial states found they could bear the cost perhaps because (1) the U.S. spearheaded effort; and (2) DuPont, the leading manufacturer of CFCs set an example for the rest of the industry by switching to substitutes; and (3) substitutes were readily available. -LDC's affordability factor was influenced by the equitable accommodations such as (1) a ten year grace period; (2) technical and financial assistance; (3) incentives for compliance, sanctions for defiance.	- Participating states decided they could afford the cost of submitting to IAEA regulations based on the belief that nuclear accidents can occur anywhere and therefore the preparation and prevention standards of the Conventions were found to be rational.

<u>Final Comments</u>

As the year 2000 fast approaches, governments worldwide find their respective agendas replete with issues new and old. New in that Cold-War matters have fallen into desuetude; new in that the post World-War II configuration of the international system has shifted; new in that issues of the environment, human rights, and global concerns have outshadowed issues of isolationism, communist expansionism, and arms races. Old issues, though, are not far from the fore. As states are sovereign, self interest and necessity dictate policy. The low politics of environmental and social concerns are easily eclipsed by the high politics of military might when world politics heat up. Ultimately, states manage their low politics by seeking order up until the point it is necessary for them to seek power.[244] While issues of security will always predominate, there is much to be said for the possibilities of the reconfigured Post Cold-War state system, such as the hope for cooperative efforts which could have never occurred in a bi-polar system. Perhaps today, issues are not perceived solely in zero-sum terms. This change in perception may allow for states to eschew their dominant strategy of independent decision making, in certain situations, to opt to participate in a joint effort, based on the belief that a collective venture will yield a preferred gain. Arguably, during the time of the Cold-War, states would not eschew their independent strategy, based purely on principle, regardless whether or not a more preferred gain could be obtained collectively. During the time of the Cold-War, a contest of ideologies left little to no room for

compromise and cooperation; every action was viewed strictly as a win or a loss. The United States and Soviet Union's respective belief systems feared that ideas had consequences, and to yield even in the slightest, was to give the adversary more leverage and opportunity to impose its views. Thus, a regime, as an institutionalized arrangement used to structure state interaction would not likely be efficacious nor possible during the ultra-suspicious times of the Cold-War. Suffice it to say that environmental issues may be more likely to attract regulatory policies from states and governments today, in a state system amenable to order. During this time of order, states have confronted many environmental problems. *Reactive* policies are slowly becoming *proactive* policies as many states are taking precautionary practices and acting in foresight to protect the environment.

Future Research

A future project may be to expand on the research method used in this study, emphasizing the structural variants *perception*, *knowledge*, and *affordability*. By increasing the number of case studies to at least twenty, the analyst would be able to conduct a quantitative analysis to determine if certain states stand out as more "environmentally conscious" than others. If certain states actively support transboundary environmental regulatory policies more than others, it would be interesting to ascertain whether or not these states have ongoing relationships with their neighboring states. In the language of this research it would be interesting to note whether these states exhibit a high level of diffuse reciprocity and regime

participation. This research has dealt with the successful formation of two such regimes. Because these regimes are only recently formed, it is too early to judge their success at implementation. Future research will better be able to judge if these regimes are truly effective in overcoming the two serious environmental issues discussed herein. For now, we can only hope that they will be.

NOTES

1. Jim MacNeill, "The Greening of International Relations," *International Journal*, Vol. 14 (Winter 1989-1990).

2. A correlative hypothesis is an educated guess that there is a relationship between two or more concepts. Janet Buttolph Johnson and Richard Joslyn, *Political Science Research Methods*, Third Edition (Washington, D.C.: Congressional Quarterly Inc, 1995), p. 55.

3. Montreal Protocol on Substances that Deplete the Ozone Layer (done 22 March 1987), reproduced from text provided to *International Legal Materials* from the United Nations, Vol. 26(6), (1987), p. 1541; Amended and Adjusted at London 1990, text in Carter and Trimble (eds.), *International Law: Selected Documents* (Boston: Little, Brown, 1991), p. 731.

4. Conventions on Nuclear Accidents: Convention on Early Notification of a Nuclear Accident and Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (done 26 September 1986), reproduced from text provided to *International Legal Materials* by the International Atomic Energy Agency Vol. 26(6), (1986), pp. 1370 and 1377.

5. Article 10A, Montreal Protocol on Substances That Deplete the Ozone Layer.

6. Oran R. Young, *International Cooperation: Building Regimes for Natural Resources and the Environment* (Ithaca: Cornell University Press, 1989), p. 149.

7. John Rawls, *The Theory of Justice* (Cambridge: Harvard University Press, 1971).

8. Young, *International Cooperation: Building Regimes for Natural Resources and the Environment*, p. 147.

9. John McCormick, "International Nongovernmental Organizations: Prospects for a Global Environmental Movement," in Sheldon Kamieniecki, ed., *Environmental Politics in the International Arena* (Albany: State University of New York Press. 1993), p. 131.

10. Ibid., p. 131.

11. The efforts to reduce greenhouse emissions is only one example. The United States hesitation to act on an acid rain agreement with Canada, or participate

in the European 30% Club for reducing sulfur dioxide emissions, are other examples. See James L. Regens and Robert W. Rycroft, *The Acid Rain Controversy* (Pittsburgh: University of Pittsburgh Press, 1988).

12. Examples include the United States leadership in the Stockholm United Nations Conference on the Human Environment, as well as its efforts in the enactment of the 1987 Montreal Protocol on Substances That Deplete the Ozone Layer.

13. Karl W. Deutsch, *The Analysis of International Relations* (Englewood Cliffs: Prentice Hall, Inc., 1968), p. 116.

14. Robert O. Keohane, *After Hegemony: Cooperation and Discord in the World Political Economy*, (Princeton: Princeton University Press, 1984).

15. Deutsch, *The Analysis of International Relations*, p. 51.

16. Lettie Wenner, "Transboundary Problems in International Law, Environmental Policies in the International Arena," in Sheldon Kamieniecki ed., *Environmental Politics in the International Arena* (Albany: State University of New York Press, 1993), p. 165.

17. Karen Litfin, "Ecoregimes: Playing Tug of War with the Nation-State," in Ronnie D. Lipschutz and Ken Conca eds., *The State and Social Power in Global Environmental Politics* (New York: Columbia University Press, 1993), p. 98.

18. Deutsch, *The Analysis of International Relations*, p. 115

19. Likewise, in the late 1960's, regimes for marine pollution were re-thought following the Torrey Canyon oil spill off the British coast and one near Santa Barbara, California, even though oil spills only account for 5% of oil dumping in the ocean. The attention thus, of a crisis, catalyzes support.

20. J. Rothstein, "Nuclear Energy, Environmental Problems and the Hydrogen Energy Economy," *International Journal of Hydrogen Energy*, Vol. 20, No. 4. (April 1995), p. 277.

21. Karen Litfin, "Ecoregimes: Playing Tug of War with the Nation-State," p. 97.

22. Tragedy of the Commons is a term defined by Oxford biologist, Garrett Hardin. Garrett Hardin, "The Tragedy of the Commons," *Science*, Vol. 162, pp. 1243-1248. Reprinted in *Population, Evolution and Birth Control*, W.H. Freeman & Company, San Francisco.

23. Andrew Hurrell and Benedict Kingsbury, "The International Politics of the Environment: An Introduction," in Andrew Hurrell and Benedict Kingsbury, eds., *The International Politics of the Environment: Actors, Interests, and Institutions* (Oxford: Clarendon Press, 1992), p. 6.

24. Principle 21 of the Stockholm Declaration of the 1972 United Nations Conference of the Human Environment.

25. Some argue that the Montreal Protocol is one such issue. Kerry Krutilla, "Unilateral Environmental Policy in the Global Commons," *Policy Studies Journal*, Vol. 19, 2 (Spring 1991).

26. Richard Falk, *This Endangered Planet: Prospects and Proposals for Human Survival* (New York: Vintage Books, 1971), pp. 37-8.

27. Hurrell and Kingbury, *The International Politics of the Environment*, p. 4.

28. Keohane, *After Hegemony*, p. 49.

29. Stephen A. Koes, "Explaining the Strategic Behavior of States: International Law as System Structure," *International Studies* Vol. 38 (1991), p. 536.

30. Thomas Hobbes, *Leviathan*, ed. Richard Tuck (Cambridge: Cambridge University Press, 1991).

31. For example, see E.H. Carr, *The Twenty Year Crisis, 1919-1939: An Introduction to the Study of International Relations* (London and New York: Harper Torchbooks, 1964); Hans J. Morganthau, *Politics Among Nations: The Struggle for Power and Peace*, 5th ed., (New York: Knopf, 1974); Kenneth Waltz, *Man, the State, and War: A Theoretical Analysis* (New York: Columbia University Press, 1959); Kenneth W. Thompson, *Masters of International Thought: Major Twentieth-Century Theorists and the World Crisis* (Baton Rouge: Louisiana State University Press, 1980), James E. Dougherty and Robert L. Pfaltzgraff, Jr., *Contending Theories of International Relations: A Comprehensive Survey*, 2nd ed. (New York: Harper and Row, 1981), chap. 3; Michael Joseph Smith, *Realist Thought from Weber to Kissinger* (Baton Rouge: Louisiana State University Press, 1986); Robert O. Keohane, *Neorealism and its Critics* (New York: Columbia University Press, 1986).

32. Kenneth N. Waltz, "The Origins of War in Neorealist Theory," *The Journal of Interdisciplinary History*, Vol. 18 (1988), p. 616.

33. Robert Axelrod, *Evolution of Cooperation* (New York: Basic Books, 1984), p. 4.

34. Kenneth N. Waltz, *Theory of International Politics* (New York: Random House, 1979), p. 64.

35. Waltz, *The Origins of War in Neorealist Theory*, p. 95.

36. Barry Buzan, Charles Jones, and Richard Little, *The Logic of Anarchy: Neorealism to Structural Realism* (New York: Columbia University Press, 1993), p. 9.

37. Arthur A. Stein's, *Why Nations Cooperate: Circumstance and Choice in International Relations*, (Ithaca: Cornell University Press, 1990), p. 5.

38. Ibid., p. 9.

39. Ibid., p. 9.

40. Ibid., fn. 17, p. 180.

41. Keohane, *After Hegemony*, p. 26.

42. Keohane, *Neorealism and its Critics*, p. 193.

43. Ibid., p. 17.

44. Ibid., p. 165.

45. Waltz, *The Theory of International Relations*, p. 111.

46. Keohane, *After Hegemony*, p. 9.

47. Keohane uses the term "bounded rationality" because pure rationality is an ideal. In reality, there are constraints on the capacity of actors to act rational by virtue of governments being large and complex organizations run by human beings. Keohane, *After Hegemony*, p. 110-116.

48. Keohane, *After Hegemony*, p. 14.

49. Ibid., p. 26.

50. Karen Litfin, on James Rosenau's *"bifurcation of world politics"*, "Ecoregimes: Playing Tug of War with the Nation-State," p. 95.

51. Ibid., p. 95.

52. Deutsch, *The Analysis of International Relations*, p. 166

53.   In this research, the notion that states possess perceptions should not be understood to mean that states possess sentient qualities. The notion of "perception" is reified in this sense to make the point that officials of the state, as individuals who make nations' policy, are representatives for the entire nation which collectively constitutes the qualities of a statehood. States' perceptions, thus are derived *via* its policymakers' perceptions.

54.   Stein, *Why Nations Cooperate*, p. 174.

55.   Keohane, *After Hegemony*, p. 51-52; Kenneth A. Oye's, ed. *Cooperation Under Anarchy*; Robert Putnam and Nicholas Bayne, *Hanging Together*, 2d ed. (Cambridge: Harvard University Press, 1987), as well as Joseph Grieco and Peter Haas, all use this definition, which comes from Charles Lindblom, *The Intelligence of Democracy* (New York: Free Press, 1965).

56.   Keohane, *After Hegemony*, p. 52.

57.   Lindblom, *The Intelligence of Democracy*, p. 227.

58.   Milner, "International Theories of Cooperation Among Nations," *World Politics* Vol. 44 (April 1992), p. 468.

59.   Ibid., 468.

60.   Hans J. Mongenthau and Kenneth Thompson, *Politics Among Nations*, 6th ed. (New York: Knopf, 1985), p. 4-17.

61.   Stein, *Why Nations Cooperate*, p. 6.

62.   Ibid., p. 26.

63.   Axelrod, *Evolution of Cooperation*.

64.   Stein, *Why Nations Cooperate*, p. 189.

65.   Stein, *Why Nations Cooperate*, p. 172.

66.   Robert O. Keohane and Joseph S. Nye, *Power and Interdependence: World Politics in Transition* (Boston: Little, Brown, 1977); Robert O. Keohane, *After Hegemony*, p. 6, Karl W. Deutsch, *The Analysis of International Relations*, p. 158; John McCormick, "International Nongovernmental Organizations: Prospects for a Global Environmental Movement," p. 131; Arthur Stein, *Why Nations Cooperate*, p. 28; Karen Litfin, "Ecoregimes: Playing Tug of War with the Nation-State," *The State and Social Power in Global Environmental Politics*, p. 95; James N. Rosenau, "Environmental Challenges in a Turbulent World,"

The State and Social Power in Global Environmental Politics, p. 72.

67.   Deutsch, *The Analysis of International Relations*, p. 158.

68.   Keohane, *After Hegemony*, p. 6.

69.   Robert Gilpen, *The Political Economy of International Relations* (Princeton: Princeton University Press, 1975), p. 43

70.   Deutsch, *The Analysis of International Relations*, p. 2.

71.   Keohane, *After Hegemony*, p. 122.

72.   Ibid., p. 122.

73.   Ibid., p. 123.

74.   Keohane and Nye, *Power and Interdependence: World Politics in Transition*; Keohane, *After Hegemony*, p. 9.

75.   Deutsch, *The Analysis of International Relations*, p. 166.

76.   Stein, *Why Nations Cooperate*, p. 28-29.

77.   Ibid., p. 65.

78.   Litfin, "Ecoregimes: Playing Tug of War with the Nation State," p. 97.

79.   Stein, *Why Nations Cooperate*, p. 25.

80.   Ibid., p. 25.

81.   Ibid., p. 26.

82.   Milner, "International Theories of Cooperation Among Nations," p. 467.

83.   Ibid., p. 467.

84.   Brams explains that states act rationally to achieve their postulated goal, "where the outcome depends not only on chance events and 'nature' but also on the actions of other players with sometimes cooperative and sometimes conflicting interests." Steven J. Brams, *Game Theory and Politics* (New York: The Free Press, 1975), p. XV.

85.   This distinction is referred to absolute and relative gains respectively. See Duncan Snidal, "Relative Gains and the Pattern of International Cooperation," *American Political Science Review* Vol. 85, No. 3 (Sept. 1991), p. 702.

86.   See John von Neumann and Oskar Morgenstern, *Theory of Games and Economic Behavior* (Princeton: Princeton University Press, 1944); Kenneth N. Waltz, *Man the State and War: A Theoretical Analysis* (Ithaca: Cornell University Press, 1954); Thomas C. Schelling, *The Strategy of Conflict* (Cambridge: Harvard University Press, 1960); Steven J. Brams, *Game Theory and Politics* (New York: Macmillan Publishing Co., Inc., 1975); Glenn H. Snyder, "'Prisoner's Dilemma' and 'Chicken' Models in International Politics," *International Studies Quarterly* 15 (March 1971); Robert Jervis, *Perception and Misperception in International Politics* (Princeton: Princeton University Press, 1976); Duncan Snidal, "The Game Theory of International Politics," *World Politics* 38 (October 1985); Peter C. Ordeshook, *Game Theory and Political Theory: An Introduction* (New York: Cambridge University Press, 1986).

87.   Bram, *Game Theory and Politics*, p. XV.

88.   Waltz, *Man the State and War: A Theoretical Analysis*, p. 204.

89.   Deutsch, *The Analysis of International Relations*, p. 148.

90.   Waltz, *Man the State and War: A Theoretical Analysis*, p. 201-205.

91.   Ibid., p. 201.

92.   Snidal, "The Game *Theory* of International Politics," p. 25.

93.   Deutsch, *The Analysis of International Relations*, p. 115.

94.   Ibid., p. 117.

95.   Used in world politics, the balance of power resulting from super powers threatening nuclear war resembles a game of chicken. The 1962 United States and Soviet Union head-on confrontation, known as the Cuban Missile Crisis, is exemplary in this regard.

96.   Robert O. Keohane, "Reciprocity in International Relations," *International Organization* Vol. 40, 1 (Winter 1986), p. 8.

97.   Kenneth A. Oye, "Explaining Cooperation Under Anarchy," in Kenneth A. Oye, ed., *Cooperation Under Anarchy* (Cambridge: Harvard University Press, 1987), p. 4.

98.   Stein, *Why Nations Cooperate*, p. 33.

99.   Keohane, *After Hegemony*, p. 12.

100.   Ibid., p. 12.

101.   Stein, *Why Nations Cooperate*, p. 157.

102.   Ibid., p. 57.

103.   Deutsch, *Nationalism and Its Alternatives* (New York: Knopf, 1969), pp. 103-4.

104.   Ibid, p. 38.

105.   Ibid, p. 37.

106.   Robert Jervis, "Cooperation under the Security Dilemma," *World Politics*, Vol. 30 (1978), p. 167.

107.   Axelrod, *Evolution of Cooperation*, p. 12.

108.   Ibid., p. 12.

109.   Ibid, p. 12.

110.   See Keohane, "Reciprocity in International Relations," p. 8; Keohane, *After Hegemony: Cooperation and Discord in the World Political Economy*, p. 128-131; Kenneth A. Oye, "Explaining Cooperation Under Anarchy," p. 14-16; Stein, *Why Nations Cooperate*, p. 69-71.

111.   Keohane, "Reciprocity in International Relations," p. 8.

112.   Game theory (specifically Axelrod's Tit-for-Tat) is used to illustrate reciprocity as a strategy. However, Axelrod's comprehensive theory of reciprocity is not delimited in this sense. He emphasizes perception and belief systems and therefore his theory should not be considered purely strategic.

113.   Keohane, "Reciprocity in International Relations," p. 4.

114.   Axelrod, *The Evolution of Cooperation*, p. 136; Oye, "Explaining Cooperation Under Anarchy," p. 15.

115.   Keohane, "Reciprocity in International Relations," p. 13.

116.   Axelrod, *The Evolution of Cooperation*, p. 469.

117.   For a discussion of focal points see Thomas Schelling, *Strategy of Conflict* (Cambridge: Harvard University Press, 1960).

118.   Stein, *Why Nations Cooperate*, p. 161.

119.   Ibid., p. 61.

120.   Arthur Stein, "When Misperception Matters," *World Politics*, Vol. 34 (July 1982), reprinted, expanded in Arthur Stein, *Why Nations Cooperate*, p. 54.

121.   Axelrod, *Evolution of Cooperation*, p. 136-139.

122.   Keohane, "Reciprocity in International Relations," p. 16.

123.   Ibid., p. 20.

124.   Ibid., p. 6.

125.   Ibid., p. 6.

126.   Ibid., p. 8.

127.   Ibid., p. 11.

128.   Ibid., p. 9.

129.   Oye, "Explaining Cooperation Under Anarchy," p. 19.

130.   Ibid., p. 19.

131.   Keohane, "Reciprocity in International Relations," p. 12.

132.   Oye, "Explaining Cooperation Under Anarchy," p. 21.

133.   Keohane, "Reciprocity in International Relations," p. 12.; Keohane, *After Hegemony*, Chap. 3.

134.   Stein, *Why Nations Cooperate*, p. 25.

135.   Ibid., p. 25.

136.   Ibid., p. 27.

137.   Walz, *Theory of International Politics*, p. 96.

138.   John Gerard Ruggie, "International Responses to Technology: Concepts and Trends," *International Organization*, Vol. 29, No. 3 (Summer), p. 570.

139.   Steven D. Krasner, ed., *International Regimes*, (Ithaca, N.Y.: Cornell University Press, 1983), p. 2

140.   Oran R. Young, "International Regimes: Toward a New Theory of Institutions," *World Politics* Vol. 39 (October 1986).

141.   Oran R. Young, *International Cooperation: Building Regimes for Natural Resources and the Environment*, (Ithaca, N.Y.: Cornell University Press, 1989).

142.   Keohane, "Reciprocity in International Relations,"; Keohane and Axelrod, "Achieving Cooperation Under Anarchy: Strategies and Institutions," *World Politics*, Vol. 38 (October 1985), p. 235; Young, *International Regimes: Toward a New Theory of Institutions*.

143.   Steven D. Krasner, ed., *International Regimes*, (Ithaca, N.Y.: Cornell University Press, 1983); Oran R. Young, "International Regimes: Toward a New Theory of Institutions," *World Politics* Vol. 39 (October 1986); Oran R. Young, *International Cooperation: Building Regimes for Natural Resources and the Environment*; Peter Haas, "Do Regimes Matter: Epistemic Communities and Mediterranean Pollution Control," *International Organization* Vol. 43, 3 (Summer 1989); Stephan Haggard and Beth A. Simmons, "Theories of International Regimes," *International Organization* Vol. 41 (Summer 1987); Arthur Stein, *Why Nations Cooperate*.

144.   Susan Strange, "Cave! Hic Dragones: A Critique of Regime Analysis," *International Organization*, Vol. 36, 2 (Spring 1982), p. 342-343.

145.   Stein, *Why Nations Cooperate*, p. 26.

146.   Ibid., p. 27.

147.   Ibid., p. 25.

148.   Stein, "Coordination and Collaboration," p. 304.

149.   Ibid., p. 301.

150.   Ibid., p. 301.

151.   Ibid., p. 304.

152.   Ibid., p. 304.

153. Stein, *Why Nations Cooperate*, p. 40.

154. Stein, "Coordination and Collaboration," p. 309.

155. Stein, "Coordination and Collaboration," p. 309.

156. Ibid., p. 313.

157. Oye, "Explaining Cooperation Under Anarchy," p. 4.

158. Stein, "Coordination and Collaboration," p. 324.

159. Stein, *Why Nations Cooperate*, Chapter 2 (pp. 25-54).

160. Preamble, Montreal Protocol on Substances that Deplete the Ozone Layer.

161. Peter M. Haas, "Banning Clorofluorocarbons: Epistemic Community Efforts to Protect Stratospheric Ozone," *International Organization* Vol. 46 (Winter 1992), p. 212.

162. For example, Fen Osler Hampson, in "Climate Change: Building International Coalitions of the Like-Minded," *International Journal*, Vol. XLV (Winter 1989-1990), advocates a comprehensive treaty for global warming and argues that the Montreal Protocol provides evidence that "regime formation [is possible] in the absence of perfect scientific information."

163. See Richard E. Benedick, "Ozone Diplomacy," *Issues in Science and Technology*, Vol. 6 (Fall 1989); Richard E. Benedick, *Ozone Diplomacy: New Directions for Safeguarding the Planet* (Cambridge, Mass., Harvard University Press, 1991).

164. See Richard Benedick, *Ozone Diplomacy: New Directions in Safeguarding the Planet*.

165. Litfin, "Ecoregimes: Playing Tug of War with the Nation-State," p. 99.

166. Stein, *Why Nations Cooperate*, p. 25.

167. Ibid., p. 25.

168. Ibid., p. 4.

169. Litfin, "Ecoregimes: Playing Tug of War with the Nation-State," p. 95.

170. Mario Molina and F. Sherwood Rowland hypothesized: what happens to the large volumes of chlorine that is released in the lower atmosphere? Mario J. Molina and Sherwood Rowland, "Stratospheric Sink for Chloroflourmethanes: Chlorine-Atom Catalyzed Destruction of the Ozone," *Nature*, Vol. 249, 810 (1974).

171. Ibid., p. 189.

172. Halons contain bromine atoms which are ozone depleting substances.

173. Albritton, "Stratospheric Ozone Depletion: Global Processes," p. 10

174. David Hurlbut, "Beyond the Montreal Protocol: Impact on Nonparty States and Lessons for Future Environmental Protection Regimes," *Colorado Journal of Environmental Law and Policy*, Vol. 4, 344, p. 346; Detlef Sprinz and Tapani Vaahtoranta, "The Interest-Based Explanation of International Environmental Policy," *International Organization*, Vol. 48, 1 (Winter 1994), p. 82.

175. *Environmental Policy and Law*, Vol. 16(5), (1986), p. 140.

176. "Greenhouse Effect" is an imprecise term because the trapped warmth in a greenhouse is from the glass roof that keeps the air in. Kellogg, "Carbon Dioxide and Climate Change," p. 40; *Life on a Warmer Earth: Possible Climatic Consequences of Man-Made Global Warming*, Executive Report 3, based on research by H. Flohn at the International Institute for Applied Systems Analysis (IIASA), 1981.

177. Peter M. Haas, "Banning Clorofluorcarbons: Epistemic Community Efforts to Protect Stratospheric Ozone," *International Organization*, Vol. 46 (Winter 1992), p. 189.

178. Ibid., p. 190.

179. See Convention on Migratory Species of Wild Animals (done 23 June 1979), stated in *International Legal Materials*, Vol. 19, 15, (1980), and Convention on the Conservation of European Wildlife and Natural Habitats (done 19 Sept. 1979), stated in U.K.T.S. No. 56 (1982), and cited in David Freestone, "The Precautionary Principle," in Robin Churchill and David Freestone, eds., *International Law and Global Climate Change*, (1991), p. 21.

180. Per L. Gundling, "The Status of International Law of the Principle of Precautionary Action," in David Freestone and Ton Ijlstra, eds., *North Sea: Perspectives on Regional Environmental Cooperation*, (1990), pp. 23-26.

181.   Montreal Protocol on Substances That Deplete the Ozone Layer.

182.   *Environmental Policy and Law*, Vol. 14 (2)(3), (1985).

183.   Hurlbut, "Beyond the Montreal Protocol," p. 348.

184.   "Toronto Group" consisted of Canada, Finland, Norway, and Sweden.

185.   Richard Benedick, cited in "Protecting the Ozone Layer," Department of State Public Information Series 21, January 1984, p. 1.

186.   Most of the predictions made on ozone depletion were done by utilizing theoretic models; little had actually been measured in the atmosphere. *Environmental Law and Policy*, Vol. 16(5), (1986), p. 140.

187.   Hurlbut, "Beyond the Montreal Protocol," p. 348.

188.   Haas, "Banning Clorofluorcarbons," p. 203; Peter H. Sand, "Protecting the Ozone Layer," *Environment*, Vol. 27 (June 1985), p. 20.

189.   Preamble, Montreal Protocol on Substances That Deplete the Ozone Layer.

190.   Haas, "Banning Clorofluorcarbons," p. 224; Karen Litfin, "Ecoregimes: Playing Tug of War with the Nation-State," *The State and Social Power in Global Environmental Politics*, Ronnie D. Lipschutz and Ken Conca (eds.), (New York: Columbia University Press, 1993), p. 99; Hurlbut, "Beyond the Montreal Protocol," p. 351.

191.   Statement of Mack McFarland, DuPont's principal science adviser for CFC-related issues, in "Ozone Science, Recent Findings," mimeograph, July 1988.

192.   Testimony of Richard Benedick, in U.S. Congress, "Ozone Layer Depletion;" Hearings, p. 97.

193.   Cited from Gary Taubes, "The Ozone Backlash," *Science*, Vol. 260(5114), (June 11, 1993), p. 1580.

194.   John McCormick, "International Nongovernmental Organizations: Prospects for a Global Environmental Movement," p. 131.

195.   Stein, *Why Nations Cooperate*, p. 49.

196.   Stein, "Coordination and Collaboration," p. 321.

197. Peter M. Haas, "Banning Chlorofluorocarbons: Epistemic Community Efforts to Protect Stratospheric Ozone," *International Organization*, Vol. 46, 1 (Winter 1992); Haas, "Introduction: Epistemic Communities and International Policy Coordination," *International Organization*, Vol. 46, 1 (Winter 1992).

198. Ibid., p. 189.

199. Ibid., p. 189.

200. Ibid., p. 189.

201. Ibid., p. 222.

202. Ibid., p. 193.

203. Flavin, "Slowing Global Warming," p. 55.

204. Hurlbut, "Beyond the Montreal Protocol," p. 352.

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206. Haas, "Banning Clorofluorcarbons," p. 195.

207. Ibid., p. 207.

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209. Kerry Krutilla, "Unilateral Environmental Policy in the Global Commons," p. 129.

210. Article Four, Vienna Convention for the Protection of the Ozone Layer (done 16 September 1987) stated in *International Legal Materials*, Vol. 26, (1987), p. 1516.

211. Article 10A, Montreal Protocol on Substances That Deplete the Ozone Layer.

212. Hurlbut, "Beyond the Montreal Protocol," p. 349.

213. Krutilla, "Unilateral Environmental Policy in the Global Commons," p. 129.

214. Litfin, "Ecoregimes," p. 99.

215. Sprinz and Vaahtoranta, "The Interest-Based Explanation of International Environmental Policy," p. 86-89.

216. Litfin, "Ecoregimes," p. 99.

217. See Wetstone, "History of Acid Rain Issue," and Amin Rosencraz, "The Acid Rain Controversy in Europe and North America: A Political Analysis," in John E. Carroll, ed., *International Environmental Diplomacy* (Cambridge: Cambridge University Press, 1988).

218. UNEP, Ad Hoc Working Group of Legal and Technical Experts for the Preparation of a Protocol on Chlorofluorocarbons to the Vienna Convention for the Protection of the Ozone Layer (Vienna Group), "Report of the Ad Hoc Working Group on the Work of Its Second Session," *United National Environmental Programme Working Group*, Vol. 167/2, 4 (March 1987), p. 7.

219. Nuclear Non-Proliferation Treaty, stated in *International Legal Materials*, Vol. 7, (1968), pp. 809-817.

220. The Application of Safeguards Pursuant to the Tlatelolco Treaty, the Non-Proliferation Treaty and the US-IAEA Safeguards Agreement of November 18, 1977 (done 27 September 1983), stated in *International Legal Materials*, Vol. 6, (1967), pp. 521.

221. Article I, Convention on Early Notification of a Nuclear Accident

222. Article I, Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency,

223. Statute, International Atomic Energy Agency, reproduced from text provided to *America On-line* from the International Atomic Energy Agency.

224. Statute, International Atomic Energy Agency, reproduced from text provided to *America On-line* from the International Atomic Energy Agency.

225. Poll done by University of Chicago's National Opinion Research Center (NORC), cited in Ann S. Bisconti, "The Two Faces of Nuclear Energy: U.S. Public Opinion From the Forties to the Nineties," *Vital Speeches of the Day*, Vol. LIX, No. 10 (March 1, 1993), p. 317.

226. December 1949 Gallup Poll cited in Ann S. Bisconti, "The Two Faces of Nuclear Energy: U.S. Public Opinion From the Forties to the Nineties," *Vital Speeches of the Day*, Vol. LIX, No. 10 (March 1, 1993), p. 317.

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228.   J. Rothstein, "Nuclear Energy, Environmental Problems and the Hydrogen Energy Economy," *International Journal of Hydrogen Energy*, Vol. 20, No. 4. (April 1995), p. 275.

229.   Oran R. Young, *International Cooperation: Building Regimes for Natural Resources and the Environment* (Ithaca: Cornell University Press, 1989), p. 151.

230.   Young, *International Cooperation: Building Regimes for Natural Resources and the Environment*, p. 147.

231.   Eugene A. Rosa and Riley E. Dunlap, "The Polls - Poll Trends: Nuclear Power: Three Decades of Public Opinion," *Public Opinion Quarterly*, Vol 58(2), (Summer 1994), p. 295.

232.   Rothstein, "Nuclear Energy, Environmental Problems and the Hydrogen Economy," p. 277.

233.   Ibid., p. 277.

234.   A.A. Harms, B.W. Augenstein, and N.S. Rabotnov, "Nuclear Energy: In Search of a Paradigm Shift," *Pergamon*, Vol. 22(5), (May 1995), p. 292.

235.   Ibid., p. 291.

236.   Ibid., p. 291.

237.   Karen Litfin, "Ecoregimes: Playing Tug of War with the Nation-State," p. 99.

238.   Young, *International Cooperation: Building Regimes for Natural Resources and the Environment*, p. 149.

239.   John Rawls, *The Theory of Justice*. The purpose of Rawls's original position is to construct a theory of justice most appropriate for regulating society and/or to determine what principles best accommodate a society of free and equal individuals. The veil of ignorance used in the original position means that the individuals have no knowledge of who they are, only, that they are rationally autonomous individuals who are purposive, and reasonable in their capacity to embrace a theory of justice founded on principles of equal respect. Ostensibly, as the parties in the original position are all similarly situated in society and are unaware of their social position in life the principles they affirm are ones anyone would adopt.

240.   Brian Johns, "Asian Economic Development Spurs Nuclear Growth," *Journal of Commerce and Commercial*, Vol. 400 (28247), (June 15, 1994), p. 58.

241. Samuel H. Day, Jr., "Two Hiroshimas," *The Progressive*, Vol. 59(8), (August 1994), p. 29.

242. P.T. Bangsberg, "China Seeks Overseas Nuclear Know-How," *Journal of Commerce and Commercial*, Vol. 400 (28271), (July 20, 1994), p. 48.

243. Official name of North Korea is the Democratic People's Republic of Korea, divided from South Korea in 1948.

244. Gary L. Scott and Craig L. Carr, "Are States Moral Agents?" *Social Theory and Practice*, Vol. 12, No. 1 (Spring 1986), p. 82.